



HARTNER

Precision Cutting Tools



CATÁLOGO
Edición 1601



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Nos reservamos el derecho de modificar el diseño como resultado de nuevos desarrollos o modificaciones estándar.

Se aplican nuestras condiciones generales de venta.

Las reclamaciones debidas a errores de impresiones, las especificaciones técnicas, no estan admitidas

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Descripción

Tipo	Aplicación	Ángulo de corte lateral	Ángulo de punta	Afilado de punta	
N	para materiales de normal mecanizado (p.ej. acero, GS, GG)	20°-30°	118°	Entrada cónica Punta estándar	Brocas en acero rápido
H	para materiales de viruta corta (p.ej. MS, bronzes, Elektron)	12°-16°	118°	Entrada cónica Punta estándar	
W	para mat. blandos y de viruta larga (p.ej. aleaciones de aluminio, cobre)	35°-40°	130°	Entrada cónica Punta estándar	
FN	para materiales de normal mecanizado para taladros muy profundos	35°	130°	Entrada cónica Punta estándar	
FN 500	para materiales de viruta larga (p.ej. aceros altamente aleados, aceros de cementación, de bonificación)	20°-30°	130°	Entrada cónica Punta estándar	
FU 500 FU 500 DZ	para aplicación universal (p.ej. aceros aleados y no aleados hasta 800 mm ²) DZ = mango cilíndrico	35°	118°	Afilado plano afilado especial	
FW	para mat. blandos y de viruta larga para taladros muy profundos	35°-40°	130°	Entrada cónica Punta estándar	
S	para materiales de difícil mecanizado (p.ej. aceros inoxidable y resistentes al calor)	35°	130°	Entrada cónica Punta estándar	
IS	para aceros inoxidable y resistentes al ácido y al calor	40°	130°	Entrada cónica Punta estándar	
V	para materiales de difícil mecanizado (p.ej. aceros de muelles)	20°-30°	130°	Entrada cónica Punta estándar	
TS 3 G	para un centrado preciso y un taladro apurado, incluido centrados obliquos o taladros interrumpidos	28°	150°	Afilado especial	
TS 80 U	para aplicación universal (p.ej. GG, GGG, aceros hasta 1000 N/mm ²)	20°-30°	140°	Entrada cónica Vaciado especial tipo U	
TS 100 U	para aceros hasta 1000 N/mm ² , para aplicación universal	25°-35°	140°	Afilado plano	
TS 150 GG	para fundición de viruta corta, aluminio y sus aleaciones con alto contenido de Si	0° (gerade genutet)	120°	Afilado plano Vaciado especial tipo GG	
TS 100 R	para fundición GGV y ADI, fundición gris, nodular, grafito	30°	–	Afilado radio	
TS 100 T	para taladros profundos en acero y fundición	30°	135°	Entrada cónica	
TS 100 INOX	para aceros inoxidable	30°	140°	Afilado plano	
TS 100 H	para aceros de alta dureza, aceros templados y aleaciones especiales	30°	140°	Entrada cónica	Rebarbadores
TS 100 EG	Desbarbadores de metal duro				
TS 100 VR	Rebarbadores 90°				
TLB E80	Brocas cañones monolabio, cabeza MD				Brocas cañones
TLB E100	Brocas cañones monolabio en metal duro				
TLB E800	Brocas cañones monolabio con plaquitas				
TLB Z80	Brocas cañones con dos labios, cabeza MD				

Código ISO

P	Acero, acero alta aleación
M	Acero inoxidable
K	Fundición gris, fund. perlítica y fund. maleable
N	Aluminio y otros metales no ferríticos
S	Aleaciones especiales, super-especiales y de Ti
H	Acero endurecido y fundición dura

En las páginas de programa encontrará para cada herramienta recomendaciones de aplicación por los grupos contiguos:

- muy adecuado
- adecuado con limitaciones

Pictogramas

Material de corte	HSS	HSS-E	M42	HSS-E-PM	VHM	HM						
	acero rápido				metal duro integral placa MD soldada							
Superficie												
	T	M	Y	Ni	B							
	TiN		MolyGlide	TiAlSiN	niquelado	bruñido						
Tipo	FN	FN500	FU500	FU500 DZ	FW	H	IS	N	V	W		
	P2000	S	TLB E 80	TLB E 100	TLB E 800	TLB Z 80	Explicación para nombres de tipo véase contraportada de la página plegable					
	TS80 U	TS100 H	TS100 INOX	TS100 R	TS100 T	TS100 U	TS150 GG	TS3 G	TS100 EG	TS100 VR		
Forma	R	A	B	C								
Profundidad	3xD	5xD	~3xD	~5xD	45,00	80,00			
							mm	mm				
Norma	DIN 333	DIN 338	DIN 339	DIN 340	DIN 343	DIN 344	DIN 345	DIN 1869	DIN 1897		
	DIN 8374	DIN 8375	DIN 8376	DIN 8377	DIN 8378	DIN 8379	DIN 6537K	DIN 6537L	DIN 6527	según DIN		
		según Hartner estándar										
Angulo de punta												
Ø-Tolerancia	m7	h5	h6	h7	h8	0/-0,004						
Dirección de corte												
	derecha	izquierda										
Forma del mango												
	según DIN 6535			cilíndrico			cono morse	cono SK				
Vaciado de punta												
	Con vaciado de punta											
Refrigeración interna												
	con RI sin RI											



Posibilidades al pedir

Por favor indique en su pedido siempre

el artículo no. con el diámetro nominal como por ejemplo:

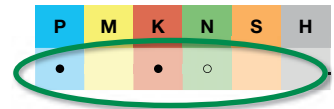
„Brocas espirales, cortas, para diámetro nominal 0,20 mm“

= **81010 0,200**

Artículo no.

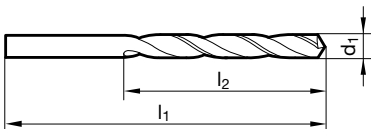
Brocas espirales cil., cortas

Artículo no. 81010



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
0,200	19,000	2,500	0,640	26,000	8,000
0,220	19,000	2,500	0,650	26,000	8,000
0,230	19,000	2,500	0,660	26,000	8,000
0,240	19,000	2,500	0,670	26,000	8,000
0,250	19,000	3,000	0,680	28,000	9,000
0,260	19,000	3,000	0,690	28,000	9,000
0,270	19,000	3,000	0,700	28,000	9,000

Diámetro nominal

En las páginas de programa encontrará para cada herramienta recomendaciones de aplicación por los grupos contiguos:

- muy adecuado
- adecuado con limitaciones



Consejos importantes

Condiciones de venta

Artículos disponibles sujetos a nuestras condiciones de ventas
Disponibles bajo demanda.

Para la fabricación de herramientas especiales, la cantidad suministrada puede variar sobre el 10% (mínimo 2 unidades) del pedido original. El pago es por la cantidad suministrada.

Condiciones de venta para pequeñas partidas

Para pedidos de poco valor, puede ser aplicado un cargo.

Grupo de herramientas	Norma	Unidades por paquete
Mango cilíndrico en HSS Broca helicoidales	DIN 338 DIN 1897 y procesos similares	≤ Ø 7.50 mm en paquetes de 10 unidades > Ø 7.50 ... Ø 10.60 mm en paquetes de 5 unidades > Ø 10.60 mm empaquetadas unitariamente
	DIN 339 DIN 340 y procesos similares	≤ Ø 6.70 mm en paquetes de 10 unidades > Ø 6.70 ... Ø 10.60 mm en paquetes de 5 unidades > Ø 10.60 mm empaquetadas unitariamente
	DIN 1869	≤ Ø 7.50 mm en paquetes de 10 unidades > Ø 7.50 ... Ø 10.60 mm en paquetes de 5 unidades > Ø 10.60 mm empaquetadas unitariamente
Mango cónico en HSS Broca helicoidales	Todas normas DIN estándar y trabajos estándar	todas las medidas se suministran unitariamente
Metal duro y tipo de metal duro Broca helicoidales	Todas normas DIN estándar y trabajos estándar	todas las medidas se suministran unitariamente
Micro brocas de precisión	DIN 1899	Todas las medidas se suministran en paquetes de 10 unidades
Brocas de centro	DIN 333 forma A, forma R	≤ Ø 4.00 mm en paquetes de 10 unidades > Ø 4.00 mm en estuches unitarios
	DIN 333 forma B	≤ Ø 2.50 mm en paquetes de 10 unidades > Ø 2.50 mm en estuches unitarios

Cuentas bancarias

Deutsche Bank AG
IBAN DE74 6537 0075 0014 6415 00
BIC DEUTDESS653

BW Bank
IBAN DE45 6005 0101 0002 5924 44
BIC SOLADEST600



HARTNER

Referencia rápida

BROCAS DE MANGO CILÍNDRICO

fabricada en HSS, HSS-E, HSS-E-PM, metal duro
brillante y recubierta

BROCAS DE MANGO CÓNICO

fabricada en HSS, HSS-E, metal duro
brillante y recubierta

BROCAS DE METAL DURO TIPO TS

herramientas de alta tecnología fabricadas en metal duro
brillante y recubierta

BROCAS CAÑÓN DE UNO Y DOS LABIOS DE CORTE

fabricada en metal duro, con cabeza de metal duro soldada o con plaquita intercambiable,
brillante y con recubierta

MICROBROCAS

fabricada en metal duro y HSS-E-PM
brillante y recubierta

BROCAS ESCALONADAS / BROCAS DE CENTRAR / AVELLANADORES CÓNICOS

fabricada en HSS, HSS-E y metal duro
brillante y recubierta

MULTIPLEX / MULTIPLEX HPC

broca con placa intercambiable y canal de refrigeración interior
placas intercambiables en HSS-E, HSS-E-PM, metal duro,
recubierta

PARTE TÉCNICA

dimensiones, definiciones, recomendaciones





Nº artículo	Página	Profundidad	Norma	Acabado	Descripción	Material de corte	Tipo
80495	245		Norma de fab.	AlTiN nano	Rebarbadores 90°	Metal duro	TS 100 VR
81010	23	~5xD	DIN 338	vaporizado	Brocas espirales cil., cortas	HSS	N
81011	47	~5xD	DIN 338	vaporizado	Brocas espirales cil., cortas	HSS-E	N
81012	65	~5xD	DIN 338	blancas	Brocas espirales cil., cortas	M42	N
81013	55	~5xD	DIN 338	blancas	Brocas espirales cil., cortas	HSS-E	IS
81015	27	~5xD	DIN 338	vaporizado	Brocas espirales cil., cortas	HSS	N
81017	29	~5xD	DIN 338	vaporizado	Brocas espirales cil., cortas	HSS	N
81020	32	~5xD	DIN 338	blancas	Brocas espirales cil., cortas	HSS	H
81025	34	~5xD	DIN 338	blancas	Brocas espirales cil., cortas	HSS	H
81030	36	~5xD	DIN 338	blancas	Brocas espirales cil., cortas	HSS	W
81035	38	~5xD	DIN 338	blancas	Brocas espirales cil., cortas	HSS	W
81040	39	~5xD	DIN 338	facetadas nitruadas	Brocas espirales cil., cortas	HSS	FN
81041	49	~5xD	DIN 338	facetadas nitruadas	Brocas espirales cil., cortas	HSS-E	FN
81045	41	~5xD	DIN 338	facetadas nitruadas	Brocas espirales cil., cortas	HSS	FN
81061	57	~5xD	DIN 338	blancas	Brocas espirales cil., cortas	HSS-E	S
81062	59	~5xD	DIN 338	marrón dorado	Brocas espirales cil., cortas	HSS-E	P2000
81063	63	~5xD	DIN 338	MolyGlide	Brocas espirales cil., cortas	HSS-E	P2000
81110	69	~3xD	DIN 1897	vaporizado	Brocas espirales extra cortas	HSS	N
81115	71	~3xD	DIN 1897	blancas	Brocas espirales extra cortas	HSS	N
81120	75	~3xD	DIN 1897	blancas	Brocas espirales extra cortas	HSS	H
81130	76	~3xD	DIN 1897	blancas	Brocas espirales extra cortas	HSS	W
81140	77	~3xD	DIN 1897	facetadas nitruadas	Brocas espirales extra cortas	HSS	FN
81145	78	~3xD	DIN 1897	facetadas nitruadas	Brocas espirales extra cortas	HSS	FN
81171	81	~3xD	DIN 1897	vaporizado	Brocas espirales extra cortas	HSS-E	V
81173	80	~3xD	DIN 1897	blancas	Brocas espirales extra cortas	HSS-E	IS
81190	106		Norma de fab.	vaporizado	Brocas para carrocería	HSS	N
81191	104		Norma de fab.	blancas	Brocas de puntear NC	HSS	N
81192	102		Norma de fab.	blancas	Brocas de puntear NC	HSS	N
81210	109	~10xD	DIN 339	vaporizado	Brocas para casquillos	HSS	N
81310	111	~10xD	DIN 340	vaporizado	Brocas espirales cil., largas	HSS	N
81311	126	~10xD	DIN 340	vaporizado	Brocas espirales cil., largas	HSS-E	N
81315	113	~10xD	DIN 340	vaporizado	Brocas espirales cil., largas	HSS	N
81317	114	~10xD	DIN 340	vaporizado	Brocas espirales cil., largas	HSS	N
81320	117	~10xD	DIN 340	blancas	Brocas espirales cil., largas	HSS	H
81330	118	~10xD	DIN 340	blancas	Brocas espirales cil., largas	HSS	W
81340	120	~10xD	DIN 340	facetadas nitruadas	Brocas espirales cil., largas	HSS	FN
81341	127	~10xD	DIN 340	facetadas nitruadas	Brocas espirales cil., largas	HSS-E	FN
81350	124	~10xD	DIN 340	blancas	Brocas espirales cil., largas	HSS	FW
81361	129	~10xD	DIN 340	blancas	Brocas espirales cil., largas	HSS-E	S
81362	129	~10xD	DIN 340	TiN	Brocas espirales cil., largas	HSS-E	S
81410	134	~15xD	DIN 1869	vaporizado	Brocas espirales, extra largas, serie 1	HSS	N
81440	135	~15xD	DIN 1869	facetadas nitruadas	Brocas espirales, extra largas, serie 1	HSS	FN
81441	138	~15xD	DIN 1869	facetadas nitruadas	Brocas espirales, extra largas, serie 1	HSS-E	FN
81450	137	~15xD	DIN 1869	blancas	Brocas espirales, extra largas, serie 1	HSS	FW
81510	139	~20xD	DIN 1869	vaporizado	Brocas espirales, extra largas, serie 2	HSS	N
81540	140	~20xD	DIN 1869	facetadas nitruadas	Brocas espirales, extra largas, serie 2	HSS	FN
81541	142	~20xD	DIN 1869	facetadas nitruadas	Brocas espirales, extra largas, serie 2	HSS-E	FN
81610	143	~25xD	DIN 1869	vaporizado	Brocas espirales, extra largas, serie 3	HSS	N
81640	144	~25xD	DIN 1869	facetadas nitruadas	Brocas espirales, extra largas, serie 3	HSS	FN
81740	145	>25xD	Norma de fab.	facetadas nitruadas	Brocas espirales, largo especial	HSS	FN
81750	146	>25xD	Norma de fab.	blancas	Brocas espirales, largo especial	HSS	FN
81760	147	>25xD	Norma de fab.	blancas	Brocas espirales, largo especial	HSS	FN
81810	148		DIN 1898	vaporizado	Brocas para pasadores cónicos	HSS	N
82010	158	~5xD	DIN 345	vaporizado	Brocas espirales	HSS	N
82011	161	~5xD	DIN 345	vaporizado	Brocas espirales	HSS-E	N
82012	162	~5xD	DIN 345	blancas	Brocas espirales	HSS-E	IS
82030	157	~5xD	DIN 345	blancas	Brocas espirales	HSS	W
82191	167		Norma de fab.	vaporizado	Brocas de puntear NC	HSS	N
82192	167		Norma de fab.	vaporizado	Brocas de puntear NC	HSS	N
82210	168	~10xD	DIN 341	vaporizado	Brocas espirales cil., largas	HSS	N
82211	169	~10xD	DIN 341	vaporizado	Brocas espirales cil., largas	HSS-E	N
82310	170	~15xD	DIN 1870	vaporizado	Brocas espirales, extra largas, serie 1	HSS	N
82340	171	~15xD	DIN 1870	facetadas nitruadas	Brocas espirales, extra largas, serie 1	HSS	FN
82341	172	~15xD	DIN 1870	facetadas nitruadas	Brocas espirales, extra largas, serie 1	HSS-E	FN
82410	173	~20xD	DIN 1870	vaporizado	Brocas espirales, extra largas, serie 2	HSS	N
82440	174	~20xD	DIN 1870	facetadas nitruadas	Brocas espirales, extra largas, serie 2	HSS	FN

Nº artículo	Página	Profundidad	Norma	Acabado	Descripción	Material de corte	Tipo
82466	175	>20xD	Norma de fab.	facetas nitruradas	Brocas espirales, largo especial	HSS	FN
82467	176	>20xD	Norma de fab.	facetas nitruradas	Brocas espirales, largo especial	HSS	FN
82468	177	>20xD	Norma de fab.	blancas	Brocas espirales, largo especial	HSS	FN
82469	178	>20xD	Norma de fab.	blancas	Brocas espirales, largo especial	HSS	FN
82515	182	~15xD	Norma de fab.	vaporizado	Brocas de refrigeración, serie extra larga	HSS-E	FN
82521	180	~10xD	Norma de fab.	vaporizado	Brocas de refrigeración, serie larga	HSS	N
82525	181	~10xD	Norma de fab.	vaporizado	Brocas de refrigeración, serie larga	HSS-E	FN
82535	179	~10xD	Norma de fab.	vaporizado	Brocas de refrigeración, serie larga	HSS	FN
82571	369		Norma de fab.	vaporizado	Tubo alimentador para refrigerante		
82578	370		Norma de fab.		Sistema de cambio rápido		
82710	107	~10xD	Norma de fab.	blancas	Brocas con canal de refrigeración	HSS	FN
82761	108	~5xD	Norma de fab.	blancas	Brocas con canal de refrigeración	HSS-E	FN
82810	186		DIN 1898	vaporizado	Brocas para pasadores cónicos	HSS	N
82971	166	~3xD	Norma de fab.	vaporizado	Brocas espirales cil., cortas	HSS-E	V
82972	165	~3xD	Norma de fab.	blancas	Brocas espirales cil., cortas	HSS-E	IS
83000	330		DIN 333	blancas	Brocas de centrar sin plano	HSS	N
83005	331		DIN 333	blancas	Brocas de centrar sin plano	HSS	N
83100	328		DIN 333	blancas	Brocas de centrar sin plano	HSS	N
83101	333		DIN 333	blancas	Brocas de centrar sin plano	HSS-E	N
83105	329		DIN 333	blancas	Brocas de centrar sin plano	HSS	N
83110	334		Norma de fab.	blancas	Brocas de centrar sin plano	HSS	N
83200	335		DIN 333	blancas	Brocas de centrar sin plano	HSS	N
83300	332		DIN 333	blancas	Brocas de centrar sin plano	HSS	N
83370	336		Norma de fab.	blancas	Brocas de centrar sin plano	Metal duro	N
83500	337		DIN 333	blancas	Brocas de centrar con plano	HSS	N
83600	337		DIN 333	blancas	Brocas de centrar con plano	HSS	N
83700	338		DIN 333	blancas	Brocas de centrar con plano	HSS	N
84100	243		Norma de fab.	blancas	Desbarbador	Metal duro	TS 100 EG
84101	244		Norma de fab.	blancas	Desbarbador	Metal duro	TS 100 EG
84400	73	~3xD	DIN 1897	TiN	Brocas espirales extra cortas	HSS	N
84405	30	~5xD	DIN 338	TiN	Brocas espirales cil., cortas	HSS	N
84406	43	~5xD	DIN 338	cabeza TiN	Brocas espirales cil., cortas	HSS	N
84415	45	~5xD	DIN 338	TiN	Brocas espirales cil., cortas	HSS	FN
84418	115	~10xD	DIN 340	TiN	Brocas espirales cil., largas	HSS	N
84423	122	~10xD	DIN 340	TiN	Brocas espirales cil., largas	HSS	FN
84425	136	~15xD	DIN 1869	TiN	Brocas espirales, extra largas, serie 1	HSS	FN
84426	141	~20xD	DIN 1869	TiN	Brocas espirales, extra largas, serie 2	HSS	FN
84434	104		Norma de fab.	TiN	Brocas de puntear NC	HSS	N
84435	102		Norma de fab.	TiN	Brocas de puntear NC	HSS	N
84445	313		Norma de fab.	TiN	Brocas escalonadas cortas con mango cil.	HSS	N
84448	330		DIN 333	TiN	Brocas de centrar sin plano	HSS	N
84450	328		DIN 333	TiN	Brocas de centrar sin plano	HSS	N
84460	160	~5xD	DIN 345	TiN	Brocas espirales	HSS	N
84461	108	~5xD	Norma de fab.	TiN	Brocas con canal de refrigeración	HSS-E	FN
84501	73	~3xD	DIN 1897	nanoFIRE	Brocas espirales extra cortas	HSS	N
84502	45	~5xD	DIN 338	nanoFIRE	Brocas espirales cil., cortas	HSS	FN
84503	83	~3xD	DIN 1897	nanoFIRE	Brocas espirales extra cortas	HSS-E	V
84504	51	~5xD	DIN 338	nanoFIRE	Brocas espirales cil., cortas	HSS-E	FN
84505	61	~5xD	DIN 338	nanoFIRE	Brocas espirales cil., cortas	HSS-E	S
84506	122	~10xD	DIN 340	nanoFIRE	Brocas espirales cil., largas	HSS	FN
84507	96	~5xD	Norma de fab.	nanoFIRE	Brocas espirales con mango cil. reforzado	HSS-E-PM	FN 500
84511	87	~3xD	DIN 1897	nanoFIRE	Brocas espirales extra cortas	HSS-E-PM	FN 500
84660	163	~5xD	DIN 345	TiAIN	Brocas espirales	HSS-E	FN
84800	51	~5xD	DIN 338	TiN	Brocas espirales cil., cortas	HSS-E	FN
84801	94	~5xD	Norma de fab.	TiN	Brocas espirales con mango cil. reforzado	HSS-E	FU 500
84802	53	~5xD	DIN 338	TiN	Brocas espirales cil., cortas	HSS-E	FU 500 DZ
84803	83	~3xD	DIN 1897	TiN	Brocas espirales extra cortas	HSS-E	V
84804	53	~5xD	DIN 338	blancas	Brocas espirales cil., cortas	HSS-E	FU 500 DZ
84805	92	~3xD	Norma de fab.	TiN	Brocas espirales con mango cil. reforzado	HSS-E	FU 500
84806	85	~3xD	DIN 1897	TiN	Brocas espirales extra cortas	HSS-E	FU 500 DZ
84807	61	~5xD	DIN 338	TiN	Brocas espirales cil., cortas	HSS-E	S
84808	85	~3xD	DIN 1897	blancas	Brocas espirales extra cortas	HSS-E	FU 500 DZ
84810	292	~5xD	DIN 1899	TiN	Microbrocas sin refrigeración interior	HSS-E-PM	N
84811	64	~5xD	DIN 338	TiN	Brocas espirales cil., cortas	HSS-E-PM	FN 500 DZ
84812	131	~10xD	DIN 340	TiN	Brocas espirales cil., largas	HSS-E	FU 500 DZ
84814	131	~10xD	DIN 340	blancas	Brocas espirales cil., largas	HSS-E	FU 500 DZ



Nº artículo	Página	Profundidad	Norma	Acabado	Descripción	Material de corte	Tipo
84859	164	~5xD	DIN 345	TiN	Brocas espirales	HSS-E	N
85010	315		DIN 8374	vaporizado	Brocas bidiametrales cil.	HSS	N
85110	316		Norma de fab.	vaporizado	Brocas bidiametrales cil.	HSS	N
85210	319		DIN 8376	vaporizado	Brocas bidiametrales cil.	HSS	N
85216	320		Norma de fab.	vaporizado	Brocas bidiametrales cil.	HSS	N
85218	318		DIN 8374	vaporizado	Brocas bidiametrales cil.	HSS	N
85310	317		DIN 8378	vaporizado	Brocas bidiametrales cil.	HSS	N
85510	322		Norma de fab.	vaporizado	Brocas bidiametrales, CM	HSS	N
85610	324		DIN 8377	vaporizado	Brocas bidiametrales, CM	HSS	N
85616	325		Norma de fab.	vaporizado	Brocas bidiametrales, CM	HSS	N
85619	326		DIN 8375	vaporizado	Brocas bidiametrales, CM	HSS	N
85710	323		DIN 8379	vaporizado	Brocas bidiametrales, CM	HSS	N
85910	306		Norma de fab.	vaporizado	Brocas escalonadas DIN 332	HSS	N
85911	306		Norma de fab.	vaporizado	Brocas escalonadas DIN 332	HSS	N
85912	307		Norma de fab.	vaporizado	Brocas escalonadas DIN 332	HSS	N
85914	308		Norma de fab.	vaporizado	Brocas escalonadas DIN 332	HSS	N
85916	310		Norma de fab.	blancas	Brocas escalonadas cortas con mango cil.	HSS	N
85917	311		Norma de fab.	blancas	Brocas escalonadas cortas con mango cil.	HSS	N
85918	312		Norma de fab.	blancas	Brocas escalonadas cortas con mango cil.	HSS	N
85920	314		Norma de fab.	blancas	Brocas escalonadas cortas con mango cil.	HSS	N
86010	151		DIN 344	vaporizado	Brocas escariadoras, cil.	HSS	N
86110	184		DIN 343	vaporizado	Brocas escariadoras, CM	HSS	N
86111	185		DIN 343	vaporizado	Brocas escariadoras, CM	HSS-E	N
86400	295	4xD	Norma de fab.	AlTiN	Microbrocas sin refrigeración interior	Metal duro	N
86401	296	7xD	Norma de fab.	AlTiN	Microbrocas sin refrigeración interior	Metal duro	N
86402	294		Norma de fab.	TiAlN	Microbrocas sin refrigeración interior	Metal duro	N
86405	297	5xD	Norma de fab.	TiAlN	Microbrocas con refrigeración interior	Metal duro	N
86408	298	8xD	Norma de fab.	TiAlN	Microbrocas con refrigeración interior	Metal duro	N
86412	299	15xD	Norma de fab.	cabeza TiAlN	Microbrocas con refrigeración interior	Metal duro	N
86509	235	15xD	Norma de fab.	TiAlN	Brocas-TS con refrigeración interior	Metal duro	TS 100 T
86511	236	20xD	Norma de fab.	cabeza TiAlN	Brocas-TS con refrigeración interior	Metal duro	TS 100 T
86512	237	25xD	Norma de fab.	cabeza TiAlN	Brocas-TS con refrigeración interior	Metal duro	TS 100 T
86513	238	30xD	Norma de fab.	cabeza TiAlN	Brocas-TS con refrigeración interior	Metal duro	TS 100 T
86514	239	40xD	Norma de fab.	cabeza TiAlN	Brocas-TS con refrigeración interior	Metal duro	TS 100 T
86602	361		Norma de fab.	TiN	Placas intercambiables	HSS-E-PM	
86608	362		Norma de fab.	FiRE	Placas intercambiables	HSS-E-PM	
86609	363		Norma de fab.	AlTiN	Placas intercambiables	HSS-E-PM	
86612	349	<3xD	Norma de fab.	niquelado	Soporte Multiplex con mango cilíndrico		
86622	350	<5xD	Norma de fab.	niquelado	Soporte Multiplex con mango cilíndrico		
86624	351	<7xD	Norma de fab.	niquelado	Soporte Multiplex con mango cilíndrico		
86628	356		Norma de fab.	niquelado	Gama especial de soportes Multiplex con mango cilíndrico		
86630	352		Norma de fab.	niquelado	Soporte Multiplex con cono de compensación cónico		
86650	354		Norma de fab.	niquelado	Soporte Multiplex con cono de compensación cónico		
86670	353		Norma de fab.	niquelado	Soporte Multiplex con cono de compensación cónico		
86678	358		Norma de fab.	niquelado	Gama especial de soportes Multiplex con mango cónico		
86680	355		Norma de fab.	niquelado	Soporte Multiplex con cono de compensación cónico		
86681	378	1xD	Norma de fab.	niquelado	Soporte Multiplex HPC		HPC
86682	379	1,5xD	Norma de fab.	niquelado	Soporte Multiplex HPC		HPC
86683	381	3xD	Norma de fab.	niquelado	Soporte Multiplex HPC		HPC
86684	383	5xD	Norma de fab.	niquelado	Soporte Multiplex HPC		HPC
86685	385	7xD	Norma de fab.	niquelado	Soporte Multiplex HPC		HPC
86686	387	10xD	Norma de fab.	niquelado	Soporte Multiplex HPC		HPC
86690	368		Norma de fab.		Alimentadores de refrigeración		
86691	372		Norma de fab.	bruñido	Transportador de refrigerante para Multiplex		
86692	373		Norma de fab.	bruñido	Transportador de refrigerante para Multiplex		
86693	374		Norma de fab.	bruñido	Transportador de refrigerante para Multiplex		
86694	375		Norma de fab.	bruñido	Transportador de refrigerante para Multiplex		
86699	376		Norma de fab.	bruñido	Union para mandril de refrigeración		
86701	367		Norma de fab.	FiRE	Placas intercambiables	Metal duro	
86702	365		Norma de fab.	FiRE	Placas intercambiables	Metal duro	
86708	364		Norma de fab.	TiN	Placas intercambiables	Metal duro	
86709	366		Norma de fab.	TiN	Placas intercambiables	Metal duro	
86721	389		Norma de fab.	AlTiN nano	Plaquetas intercambiables Multiplex HPC	Metal duro	HPC
86722	392		Norma de fab.	nanoFiRE	Plaquetas intercambiables Multiplex HPC	Metal duro	HPC
86723	395		Norma de fab.	FiRE	Plaquetas intercambiables Multiplex HPC	Metal duro	HPC
86724	398		Norma de fab.	blancas	Plaquetas intercambiables Multiplex HPC	Metal duro	HPC



Nº artículo	Página	Profundidad	Norma	Acabado	Descripción	Material de corte	Tipo
86725	401		Norma de fab.	AlTiN nano	Plaquitas intercambiables Multiplex HPC	Metal duro	HPC
86726	404		Norma de fab.	TiAlN	Plaquitas para avellanar Multiplex HPC	Metal duro	
86727	404		Norma de fab.	blancas	Plaquitas para avellanar Multiplex HPC	Metal duro	
86728	405		Norma de fab.	TiN	Plaquitas para avellanar Multiplex HPC	Metal duro	
86842	371		Norma de fab.		Atornillador Torx		
86843	406		Norma de fab.		Tornillos tensores para porta Multiplex HPC 1,5-10xD		
86844	407		Norma de fab.		Liáve dinamométrica		
86845	408		Norma de fab.		Adaptor exagonal		
86846	409		Norma de fab.		Tornillos tensores para porta de avellanar Multiplex HPC		
87011	289	~5xD	DIN 1899	blancas	Microbrocas sin refrigeración interior	HSS-E-PM	N
87016	291	~5xD	DIN 1899	blancas	Microbrocas sin refrigeración interior	HSS-E-PM	N
88013	98	~5xD	DIN 338	vaporizado	Juego de brocas helicoidales	HSS	N
88014	98	~5xD	DIN 338	marrón dorado	Juego de brocas helicoidales	HSS-E	P2000
88015	99	~3xD	DIN 1897	MolyGlide	Juego de brocas helicoidales	HSS-E	P2000
88016	99	~5xD	DIN 338	cabeza TiN	Juego de brocas helicoidales	HSS	N
88026	100	~5xD	DIN 338	vaporizado	Juego de brocas helicoidales	HSS-E	N
88200	327		DIN 335	blancas	Avellanadores cónicos 90°	HSS	
88303	101		Norma de fab.		Juego de brocas helicoidales		
89235	89	~3xD	DIN 6539	blancas	Brocas espirales extra cortas	Metal duro	N
89237	200	3xD	DIN 6539	TiN	Brocas-TS sin refrigeración interior	Metal duro	TS 100 U
89239	241	5xD	DIN 6539	blancas	Brocas-TS, 3 cortes	Metal duro	TS 3 G
89242	105		Norma de fab.	blancas	Brocas de puntear NC	Metal duro	N
89243	103		Norma de fab.	blancas	Brocas de puntear NC	Metal duro	N
89244	67	~5xD	Norma de fab.	blancas	Brocas espirales cil., cortas	Metal duro	N
89246	91	~3xD	Norma de fab.	blancas	Brocas espirales extra cortas	Metal duro	N
89247	240	5xD	DIN 6537L	blancas	Brocas-TS, 3 cortes	Metal duro	TS 3 G
89249	105		Norma de fab.	blancas	Brocas de puntear NC	Metal duro	N
89252	321			blancas	Brocas bidiametrales cil.	Metal duro	N
89254	309		Norma de fab.	blancas	Brocas escalonadas cortas con mango cil.	Metal duro	N
89264	196	3xD	DIN 6537K	TiN	Brocas-TS sin refrigeración interior	Metal duro	TS 100 U
89266	207	3xD	DIN 6537K	TiN	Brocas-TS con refrigeración interior	Metal duro	TS 100 U
89272	214	5xD	DIN 6537L	TiN	Brocas-TS con refrigeración interior	Metal duro	TS 100 U
89275	204	5xD	Norma de fab.	TiN	Brocas-TS sin refrigeración interior	Metal duro	TS 100 U
89281	293	~5xD	Norma de fab.	blancas	Microbrocas sin refrigeración interior	Metal duro	N
89286	133	~10xD	Norma de fab.	blancas	Brocas espirales cil., largas	Metal duro	N
89292	213	4xD	Norma de fab.	blancas	Brocas-TS con refrigeración interior	Metal duro	TS 150 GG
89293	231	10xD	Norma de fab.	blancas	Brocas-TS con refrigeración interior	Metal duro	TS 150 GG
89294	230	7xD	Norma de fab.	blancas	Brocas-TS con refrigeración interior	Metal duro	TS 150 GG
89295	231	10xD	Norma de fab.	blancas	Brocas-TS con refrigeración interior	Metal duro	TS 150 GG
89301	150		DIN 8037	blancas	Brocas espirales, placa MD soldada	Carbide	N
89302	183		DIN 8041	blancas	Brocas espirales, placa MD soldada	Carbide	N
89303	149		DIN 8038	blancas	Brocas espirales, placa MD soldada	Carbide	N
89306	208	3xD	DIN 6538K	TiN	Brocas-TS con refrigeración interior	Carbide	TS 80 U
89307	217	5xD	DIN 6538M	TiN	Brocas-TS con refrigeración interior	Carbide	TS 80 U
89308	226	7xD	DIN 6538L	TiN	Brocas-TS con refrigeración interior	Carbide	TS 80 U
89401	200	3xD	DIN 6539	nanoFIRE	Brocas-TS sin refrigeración interior	Metal duro	TS 100 U
89402	194	3xD	DIN 6537K	nanoFIRE	Brocas-TS sin refrigeración interior	Metal duro	TS 100 U
89408	215	5xD	DIN 6537L	nanoFIRE	Brocas-TS con refrigeración interior	Metal duro	TS 100 U
89410	205	3xD	DIN 6537K	nanoFIRE	Brocas-TS con refrigeración interior	Metal duro	TS 100 U
89411	215	5xD	DIN 6537L	nanoFIRE	Brocas-TS con refrigeración interior	Metal duro	TS 100 U
89412	224	7xD	Norma de fab.	nanoFIRE	Brocas-TS con refrigeración interior	Metal duro	TS 100 U
89413	194	3xD	DIN 6537K	nanoFIRE	Brocas-TS sin refrigeración interior	Metal duro	TS 100 U
89414	202	5xD	DIN 6537L	nanoFIRE	Brocas-TS sin refrigeración interior	Metal duro	TS 100 U
89415	205	3xD	DIN 6537K	nanoFIRE	Brocas-TS con refrigeración interior	Metal duro	TS 100 U
89416	224	7xD	Norma de fab.	nanoFIRE	Brocas-TS con refrigeración interior	Metal duro	TS 100 U
89417	202	5xD	DIN 6537L	nanoFIRE	Brocas-TS sin refrigeración interior	Metal duro	TS 100 U
89418	233	12xD	Norma de fab.	cabeza nanoFIRE	Brocas-TS con refrigeración interior	Metal duro	TS 100 U
89420	222	5xD	DIN 6537L	FIRE	Brocas-TS con refrigeración interior	Metal duro	TS 100 R
89421	228	7xD	Norma de fab.	FIRE	Brocas-TS con refrigeración interior	Metal duro	TS 100 R
89422	198	3xD	DIN 6537K	TiAlSiN	Brocas-TS sin refrigeración interior	Metal duro	TS 100 H
89423	211	3xD	DIN 6537K	TiAlSiN	Brocas-TS con refrigeración interior	Metal duro	TS 100 H
89424	211	3xD	DIN 6537K	TiAlSiN	Brocas-TS con refrigeración interior	Metal duro	TS 100 H
89425	220	5xD	DIN 6537L	TiAlSiN	Brocas-TS con refrigeración interior	Metal duro	TS 100 H
89426	220	5xD	DIN 6537L	TiAlSiN	Brocas-TS con refrigeración interior	Metal duro	TS 100 H
89427	227	7xD	Norma de fab.	TiAlSiN	Brocas-TS con refrigeración interior	Metal duro	TS 100 H
89450	209	3xD	DIN 6537K	AlTiN nano	Brocas-TS con refrigeración interior	Metal duro	TS 100 INOX



N° artículo	Página	Profundidad	Norma	Acabado	Descripción	Material de corte	Tipo
89451	218	5xD	DIN 6537L	AlTiN nano	Brocas-TS con refrigeración interior	Metal duro	TS 100 INOX
89501	257	80.000	Norma de fab.	blancas	Broca monolabio E 100	Metal duro	TLB E 100
89502	259	160.000	Norma de fab.	blancas	Broca monolabio E 100	Metal duro	TLB E 100
89503	256	45.000	Norma de fab.	blancas	Broca monolabio E 100	Metal duro	TLB E 100
89504	258	120.000	Norma de fab.	blancas	Broca monolabio E 100	Metal duro	TLB E 100
89505	260	20xD	Norma de fab.	TiN	Broca monolabio E 80	Carbide	TLB E 80
89506	262	40xD	Norma de fab.	TiN	Broca monolabio E 80	Carbide	TLB E 80
89507	263	80xD	Norma de fab.	TiN	Broca monolabio E 80	Carbide	TLB E 80
89508	267	30xD	Norma de fab.	blancas	Brocas cañon con 2 labios de corte Z 80	Carbide	TLB Z 80
89509	261	30xD	Norma de fab.	TiN	Broca monolabio E 80	Carbide	TLB E 80
89510	256	45.000	Norma de fab.	AlTiN	Broca monolabio E 100	Metal duro	TLB E 100
89511	257	80.000	Norma de fab.	AlTiN	Broca monolabio E 100	Metal duro	TLB E 100
89512	258	120.000	Norma de fab.	AlTiN	Broca monolabio E 100	Metal duro	TLB E 100
89513	259	160.000	Norma de fab.	AlTiN	Broca monolabio E 100	Metal duro	TLB E 100
89514	260	20xD	Norma de fab.	TiCN	Broca monolabio E 80	Carbide	TLB E 80
89515	261	30xD	Norma de fab.	TiCN	Broca monolabio E 80	Carbide	TLB E 80
89516	262	40xD	Norma de fab.	TiCN	Broca monolabio E 80	Carbide	TLB E 80
89517	263	80xD	Norma de fab.	TiCN	Broca monolabio E 80	Carbide	TLB E 80
89518	267	30xD	Norma de fab.	blancas	Brocas cañon con 2 labios de corte Z 80	Carbide	TLB Z 80
89520	253	25xD	Norma de fab.	AlTiN nano	Broca monolabio E 100	Metal duro	TLB E 100
89521	254	50xD	Norma de fab.	AlTiN nano	Broca monolabio E 100	Metal duro	TLB E 100
89522	255	75xD	Norma de fab.	AlTiN nano	Broca monolabio E 100	Metal duro	TLB E 100
89530	264	30xD	Norma de fab.	TiN	Broca-monolabio-con plaquita E-800	Carbide	TLB E 800
89535	265		Norma de fab.	TiN	Plaquetas de corte para brocas monolabio E 800	Metal duro	
89536	266		Norma de fab.	TiN	Patines guía per brocas monolabio E 800	Metal duro	
89550	209	3xD	DIN 6537K	AlTiN nano	Brocas-TS con refrigeración interior	Metal duro	TS 100 INOX
89551	218	5xD	DIN 6537L	AlTiN nano	Brocas-TS con refrigeración interior	Metal duro	TS 100 INOX

LOS EXPENDEDORES DE HERRAMIENTAS HARTNER

Los diferentes expendedores de herramientas Hartner TM326, TM426 y TM526 optimizan la gestión y el almacenamiento de sus herramientas. Gane más seguridad para sus existencias y más transparencia en la gestión de las herramientas.



TM 326

El sistema modular por ubicación

TM 426

El sistema espiral para almacenar grandes cantidades de herramientas compactas

TM 526

El sistema de cajones con un control 100% de extracción



HARTNER

Precision Cutting Tools

DISTRIBUCIÓN DE HERRAMIENTAS MODERNA

Automatización de procesos de abastecimiento



Reportes



Preparación de datos



Intercambio de datos





HARTNER

Precision Cutting Tools

MEJORA DEL RENDIMIENTO POR PROCESOS OPTIMIZADOS DE GESTIÓN

”Los expendedores de herramientas Hartner incrementan la rentabilidad y eficiencia del trabajo en cualquier tamaño de empresa.“



NUESTROS CLIENTES NOS CONFIRMAN:

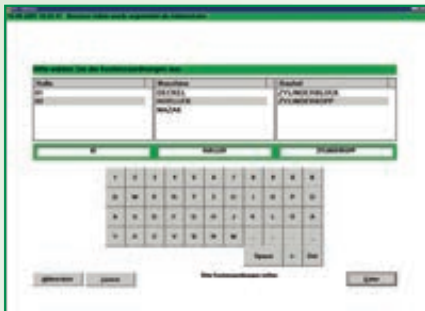
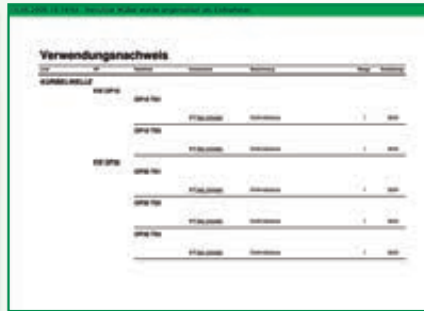
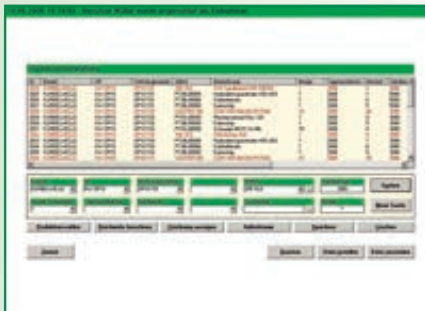
10% de **reducción de costes de herramientas**

1 hora de **reducción de costes de administración** por día

14% **menos de paradas de máquina**

24 horas de **herramientas controladas**

INTELIGENCIA INTEGRADA: TOOL MANAGEMENT SOFTWARE



**MÓDULO DE ENTRADA DE
MERCANCÍAS**
PROVEEDORES CONTROLADOS

PEDIDOS MODULARES
PLANIFIQUE DE A-Z

**MÓDULO DE ALMACENAJE PARA
LA GESTIÓN DE REAFILADOS**
TODOS LOS DATOS CONTROLADOS

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GESTIÓN DE HERRAMIENTAS

MÓDULO DE LISTA DE PIEZAS
RECONOCER Y RELACIONAR

MÓDULO PARADA DE MÁQUINA
PREVENCIÓN DE PARADA DE MÁQUINA

**MÓDULO PARA GESTIONAR
MEDIOS DE MEDICIÓN**
SABER LO QUE ESTA PASANDO





HARTNER

Precision Cutting Tools















Brocas de mango cilíndrico















BROCAS DE MANGO CILÍNDRICO

fabricada en HSS, HSS-E, HSS-E-PM, metal duro
brillante y recubierta



P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
						DIN 338	N	HSS		derecha	cil.	~5xD	0,200 - 20,000	81010	23
						DIN 338	N	HSS		izquierda	cil.	~5xD	0,250 - 17,000	81015	27
						DIN 338	N	HSS		derecha	cil.	~5xD	3,000 - 13,000	81017	29
						DIN 338	H	HSS		derecha	cil.	~5xD	0,300 - 19,000	81020	32
						DIN 338	H	HSS		izquierda	cil.	~5xD	0,500 - 16,000	81025	34
						DIN 338	W	HSS		derecha	cil.	~5xD	0,250 - 16,500	81030	36
						DIN 338	W	HSS		izquierda	cil.	~5xD	0,500 - 15,000	81035	38
						DIN 338	FN	HSS		derecha	cil.	~5xD	0,800 - 16,000	81040	39
						DIN 338	FN	HSS		izquierda	cil.	~5xD	1,400 - 16,000	81045	41
						DIN 338	N	HSS		derecha	cil.	~5xD	0,400 - 19,500	84405	30
						DIN 338	N	HSS		derecha	cil.	~5xD	1,000 - 16,000	84406	43
						DIN 338	FN	HSS		derecha	cil.	~5xD	1,000 - 16,000	84415	45
						DIN 338	FN	HSS		derecha	cil.	~5xD	1,000 - 16,000	84502	45
						DIN 338	N	M42		derecha	cil.	~5xD	1,000 - 14,000	81012	65

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
●	○	●	○	○	○	DIN 338	N	HSS-E		derecha	cil.	~5xD	0,200 - 20,000	81011	47
○	○	○	○	○	○	DIN 338	IS	HSS-E		derecha	cil.	~5xD	1,000 - 13,000	81013	55
●	○	●	●	○	○	DIN 338	FN	HSS-E		derecha	cil.	~5xD	1,000 - 12,700	81041	49
○	●	○	○	○	○	DIN 338	S	HSS-E		derecha	cil.	~5xD	0,200 - 17,500	81061	57
●	○	○	○	○	○	DIN 338	P2000	HSS-E		derecha	cil.	~5xD	1,000 - 13,000	81062	59
●	○	○	○	○	○	DIN 338	P2000	HSS-E		derecha	cil.	~5xD	3,300 - 12,000	81063	63
●	○	●	○	○	○	DIN 338	FN	HSS-E		derecha	cil.	~5xD	1,000 - 13,000	84504	51
○	●	○	○	○	○	DIN 338	S	HSS-E		derecha	cil.	~5xD	0,500 - 13,000	84505	61
●	○	●	○	○	○	DIN 338	FN	HSS-E		derecha	cil.	~5xD	1,000 - 13,000	84800	51
●	●	●	●	○	○	DIN 338	FU 500 DZ	HSS-E		derecha	cil.	~5xD	1,000 - 14,000	84802	53
●	●	●	●	○	○	DIN 338	FU 500 DZ	HSS-E		derecha	cil.	~5xD	1,000 - 14,000	84804	53
○	●	○	○	○	○	DIN 338	S	HSS-E		derecha	cil.	~5xD	0,500 - 13,000	84807	61
●	○	●	○	○	○	DIN 338	FN 500 DZ	HSS-E-PM		derecha	cil.	~5xD	1,000 - 14,000	84811	64
○	○	○	●	○	○	Norma de fab.	N	Metal duro		derecha	cil.	~5xD	1,000 - 12,000	89244	67

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
						DIN 1897	N	HSS		derecha	cil.	~3xD	0,500 - 39,500	81110	69
						DIN 1897	N	HSS		izquierda	cil.	~3xD	0,500 - 36,500	81115	71
						DIN 1897	H	HSS		derecha	cil.	~3xD	1,200 - 15,000	81120	75
						DIN 1897	W	HSS		derecha	cil.	~3xD	1,500 - 16,000	81130	76
						DIN 1897	FN	HSS		derecha	cil.	~3xD	1,500 - 15,500	81140	77
						DIN 1897	FN	HSS		izquierda	cil.	~3xD	1,000 - 16,000	81145	78
						DIN 1897	N	HSS		derecha	cil.	~3xD	1,000 - 25,000	84400	73
						DIN 1897	N	HSS		derecha	cil.	~3xD	1,000 - 25,000	84501	73
						DIN 1897	V	HSS-E		derecha	cil.	~3xD	0,400 - 25,000	81171	81
						DIN 1897	IS	HSS-E		derecha	cil.	~3xD	1,000 - 12,000	81173	80
						DIN 1897	V	HSS-E		derecha	cil.	~3xD	0,500 - 15,000	84503	83
						DIN 1897	V	HSS-E		derecha	cil.	~3xD	0,500 - 15,000	84803	83
						DIN 1897	FU 500 DZ	HSS-E		derecha	cil.	~3xD	1,000 - 14,000	84806	85
						DIN 1897	FU 500 DZ	HSS-E		derecha	cil.	~3xD	1,000 - 14,000	84808	85

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas espirales extra cortas



●	○	●	○	○	○	DIN 1897	FN 500	HSS-E-PM	ⓔ	derecha	cil.	~3xD	1,000 - 13,500	84511	87
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○	○	○	●	○	○	DIN 6539	N	Metal duro	○	derecha	cil.	~3xD	0,800 - 16,000	89235	89
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○	○	○	○	○	○	Norma de fab.	N	Metal duro	○	derecha	cil.	~3xD	0,500 - 6,500	89246	91
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Brocas espirales con mango cil. reforzado



●	●	●	●	○	○	Norma de fab.	FU 500	HSS-E	ⓧ	derecha	HA	~3xD	2,000 - 20,000	84805	92
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●	●	●	●	○	○	Norma de fab.	FU 500	HSS-E	ⓧ	derecha	HA	~5xD	2,000 - 20,000	84801	94
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●	○	●	○	○	○	Norma de fab.	FN 500	HSS-E-PM	ⓔ	derecha	HA	~5xD	2,000 - 13,000	84507	96
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Juego de brocas helicoidales



○	○	○	○	○	○	Norma de fab.								88303	101
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●	○	○	○	○	○	DIN 1897	P2000	HSS-E	Ⓜ	derecha	cil.	~3xD		88015	99
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P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Juego de brocas helicoidales



●	●	●	○	●	●	DIN 338	N	HSS		derecha	cil.	~5xD		88013	98
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●	●	●	○	●	●	DIN 338	N	HSS		derecha	cil.	~5xD		88016	99
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●	○	○	○	●	●	DIN 338	P2000	HSS-E		derecha	cil.	~5xD		88014	98
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●	●	○	○	●	●	DIN 338	N	HSS-E		derecha	cil.	~5xD		88026	100
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Brocas de puntear NC








●	○	●	●	○	●	Norma de fab.	N	HSS		derecha	cil.	3,000 - 25,000		81191	104
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
●	○	●	●	○	●	Norma de fab.	N	HSS		derecha	cil.	3,000 - 25,000		81192	102
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P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas de puntear NC

	•	○	•	•	○	Norma de fab.	N	HSS		derecha	cil.	3,000 - 25,000	84434	104
	•	○	•	•	○	Norma de fab.	N	HSS		derecha	cil.	3,000 - 25,000	84435	102
	○	○	○	○	○	Norma de fab.	N	Metal duro		derecha	cil.	4,000 - 20,000	89242	105
	○	○	○	○	○	Norma de fab.	N	Metal duro		derecha	cil.	4,000 - 20,000	89243	103
	○	○	○	○	○	Norma de fab.	N	Metal duro		derecha	HB	4,000 - 20,000	89249	105


Brocas para carrocería

	•	○	•	•	○	Norma de fab.	N	HSS		derecha		2,000 - 10,000	81190	106
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Brocas con canal de refrigeración

	•	•	•	•	•	Norma de fab.	FN	HSS-E		derecha	HE	~5xD	5,000 - 20,000	82761	108
	•	•	•	•	○	Norma de fab.	FN	HSS-E		derecha	HE	~5xD	5,000 - 20,000	84461	108
	•	○	•	•	○	Norma de fab.	FN	HSS		derecha	cil.	~10xD	3,000 - 13,000	82710	107







Brocas para casquillos

	•	○	•	○	○	DIN 339	N	HSS		derecha	cil.	~10xD	0,800 - 19,000	81210	109
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P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
						DIN 340	N	HSS		derecha	cil.	~10xD	0,400 - 23,500	81310	111
						DIN 340	N	HSS		izquierda	cil.	~10xD	0,900 - 15,000	81315	113
						DIN 340	N	HSS		derecha	cil.	~10xD	3,100 - 10,000	81317	114
						DIN 340	H	HSS		derecha	cil.	~10xD	0,600 - 15,000	81320	117
						DIN 340	W	HSS		derecha	cil.	~10xD	0,500 - 20,000	81330	118
						DIN 340	FN	HSS		derecha	cil.	~10xD	0,900 - 14,000	81340	120
						DIN 340	FW	HSS		derecha	cil.	~10xD	1,000 - 14,000	81350	124
						DIN 340	N	HSS		derecha	cil.	~10xD	0,500 - 16,000	84418	115
						DIN 340	FN	HSS		derecha	cil.	~10xD	1,000 - 14,000	84423	122
						DIN 340	FN	HSS		derecha	cil.	~10xD	1,000 - 14,000	84506	122
						DIN 340	N	HSS-E		derecha	cil.	~10xD	0,500 - 12,500	81311	126
						DIN 340	FN	HSS-E		derecha	cil.	~10xD	1,000 - 16,000	81341	127
						DIN 340	S	HSS-E		derecha	cil.	~10xD	1,000 - 13,000	81361	129
						DIN 340	S	HSS-E		derecha	cil.	~10xD	1,000 - 13,000	81362	129

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas espirales cil., largas

		DIN 340	FU 500 DZ	HSS-E		derecha	cil.	~10xD	1,000 - 14,000	84812	131
		DIN 340	FU 500 DZ	HSS-E		derecha	cil.	~10xD	1,000 - 14,000	84814	131
		Norma de fab.	N	Metal duro		derecha	cil.	~10xD	0,500 - 1,500	89286	133

Brocas espirales, extra largas, serie 1

		DIN 1869	N	HSS		derecha	cil.	~15xD	1,600 - 13,000	81410	134
		DIN 1869	FN	HSS		derecha	cil.	~15xD	2,000 - 13,000	81440	135
		DIN 1869	FW	HSS		derecha	cil.	~15xD	2,000 - 9,500	81450	137
		DIN 1869	FN	HSS		derecha	cil.	~15xD	2,000 - 12,000	84425	136
		DIN 1869	FN	HSS-E		derecha	cil.	~15xD	3,000 - 10,000	81441	138

Brocas espirales, extra largas, serie 2

		DIN 1869	N	HSS		derecha	cil.	~20xD	3,000 - 12,000	81510	139
		DIN 1869	FN	HSS		derecha	cil.	~20xD	2,000 - 13,000	81540	140
		DIN 1869	FN	HSS		derecha	cil.	~20xD	3,000 - 8,500	84426	141
		DIN 1869	FN	HSS-E		derecha	cil.	~20xD	3,000 - 10,000	81541	142

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas espirales, extra largas, serie 3

						DIN 1869	N	HSS		derecha	cil.	~25xD	4,000 - 12,000	81610	143
						DIN 1869	FN	HSS		derecha	cil.	~25xD	3,000 - 13,000	81640	144

Brocas espirales, largo especial

						Norma de fab.	FN	HSS		derecha	cil.	>25xD	6,000 - 12,000	81740	145
						Norma de fab.	FN	HSS		derecha	cil.	>25xD	8,000 - 12,000	81750	146
						Norma de fab.	FN	HSS		derecha	cil.	>25xD	10,000 - 12,000	81760	147

Brocas para pasadores cónicos

						DIN 1898	N	HSS		derecha	cil.		2,000 - 12,000	81810	148
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Brocas espirales, placa MD soldada

						DIN 8037	N	Carbide		derecha	cil.		2,600 - 20,000	89301	150
						DIN 8038	N	Carbide		derecha	cil.		3,100 - 8,000	89303	149

Brocas escariadoras, cil.

						DIN 344	N	HSS		derecha	cil.		3,800 - 15,000	86010	151
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Brocas espirales cil., cortas

Artículo N° 81010

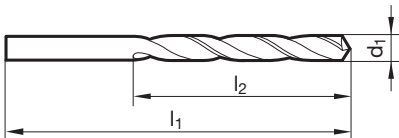


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,200		19,000	2,500	0,640		26,000	8,000
0,220		19,000	2,500	0,650		26,000	8,000
0,230		19,000	2,500	0,660		26,000	8,000
0,240		19,000	2,500	0,670		26,000	8,000
0,250		19,000	3,000	0,680		28,000	9,000
0,260		19,000	3,000	0,690		28,000	9,000
0,270		19,000	3,000	0,700		28,000	9,000
0,280		19,000	3,000	0,710		28,000	9,000
0,290		19,000	3,000	0,720		28,000	9,000
0,300		19,000	3,000	0,730		28,000	9,000
0,310		19,000	4,000	0,740		28,000	9,000
0,320		19,000	4,000	0,750		28,000	9,000
0,330		19,000	4,000	0,760		30,000	10,000
0,350		19,000	4,000	0,770		30,000	10,000
0,360		19,000	4,000	0,780		30,000	10,000
0,370		19,000	4,000	0,790	1/32	30,000	10,000
0,380		19,000	4,000	0,800		30,000	10,000
0,390		20,000	5,000	0,810		30,000	10,000
0,400		20,000	5,000	0,820		30,000	10,000
0,410		20,000	5,000	0,830		30,000	10,000
0,420		20,000	5,000	0,840		30,000	10,000
0,430		20,000	5,000	0,850		30,000	10,000
0,440		20,000	5,000	0,860		32,000	11,000
0,450		20,000	5,000	0,870		32,000	11,000
0,460		20,000	5,000	0,880		32,000	11,000
0,470		20,000	5,000	0,890		32,000	11,000
0,480		20,000	5,000	0,900		32,000	11,000
0,490		22,000	6,000	0,910		32,000	11,000
0,500		22,000	6,000	0,920		32,000	11,000
0,510		22,000	6,000	0,930		32,000	11,000
0,520		22,000	6,000	0,950		32,000	11,000
0,530		22,000	6,000	0,960		34,000	12,000
0,540		24,000	7,000	0,970		34,000	12,000
0,550		24,000	7,000	0,980		34,000	12,000
0,560		24,000	7,000	0,990		34,000	12,000
0,570		24,000	7,000	1,000		34,000	12,000
0,580		24,000	7,000	1,010		34,000	12,000
0,590		24,000	7,000	1,020		34,000	12,000
0,600		24,000	7,000	1,030		34,000	12,000
0,610		26,000	8,000	1,040		34,000	12,000
0,620		26,000	8,000	1,050		34,000	12,000
0,630		26,000	8,000	1,070		36,000	14,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,100		36,000	14,000	2,050		49,000	24,000
1,110		36,000	14,000	2,100		49,000	24,000
1,120		36,000	14,000	2,110		49,000	24,000
1,130		36,000	14,000	2,120		49,000	24,000
1,140		36,000	14,000	2,140		53,000	27,000
1,150		36,000	14,000	2,150		53,000	27,000
1,160		36,000	14,000	2,170		53,000	27,000
1,170		36,000	14,000	2,200		53,000	27,000
1,180		36,000	14,000	2,210		53,000	27,000
1,190	3/64	38,000	16,000	2,220		53,000	27,000
1,200		38,000	16,000	2,250		53,000	27,000
1,210		38,000	16,000	2,270		53,000	27,000
1,220		38,000	16,000	2,300		53,000	27,000
1,230		38,000	16,000	2,330		53,000	27,000
1,240		38,000	16,000	2,350		53,000	27,000
1,250		38,000	16,000	2,360		53,000	27,000
1,260		38,000	16,000	2,370		57,000	30,000
1,270		38,000	16,000	2,380	3/32	57,000	30,000
1,280		38,000	16,000	2,400		57,000	30,000
1,300		38,000	16,000	2,420		57,000	30,000
1,310		38,000	16,000	2,440		57,000	30,000
1,350		40,000	18,000	2,450		57,000	30,000
1,360		40,000	18,000	2,460		57,000	30,000
1,390		40,000	18,000	2,500		57,000	30,000
1,400		40,000	18,000	2,510		57,000	30,000
1,410		40,000	18,000	2,520		57,000	30,000
1,420		40,000	18,000	2,530		57,000	30,000
1,430		40,000	18,000	2,550		57,000	30,000
1,440		40,000	18,000	2,570		57,000	30,000
1,450		40,000	18,000	2,600		57,000	30,000
1,460		40,000	18,000	2,640		57,000	30,000
1,480		40,000	18,000	2,650		57,000	30,000
1,490		40,000	18,000	2,700		61,000	33,000
1,500		40,000	18,000	2,710		61,000	33,000
1,510		43,000	20,000	2,750		61,000	33,000
1,520		43,000	20,000	2,780	7/64	61,000	33,000
1,550		43,000	20,000	2,800		61,000	33,000
1,560		43,000	20,000	2,820		61,000	33,000
1,570		43,000	20,000	2,850		61,000	33,000
1,580		43,000	20,000	2,880		61,000	33,000
1,590	1/16	43,000	20,000	2,900		61,000	33,000
1,600		43,000	20,000	2,940		61,000	33,000
1,620		43,000	20,000	2,950		61,000	33,000
1,630		43,000	20,000	2,970		61,000	33,000
1,650		43,000	20,000	3,000		61,000	33,000
1,700		43,000	20,000	3,010		65,000	36,000
1,720		46,000	22,000	3,020		65,000	36,000
1,730		46,000	22,000	3,050		65,000	36,000
1,740		46,000	22,000	3,060		65,000	36,000
1,750		46,000	22,000	3,070		65,000	36,000
1,760		46,000	22,000	3,100		65,000	36,000
1,790		46,000	22,000	3,150		65,000	36,000
1,800		46,000	22,000	3,160		65,000	36,000
1,810		46,000	22,000	3,170	1/8	65,000	36,000
1,820		46,000	22,000	3,180		65,000	36,000
1,830		46,000	22,000	3,200		65,000	36,000
1,840		46,000	22,000	3,250		65,000	36,000
1,850		46,000	22,000	3,260		65,000	36,000
1,890		46,000	22,000	3,300		65,000	36,000
1,900		46,000	22,000	3,320		65,000	36,000
1,910		49,000	24,000	3,350		65,000	36,000
1,920		49,000	24,000	3,400		70,000	39,000
1,930		49,000	24,000	3,450		70,000	39,000
1,940		49,000	24,000	3,500		70,000	39,000
1,950		49,000	24,000	3,550		70,000	39,000
1,980	5/64	49,000	24,000	3,600		70,000	39,000
1,990		49,000	24,000	3,620		70,000	39,000
2,000		49,000	24,000	3,650		70,000	39,000
2,010		49,000	24,000	3,670		70,000	39,000
2,020		49,000	24,000	3,680		70,000	39,000
2,030		49,000	24,000	3,700		70,000	39,000
2,040		49,000	24,000	3,740		70,000	39,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
3,750		70,000	39,000	5,900		93,000	57,000
3,800		75,000	43,000	5,950	15/64	93,000	57,000
3,850		75,000	43,000	6,000		93,000	57,000
3,900		75,000	43,000	6,030		101,000	63,000
3,930		75,000	43,000	6,040		101,000	63,000
3,950		75,000	43,000	6,050		101,000	63,000
3,970	5/32	75,000	43,000	6,100		101,000	63,000
3,990		75,000	43,000	6,150		101,000	63,000
4,000		75,000	43,000	6,200		101,000	63,000
4,030		75,000	43,000	6,250		101,000	63,000
4,040		75,000	43,000	6,260		101,000	63,000
4,050		75,000	43,000	6,300		101,000	63,000
4,060		75,000	43,000	6,350	1/4	101,000	63,000
4,100		75,000	43,000	6,400		101,000	63,000
4,150		75,000	43,000	6,450		101,000	63,000
4,200		75,000	43,000	6,500		101,000	63,000
4,220		75,000	43,000	6,550		101,000	63,000
4,250		75,000	43,000	6,600		101,000	63,000
4,300		80,000	47,000	6,650		101,000	63,000
4,320		80,000	47,000	6,700		101,000	63,000
4,350		80,000	47,000	6,750	17/64	109,000	69,000
4,370	11/64	80,000	47,000	6,800		109,000	69,000
4,390		80,000	47,000	6,850		109,000	69,000
4,400		80,000	47,000	6,900		109,000	69,000
4,450		80,000	47,000	6,950		109,000	69,000
4,500		80,000	47,000	7,000		109,000	69,000
4,520		80,000	47,000	7,050		109,000	69,000
4,530		80,000	47,000	7,100		109,000	69,000
4,550		80,000	47,000	7,140	9/32	109,000	69,000
4,570		80,000	47,000	7,200		109,000	69,000
4,600		80,000	47,000	7,250		109,000	69,000
4,650		80,000	47,000	7,300		109,000	69,000
4,700		80,000	47,000	7,350		109,000	69,000
4,750		80,000	47,000	7,400		109,000	69,000
4,760	3/16	86,000	52,000	7,450		109,000	69,000
4,780		86,000	52,000	7,500		109,000	69,000
4,800		86,000	52,000	7,540	19/64	117,000	75,000
4,830		86,000	52,000	7,600		117,000	75,000
4,850		86,000	52,000	7,700		117,000	75,000
4,900		86,000	52,000	7,750		117,000	75,000
4,920		86,000	52,000	7,800		117,000	75,000
4,950		86,000	52,000	7,850		117,000	75,000
5,000		86,000	52,000	7,900		117,000	75,000
5,050		86,000	52,000	7,940	5/16	117,000	75,000
5,060		86,000	52,000	7,950		117,000	75,000
5,100		86,000	52,000	8,000		117,000	75,000
5,110		86,000	52,000	8,050		117,000	75,000
5,150		86,000	52,000	8,100		117,000	75,000
5,160	13/64	86,000	52,000	8,200		117,000	75,000
5,200		86,000	52,000	8,250		117,000	75,000
5,220		86,000	52,000	8,300		117,000	75,000
5,250		86,000	52,000	8,330	21/64	117,000	75,000
5,300		86,000	52,000	8,400		117,000	75,000
5,310		93,000	57,000	8,450		117,000	75,000
5,350		93,000	57,000	8,500		117,000	75,000
5,400		93,000	57,000	8,550		125,000	81,000
5,410		93,000	57,000	8,600		125,000	81,000
5,420		93,000	57,000	8,700		125,000	81,000
5,450		93,000	57,000	8,730	11/32	125,000	81,000
5,500		93,000	57,000	8,750		125,000	81,000
5,530		93,000	57,000	8,800		125,000	81,000
5,550		93,000	57,000	8,850		125,000	81,000
5,560	7/32	93,000	57,000	8,900		125,000	81,000
5,600		93,000	57,000	9,000		125,000	81,000
5,610		93,000	57,000	9,050		125,000	81,000
5,620		93,000	57,000	9,100		125,000	81,000
5,650		93,000	57,000	9,130	23/64	125,000	81,000
5,700		93,000	57,000	9,150		125,000	81,000
5,750		93,000	57,000	9,200		125,000	81,000
5,790		93,000	57,000	9,250		125,000	81,000
5,800		93,000	57,000	9,300		125,000	81,000
5,850		93,000	57,000	9,350		125,000	81,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
9,400		125,000	81,000	13,100	33/64	151,000	101,000
9,500		125,000	81,000	13,200		151,000	101,000
9,520	3/8	133,000	87,000	13,250		160,000	108,000
9,550		133,000	87,000	13,300		160,000	108,000
9,600		133,000	87,000	13,400		160,000	108,000
9,650		133,000	87,000	13,490	17/32	160,000	108,000
9,700		133,000	87,000	13,500		160,000	108,000
9,750		133,000	87,000	13,600		160,000	108,000
9,800		133,000	87,000	13,700		160,000	108,000
9,900		133,000	87,000	13,750		160,000	108,000
9,920	25/64	133,000	87,000	13,800		160,000	108,000
9,950		133,000	87,000	13,900		160,000	108,000
10,000		133,000	87,000	14,000		160,000	108,000
10,050		133,000	87,000	14,100		169,000	114,000
10,080		133,000	87,000	14,200		169,000	114,000
10,100		133,000	87,000	14,250		169,000	114,000
10,200		133,000	87,000	14,300		169,000	114,000
10,250		133,000	87,000	14,400		169,000	114,000
10,300		133,000	87,000	14,500		169,000	114,000
10,320	13/32	133,000	87,000	14,600		169,000	114,000
10,400		133,000	87,000	14,680	37/64	169,000	114,000
10,500		133,000	87,000	14,700		169,000	114,000
10,600		133,000	87,000	14,750		169,000	114,000
10,700		142,000	94,000	14,800		169,000	114,000
10,720	27/64	142,000	94,000	14,900		169,000	114,000
10,750		142,000	94,000	15,000		169,000	114,000
10,800		142,000	94,000	15,080	19/32	178,000	120,000
10,900		142,000	94,000	15,100		178,000	120,000
11,000		142,000	94,000	15,200		178,000	120,000
11,100		142,000	94,000	15,250		178,000	120,000
11,110	7/16	142,000	94,000	15,400		178,000	120,000
11,150		142,000	94,000	15,500		178,000	120,000
11,200		142,000	94,000	15,600		178,000	120,000
11,250		142,000	94,000	15,700		178,000	120,000
11,300		142,000	94,000	15,750		178,000	120,000
11,400		142,000	94,000	15,800		178,000	120,000
11,500		142,000	94,000	15,870	5/8	178,000	120,000
11,510	29/64	142,000	94,000	16,000		178,000	120,000
11,600		142,000	94,000	16,100		184,000	125,000
11,700		142,000	94,000	16,200		184,000	125,000
11,750		142,000	94,000	16,250		184,000	125,000
11,800		142,000	94,000	16,270	41/64	184,000	125,000
11,900		151,000	101,000	16,500		184,000	125,000
11,910	15/32	151,000	101,000	16,700		184,000	125,000
12,000		151,000	101,000	16,900		184,000	125,000
12,050		151,000	101,000	17,000		184,000	125,000
12,100		151,000	101,000	17,250		191,000	130,000
12,200		151,000	101,000	17,500		191,000	130,000
12,250		151,000	101,000	17,750		191,000	130,000
12,300	31/64	151,000	101,000	17,800		191,000	130,000
12,400		151,000	101,000	18,000		191,000	130,000
12,500		151,000	101,000	18,500		198,000	135,000
12,600		151,000	101,000	18,750		198,000	135,000
12,650		151,000	101,000	19,000		198,000	135,000
12,700	1/2	151,000	101,000	19,250		205,000	140,000
12,750		151,000	101,000	19,500		205,000	140,000
12,800		151,000	101,000	20,000		205,000	140,000
12,850		151,000	101,000				
12,900		151,000	101,000				
13,000		151,000	101,000				



Brocas espirales cil., cortas

Artículo N° 81015

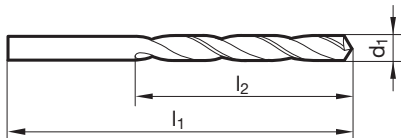


P	M	K	N	S	H
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vaciado de punta $\geq \emptyset 15,000$ • entrada cónica

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1	inch	l1	l2	d1	inch	l1	l2
mm		mm	mm	mm		mm	mm
0,250		19,000	3,000	2,600		57,000	30,000
0,300		19,000	3,000	2,700		61,000	33,000
0,370		19,000	4,000	2,750		61,000	33,000
0,400		20,000	5,000	2,800		61,000	33,000
0,500		22,000	6,000	2,900		61,000	33,000
0,550		24,000	7,000	3,000		61,000	33,000
0,600		24,000	7,000	3,050		65,000	36,000
0,650		26,000	8,000	3,100		65,000	36,000
0,700		28,000	9,000	3,150		65,000	36,000
0,800		30,000	10,000	3,200		65,000	36,000
0,900		32,000	11,000	3,250		65,000	36,000
0,950		32,000	11,000	3,300		65,000	36,000
1,000		34,000	12,000	3,350		65,000	36,000
1,050		34,000	12,000	3,400		70,000	39,000
1,100		36,000	14,000	3,450		70,000	39,000
1,150		36,000	14,000	3,500		70,000	39,000
1,170		36,000	14,000	3,550		70,000	39,000
1,190	3/64	38,000	16,000	3,600		70,000	39,000
1,200		38,000	16,000	3,650		70,000	39,000
1,250		38,000	16,000	3,700		70,000	39,000
1,300		38,000	16,000	3,750		70,000	39,000
1,350		40,000	18,000	3,800		75,000	43,000
1,400		40,000	18,000	3,850		75,000	43,000
1,450		40,000	18,000	3,900		75,000	43,000
1,500		40,000	18,000	3,950		75,000	43,000
1,550		43,000	20,000	4,000		75,000	43,000
1,560		43,000	20,000	4,100		75,000	43,000
1,600		43,000	20,000	4,150		75,000	43,000
1,700		43,000	20,000	4,200		75,000	43,000
1,800		46,000	22,000	4,250		75,000	43,000
1,850		46,000	22,000	4,300		80,000	47,000
1,900		46,000	22,000	4,350		80,000	47,000
2,000		49,000	24,000	4,400		80,000	47,000
2,050		49,000	24,000	4,450		80,000	47,000
2,100		49,000	24,000	4,500		80,000	47,000
2,150		53,000	27,000	4,550		80,000	47,000
2,200		53,000	27,000	4,600		80,000	47,000
2,250		53,000	27,000	4,650		80,000	47,000
2,300		53,000	27,000	4,700		80,000	47,000
2,400		57,000	30,000	4,750		80,000	47,000
2,500		57,000	30,000	4,800		86,000	52,000
2,550		57,000	30,000	4,850		86,000	52,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,900		86,000	52,000	8,700		125,000	81,000
4,950		86,000	52,000	8,800		125,000	81,000
5,000		86,000	52,000	8,900		125,000	81,000
5,100		86,000	52,000	9,000		125,000	81,000
5,200		86,000	52,000	9,100		125,000	81,000
5,250		86,000	52,000	9,200		125,000	81,000
5,300		86,000	52,000	9,300		125,000	81,000
5,400		93,000	57,000	9,400		125,000	81,000
5,450		93,000	57,000	9,500		125,000	81,000
5,500		93,000	57,000	9,600		133,000	87,000
5,600		93,000	57,000	9,700		133,000	87,000
5,650		93,000	57,000	9,750		133,000	87,000
5,700		93,000	57,000	9,800		133,000	87,000
5,750		93,000	57,000	9,900		133,000	87,000
5,800		93,000	57,000	10,000		133,000	87,000
5,850		93,000	57,000	10,100		133,000	87,000
5,900		93,000	57,000	10,200		133,000	87,000
5,950	15/64	93,000	57,000	10,300		133,000	87,000
6,000		93,000	57,000	10,500		133,000	87,000
6,100		101,000	63,000	10,750		142,000	94,000
6,200		101,000	63,000	10,900		142,000	94,000
6,250		101,000	63,000	11,000		142,000	94,000
6,300		101,000	63,000	11,100		142,000	94,000
6,400		101,000	63,000	11,250		142,000	94,000
6,500		101,000	63,000	11,500		142,000	94,000
6,600		101,000	63,000	11,750		142,000	94,000
6,650		101,000	63,000	11,800		142,000	94,000
6,700		101,000	63,000	12,000		151,000	101,000
6,750	17/64	109,000	69,000	12,250		151,000	101,000
6,800		109,000	69,000	12,500		151,000	101,000
6,900		109,000	69,000	12,700	1/2	151,000	101,000
7,000		109,000	69,000	12,750		151,000	101,000
7,100		109,000	69,000	12,800		151,000	101,000
7,200		109,000	69,000	13,000		151,000	101,000
7,250		109,000	69,000	13,800		160,000	108,000
7,300		109,000	69,000	14,000		160,000	108,000
7,400		109,000	69,000	15,000		169,000	114,000
7,500		109,000	69,000	15,500		178,000	120,000
7,600		117,000	75,000	16,000		178,000	120,000
7,700		117,000	75,000	17,000		184,000	125,000
7,800		117,000	75,000				
7,900		117,000	75,000				
8,000		117,000	75,000				
8,100		117,000	75,000				
8,200		117,000	75,000				
8,400		117,000	75,000				
8,500		117,000	75,000				
8,600		125,000	81,000				



Brocas espirales cil., cortas

Artículo N° 81017

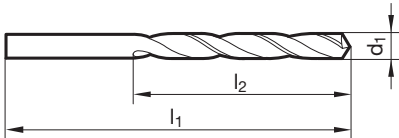


P	M	K	N	S	H
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vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • con arrastre según DIN 1809

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
3,000		61,000	33,000	6,750	17/64	109,000	69,000
3,100		65,000	36,000	6,800		109,000	69,000
3,200		65,000	36,000	7,000		109,000	69,000
3,300		65,000	36,000	7,200		109,000	69,000
3,400		70,000	39,000	7,500		109,000	69,000
3,500		70,000	39,000	7,700		117,000	75,000
3,600		70,000	39,000	7,750		117,000	75,000
3,700		70,000	39,000	7,800		117,000	75,000
3,800		75,000	43,000	7,900		117,000	75,000
4,000		75,000	43,000	8,000		117,000	75,000
4,100		75,000	43,000	8,100		117,000	75,000
4,200		75,000	43,000	8,250		117,000	75,000
4,300		80,000	47,000	8,400		117,000	75,000
4,400		80,000	47,000	8,500		117,000	75,000
4,500		80,000	47,000	8,600		125,000	81,000
4,600		80,000	47,000	8,700		125,000	81,000
4,700		80,000	47,000	8,800		125,000	81,000
4,800		86,000	52,000	8,900		125,000	81,000
4,900		86,000	52,000	9,000		125,000	81,000
5,000		86,000	52,000	9,100		125,000	81,000
5,100		86,000	52,000	9,500		125,000	81,000
5,200		86,000	52,000	9,800		133,000	87,000
5,400		93,000	57,000	9,900		133,000	87,000
5,500		93,000	57,000	10,000		133,000	87,000
5,600		93,000	57,000	10,200		133,000	87,000
5,700		93,000	57,000	10,500		133,000	87,000
5,750		93,000	57,000	12,000		151,000	101,000
5,800		93,000	57,000	13,000		151,000	101,000
5,900		93,000	57,000				
6,000		93,000	57,000				
6,100		101,000	63,000				
6,200		101,000	63,000				
6,300		101,000	63,000				
6,400		101,000	63,000				
6,500		101,000	63,000				
6,700		101,000	63,000				



Brocas espirales cil., cortas

Artículo N° 84405

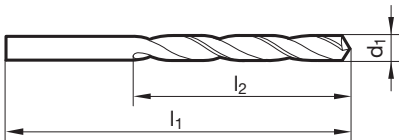


P	M	K	N	S	H
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vaciado de punta $\geq \varnothing 1,000$ • entrada cónica

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,400		20,000	5,000	2,700		61,000	33,000
0,500		22,000	6,000	2,750		61,000	33,000
0,600		24,000	7,000	2,800		61,000	33,000
0,610		26,000	8,000	2,850		61,000	33,000
0,700		28,000	9,000	2,900		61,000	33,000
0,800		30,000	10,000	2,950		61,000	33,000
0,820		30,000	10,000	3,000		61,000	33,000
0,900		32,000	11,000	3,050		65,000	36,000
1,000		34,000	12,000	3,100		65,000	36,000
1,020		34,000	12,000	3,150		65,000	36,000
1,100		36,000	14,000	3,200		65,000	36,000
1,150		36,000	14,000	3,250		65,000	36,000
1,200		38,000	16,000	3,300		65,000	36,000
1,250		38,000	16,000	3,400		70,000	39,000
1,300		38,000	16,000	3,450		70,000	39,000
1,350		40,000	18,000	3,500		70,000	39,000
1,400		40,000	18,000	3,550		70,000	39,000
1,450		40,000	18,000	3,600		70,000	39,000
1,500		40,000	18,000	3,650		70,000	39,000
1,550		43,000	20,000	3,700		70,000	39,000
1,600		43,000	20,000	3,750		70,000	39,000
1,650		43,000	20,000	3,800		75,000	43,000
1,700		43,000	20,000	3,900		75,000	43,000
1,750		46,000	22,000	3,950		75,000	43,000
1,800		46,000	22,000	4,000		75,000	43,000
1,820		46,000	22,000	4,100		75,000	43,000
1,900		46,000	22,000	4,150		75,000	43,000
2,000		49,000	24,000	4,200		75,000	43,000
2,050		49,000	24,000	4,250		75,000	43,000
2,100		49,000	24,000	4,300		80,000	47,000
2,150		53,000	27,000	4,400		80,000	47,000
2,200		53,000	27,000	4,500		80,000	47,000
2,250		53,000	27,000	4,600		80,000	47,000
2,300		53,000	27,000	4,700		80,000	47,000
2,400		57,000	30,000	4,800		86,000	52,000
2,450		57,000	30,000	4,900		86,000	52,000
2,500		57,000	30,000	5,000		86,000	52,000
2,520		57,000	30,000	5,100		86,000	52,000
2,530		57,000	30,000	5,200		86,000	52,000
2,550		57,000	30,000	5,250		86,000	52,000
2,600		57,000	30,000	5,300		86,000	52,000
2,650		57,000	30,000	5,400		93,000	57,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
5,500		93,000	57,000	10,200		133,000	87,000
5,600		93,000	57,000	10,300		133,000	87,000
5,700		93,000	57,000	10,500		133,000	87,000
5,800		93,000	57,000	10,600		133,000	87,000
5,900		93,000	57,000	10,700		142,000	94,000
6,000		93,000	57,000	10,750		142,000	94,000
6,040		101,000	63,000	10,800		142,000	94,000
6,100		101,000	63,000	11,000		142,000	94,000
6,200		101,000	63,000	11,100		142,000	94,000
6,300		101,000	63,000	11,200		142,000	94,000
6,350	1/4	101,000	63,000	11,250		142,000	94,000
6,400		101,000	63,000	11,300		142,000	94,000
6,500		101,000	63,000	11,400		142,000	94,000
6,550		101,000	63,000	11,500		142,000	94,000
6,600		101,000	63,000	11,600		142,000	94,000
6,700		101,000	63,000	11,700		142,000	94,000
6,750	17/64	109,000	69,000	11,750		142,000	94,000
6,800		109,000	69,000	11,800		142,000	94,000
6,900		109,000	69,000	11,900		151,000	101,000
7,000		109,000	69,000	12,000		151,000	101,000
7,100		109,000	69,000	12,100		151,000	101,000
7,200		109,000	69,000	12,200		151,000	101,000
7,300		109,000	69,000	12,300	31/64	151,000	101,000
7,400		109,000	69,000	12,500		151,000	101,000
7,500		109,000	69,000	12,700	1/2	151,000	101,000
7,600		117,000	75,000	12,800		151,000	101,000
7,700		117,000	75,000	12,900		151,000	101,000
7,750		117,000	75,000	13,000		151,000	101,000
7,800		117,000	75,000	13,100	33/64	151,000	101,000
7,900		117,000	75,000	13,250		160,000	108,000
8,000		117,000	75,000	13,500		160,000	108,000
8,100		117,000	75,000	13,750		160,000	108,000
8,200		117,000	75,000	14,000		160,000	108,000
8,300		117,000	75,000	14,200		169,000	114,000
8,400		117,000	75,000	14,250		169,000	114,000
8,500		117,000	75,000	14,500		169,000	114,000
8,600		125,000	81,000	14,750		169,000	114,000
8,700		125,000	81,000	15,000		169,000	114,000
8,750		125,000	81,000	15,250		178,000	120,000
8,800		125,000	81,000	15,500		178,000	120,000
8,900		125,000	81,000	15,750		178,000	120,000
9,000		125,000	81,000	15,800		178,000	120,000
9,100		125,000	81,000	16,000		178,000	120,000
9,200		125,000	81,000	16,500		184,000	125,000
9,300		125,000	81,000	17,000		184,000	125,000
9,400		125,000	81,000	17,500		191,000	130,000
9,500		125,000	81,000	18,000		191,000	130,000
9,600		133,000	87,000	18,500		198,000	135,000
9,700		133,000	87,000	19,000		198,000	135,000
9,750		133,000	87,000	19,500		205,000	140,000
9,800		133,000	87,000				
9,900		133,000	87,000				
10,000		133,000	87,000				
10,100		133,000	87,000				



Brocas espirales cil., cortas

Artículo N° 81020

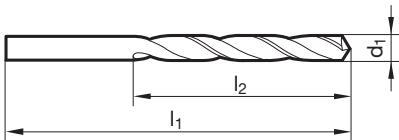


P	M	K	N	S	H
			•		



vaciado de punta $\geq \varnothing 14,500$ • entrada cónica

materiales duros y quebradizos • latón, aleaciones de magnesio • bronce y bronce al fósforo • pizarra, mica, Pertinax



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,300		19,000	3,000	2,120		49,000	24,000
0,320		19,000	4,000	2,200		53,000	27,000
0,400		20,000	5,000	2,250		53,000	27,000
0,440		20,000	5,000	2,300		53,000	27,000
0,450		20,000	5,000	2,400		57,000	30,000
0,480		20,000	5,000	2,450		57,000	30,000
0,500		22,000	6,000	2,500		57,000	30,000
0,560		24,000	7,000	2,550		57,000	30,000
0,600		24,000	7,000	2,600		57,000	30,000
0,650		26,000	8,000	2,700		61,000	33,000
0,700		28,000	9,000	2,780	7/64	61,000	33,000
0,750		28,000	9,000	2,800		61,000	33,000
0,800		30,000	10,000	2,900		61,000	33,000
0,810		30,000	10,000	2,950		61,000	33,000
0,840		30,000	10,000	3,000		61,000	33,000
0,900		32,000	11,000	3,020		65,000	36,000
0,910		32,000	11,000	3,050		65,000	36,000
0,950		32,000	11,000	3,070		65,000	36,000
1,000		34,000	12,000	3,100		65,000	36,000
1,050		34,000	12,000	3,150		65,000	36,000
1,100		36,000	14,000	3,200		65,000	36,000
1,150		36,000	14,000	3,250		65,000	36,000
1,200		38,000	16,000	3,300		65,000	36,000
1,250		38,000	16,000	3,350		65,000	36,000
1,280		38,000	16,000	3,400		70,000	39,000
1,300		38,000	16,000	3,500		70,000	39,000
1,310		38,000	16,000	3,550		70,000	39,000
1,400		40,000	18,000	3,600		70,000	39,000
1,420		40,000	18,000	3,700		70,000	39,000
1,450		40,000	18,000	3,750		70,000	39,000
1,500		40,000	18,000	3,800		75,000	43,000
1,510		43,000	20,000	3,850		75,000	43,000
1,550		43,000	20,000	3,900		75,000	43,000
1,600		43,000	20,000	4,000		75,000	43,000
1,700		43,000	20,000	4,050		75,000	43,000
1,800		46,000	22,000	4,100		75,000	43,000
1,850		46,000	22,000	4,200		75,000	43,000
1,900		46,000	22,000	4,250		75,000	43,000
1,950		49,000	24,000	4,300		80,000	47,000
2,000		49,000	24,000	4,400		80,000	47,000
2,050		49,000	24,000	4,500		80,000	47,000
2,100		49,000	24,000	4,600		80,000	47,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,700		80,000	47,000	8,900		125,000	81,000
4,750		80,000	47,000	9,000		125,000	81,000
4,800		86,000	52,000	9,100		125,000	81,000
4,900		86,000	52,000	9,200		125,000	81,000
5,000		86,000	52,000	9,250		125,000	81,000
5,100		86,000	52,000	9,300		125,000	81,000
5,200		86,000	52,000	9,400		125,000	81,000
5,250		86,000	52,000	9,500		125,000	81,000
5,300		86,000	52,000	9,600		133,000	87,000
5,400		93,000	57,000	9,700		133,000	87,000
5,500		93,000	57,000	9,750		133,000	87,000
5,600		93,000	57,000	9,800		133,000	87,000
5,700		93,000	57,000	9,900		133,000	87,000
5,750		93,000	57,000	10,000		133,000	87,000
5,800		93,000	57,000	10,050		133,000	87,000
5,900		93,000	57,000	10,100		133,000	87,000
6,000		93,000	57,000	10,200		133,000	87,000
6,100		101,000	63,000	10,500		133,000	87,000
6,200		101,000	63,000	10,600		133,000	87,000
6,250		101,000	63,000	10,800		142,000	94,000
6,300		101,000	63,000	11,000		142,000	94,000
6,400		101,000	63,000	11,200		142,000	94,000
6,500		101,000	63,000	11,500		142,000	94,000
6,600		101,000	63,000	12,000		151,000	101,000
6,700		101,000	63,000	12,100		151,000	101,000
6,800		109,000	69,000	12,500		151,000	101,000
6,900		109,000	69,000	12,700	1/2	151,000	101,000
7,000		109,000	69,000	13,000		151,000	101,000
7,050		109,000	69,000	14,000		160,000	108,000
7,100		109,000	69,000	14,500		169,000	114,000
7,200		109,000	69,000	15,000		169,000	114,000
7,250		109,000	69,000	15,100		178,000	120,000
7,300		109,000	69,000	15,250		178,000	120,000
7,400		109,000	69,000	15,500		178,000	120,000
7,500		109,000	69,000	16,000		178,000	120,000
7,600		117,000	75,000	18,000		191,000	130,000
7,700		117,000	75,000	19,000		198,000	135,000
7,800		117,000	75,000				
7,900		117,000	75,000				
8,000		117,000	75,000				
8,050		117,000	75,000				
8,100		117,000	75,000				
8,200		117,000	75,000				
8,400		117,000	75,000				
8,500		117,000	75,000				
8,600		125,000	81,000				
8,700		125,000	81,000				
8,800		125,000	81,000				

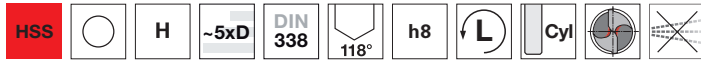


Brocas espirales cil., cortas

Artículo N° 81025

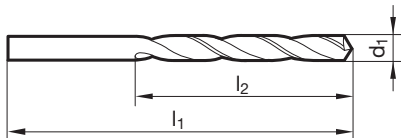


P	M	K	N	S	H
			•		



vaciado de punta $\geq \varnothing 14,500$ • entrada cónica

materiales duros y quebradizos • latón, aleaciones de magnesio • bronce y bronce al fósforo • pizarra, mica, Pertinax



d1	inch	l1	l2	d1	inch	l1	l2
mm		mm	mm	mm		mm	mm
0,500		22,000	6,000	2,250		53,000	27,000
0,580		24,000	7,000	2,300		53,000	27,000
0,670		26,000	8,000	2,350		53,000	27,000
0,690		28,000	9,000	2,400		57,000	30,000
0,700		28,000	9,000	2,430		57,000	30,000
0,750		28,000	9,000	2,500		57,000	30,000
0,800		30,000	10,000	2,600		57,000	30,000
0,900		32,000	11,000	2,700		61,000	33,000
0,950		32,000	11,000	2,750		61,000	33,000
1,000		34,000	12,000	2,800		61,000	33,000
1,040		34,000	12,000	2,900		61,000	33,000
1,050		34,000	12,000	3,000		61,000	33,000
1,100		36,000	14,000	3,100		65,000	36,000
1,150		36,000	14,000	3,150		65,000	36,000
1,180		36,000	14,000	3,200		65,000	36,000
1,200		38,000	16,000	3,250		65,000	36,000
1,240		38,000	16,000	3,300		65,000	36,000
1,290		38,000	16,000	3,400		70,000	39,000
1,300		38,000	16,000	3,500		70,000	39,000
1,310		38,000	16,000	3,700		70,000	39,000
1,330		40,000	18,000	3,750		70,000	39,000
1,350		40,000	18,000	3,800		75,000	43,000
1,400		40,000	18,000	3,850		75,000	43,000
1,460		40,000	18,000	3,900		75,000	43,000
1,470		40,000	18,000	4,000		75,000	43,000
1,480		40,000	18,000	4,100		75,000	43,000
1,500		40,000	18,000	4,200		75,000	43,000
1,600		43,000	20,000	4,250		75,000	43,000
1,700		43,000	20,000	4,300		80,000	47,000
1,710		46,000	22,000	4,350		80,000	47,000
1,730		46,000	22,000	4,400		80,000	47,000
1,800		46,000	22,000	4,500		80,000	47,000
1,900		46,000	22,000	4,600		80,000	47,000
1,920		49,000	24,000	4,700		80,000	47,000
1,950		49,000	24,000	4,750		80,000	47,000
2,000		49,000	24,000	4,800		86,000	52,000
2,030		49,000	24,000	4,850		86,000	52,000
2,050		49,000	24,000	4,950		86,000	52,000
2,060		49,000	24,000	5,000		86,000	52,000
2,100		49,000	24,000	5,100		86,000	52,000
2,150		53,000	27,000	5,200		86,000	52,000
2,200		53,000	27,000	5,300		86,000	52,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
5,400		93,000	57,000	8,200		117,000	75,000
5,500		93,000	57,000	8,300		117,000	75,000
5,750		93,000	57,000	8,500		117,000	75,000
5,800		93,000	57,000	8,600		125,000	81,000
5,900		93,000	57,000	8,700		125,000	81,000
6,000		93,000	57,000	9,000		125,000	81,000
6,100		101,000	63,000	9,200		125,000	81,000
6,200		101,000	63,000	9,400		125,000	81,000
6,250		101,000	63,000	9,500		125,000	81,000
6,350	1/4	101,000	63,000	9,800		133,000	87,000
6,400		101,000	63,000	10,000		133,000	87,000
6,500		101,000	63,000	10,200		133,000	87,000
6,600		101,000	63,000	11,500		142,000	94,000
6,900		109,000	69,000	12,000		151,000	101,000
7,000		109,000	69,000	13,500		160,000	108,000
7,100		109,000	69,000	14,500		169,000	114,000
7,200		109,000	69,000	15,500		178,000	120,000
7,300		109,000	69,000	16,000		178,000	120,000
7,700		117,000	75,000				
7,750		117,000	75,000				
7,800		117,000	75,000				
7,900		117,000	75,000				
8,000		117,000	75,000				
8,100		117,000	75,000				

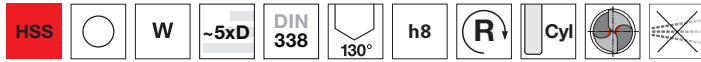


Brocas espirales cil., cortas

Artículo N° 81030

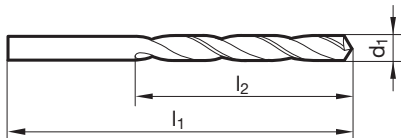


P	M	K	N	S	H
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vaciado de punta $\geq \emptyset 14,500$ • entrada cónica

mat. blandos y de viruta larga • aluminio, alea. de alum. (de vir. larga) • zink, cobre fino, siluminio, electrón • plásticos (blandos)
• madera



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,250		19,000	3,000	2,300		53,000	27,000
0,400		20,000	5,000	2,350		53,000	27,000
0,500		22,000	6,000	2,400		57,000	30,000
0,550		24,000	7,000	2,450		57,000	30,000
0,600		24,000	7,000	2,500		57,000	30,000
0,650		26,000	8,000	2,550		57,000	30,000
0,700		28,000	9,000	2,600		57,000	30,000
0,800		30,000	10,000	2,700		61,000	33,000
0,850		30,000	10,000	2,750		61,000	33,000
0,900		32,000	11,000	2,800		61,000	33,000
0,950		32,000	11,000	2,850		61,000	33,000
0,970		34,000	12,000	2,900		61,000	33,000
1,000		34,000	12,000	2,950		61,000	33,000
1,050		34,000	12,000	3,000		61,000	33,000
1,060		34,000	12,000	3,050		65,000	36,000
1,070		36,000	14,000	3,100		65,000	36,000
1,100		36,000	14,000	3,150		65,000	36,000
1,150		36,000	14,000	3,200		65,000	36,000
1,200		38,000	16,000	3,250		65,000	36,000
1,210		38,000	16,000	3,300		65,000	36,000
1,240		38,000	16,000	3,400		70,000	39,000
1,250		38,000	16,000	3,450		70,000	39,000
1,280		38,000	16,000	3,500		70,000	39,000
1,300		38,000	16,000	3,600		70,000	39,000
1,400		40,000	18,000	3,650		70,000	39,000
1,450		40,000	18,000	3,700		70,000	39,000
1,500		40,000	18,000	3,750		70,000	39,000
1,530		43,000	20,000	3,800		75,000	43,000
1,550		43,000	20,000	3,850		75,000	43,000
1,600		43,000	20,000	3,900		75,000	43,000
1,650		43,000	20,000	3,950		75,000	43,000
1,700		43,000	20,000	4,000		75,000	43,000
1,750		46,000	22,000	4,040		75,000	43,000
1,800		46,000	22,000	4,100		75,000	43,000
1,900		46,000	22,000	4,150		75,000	43,000
1,950		49,000	24,000	4,200		75,000	43,000
2,000		49,000	24,000	4,250		75,000	43,000
2,050		49,000	24,000	4,300		80,000	47,000
2,100		49,000	24,000	4,400		80,000	47,000
2,150		53,000	27,000	4,500		80,000	47,000
2,200		53,000	27,000	4,600		80,000	47,000
2,250		53,000	27,000	4,700		80,000	47,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,750		80,000	47,000	8,730	11/32	125,000	81,000
4,800		86,000	52,000	8,750		125,000	81,000
4,850		86,000	52,000	8,800		125,000	81,000
4,900		86,000	52,000	8,900		125,000	81,000
4,950		86,000	52,000	9,000		125,000	81,000
5,000		86,000	52,000	9,100		125,000	81,000
5,050		86,000	52,000	9,200		125,000	81,000
5,100		86,000	52,000	9,250		125,000	81,000
5,200		86,000	52,000	9,300		125,000	81,000
5,250		86,000	52,000	9,400		125,000	81,000
5,300		86,000	52,000	9,500		125,000	81,000
5,400		93,000	57,000	9,600		133,000	87,000
5,500		93,000	57,000	9,700		133,000	87,000
5,550		93,000	57,000	9,800		133,000	87,000
5,600		93,000	57,000	9,900		133,000	87,000
5,700		93,000	57,000	10,000		133,000	87,000
5,750		93,000	57,000	10,100		133,000	87,000
5,800		93,000	57,000	10,200		133,000	87,000
5,900		93,000	57,000	10,250		133,000	87,000
5,950	15/64	93,000	57,000	10,400		133,000	87,000
6,000		93,000	57,000	10,500		133,000	87,000
6,100		101,000	63,000	10,800		142,000	94,000
6,150		101,000	63,000	10,900		142,000	94,000
6,200		101,000	63,000	10,950		142,000	94,000
6,250		101,000	63,000	11,000		142,000	94,000
6,300		101,000	63,000	11,200		142,000	94,000
6,350	1/4	101,000	63,000	11,500		142,000	94,000
6,400		101,000	63,000	11,600		142,000	94,000
6,500		101,000	63,000	11,700		142,000	94,000
6,600		101,000	63,000	11,800		142,000	94,000
6,700		101,000	63,000	12,000		151,000	101,000
6,750	17/64	109,000	69,000	12,100		151,000	101,000
6,800		109,000	69,000	12,200		151,000	101,000
6,900		109,000	69,000	12,300	31/64	151,000	101,000
7,000		109,000	69,000	12,500		151,000	101,000
7,100		109,000	69,000	12,600		151,000	101,000
7,200		109,000	69,000	12,700	1/2	151,000	101,000
7,250		109,000	69,000	12,800		151,000	101,000
7,300		109,000	69,000	13,000		151,000	101,000
7,400		109,000	69,000	13,200		151,000	101,000
7,500		109,000	69,000	13,500		160,000	108,000
7,600		117,000	75,000	14,000		160,000	108,000
7,700		117,000	75,000	14,500		169,000	114,000
7,750		117,000	75,000	15,000		169,000	114,000
7,800		117,000	75,000	16,000		178,000	120,000
7,900		117,000	75,000	16,500		184,000	125,000
8,000		117,000	75,000				
8,100		117,000	75,000				
8,200		117,000	75,000				
8,300		117,000	75,000				
8,400		117,000	75,000				
8,500		117,000	75,000				
8,600		125,000	81,000				
8,700		125,000	81,000				

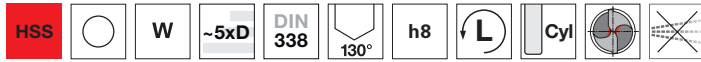


Brocas espirales cil., cortas

Artículo N° 81035

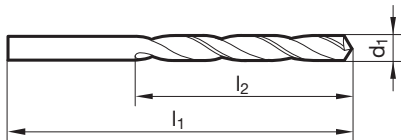


P	M	K	N	S	H
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vaciado de punta $\geq \varnothing 15,000$ • entrada cónica

mat. blandos y de viruta larga • aluminio, alea. de alum. (de vir. larga) • zink, cobre fino, siluminio, electrón • plásticos (blandos)
• madera



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,500		22,000	6,000	5,100		86,000	52,000
0,600		24,000	7,000	5,200		86,000	52,000
0,750		28,000	9,000	5,250		86,000	52,000
1,000		34,000	12,000	5,300		86,000	52,000
1,050		34,000	12,000	5,400		93,000	57,000
1,100		36,000	14,000	5,500		93,000	57,000
1,200		38,000	16,000	5,600		93,000	57,000
1,550		43,000	20,000	5,800		93,000	57,000
1,750		46,000	22,000	5,950	15/64	93,000	57,000
1,800		46,000	22,000	6,000		93,000	57,000
1,850		46,000	22,000	6,200		101,000	63,000
1,900		46,000	22,000	6,300		101,000	63,000
2,000		49,000	24,000	6,400		101,000	63,000
2,300		53,000	27,000	6,700		101,000	63,000
2,350		53,000	27,000	6,800		109,000	69,000
2,400		57,000	30,000	6,900		109,000	69,000
2,500		57,000	30,000	7,000		109,000	69,000
2,600		57,000	30,000	7,100		109,000	69,000
2,650		57,000	30,000	7,400		109,000	69,000
2,700		61,000	33,000	7,500		109,000	69,000
2,800		61,000	33,000	7,600		117,000	75,000
2,900		61,000	33,000	7,700		117,000	75,000
3,000		61,000	33,000	7,900		117,000	75,000
3,100		65,000	36,000	8,000		117,000	75,000
3,200		65,000	36,000	8,600		125,000	81,000
3,500		70,000	39,000	8,700		125,000	81,000
3,600		70,000	39,000	9,100		125,000	81,000
3,700		70,000	39,000	9,200		125,000	81,000
3,800		75,000	43,000	9,300		125,000	81,000
3,850		75,000	43,000	9,400		125,000	81,000
3,900		75,000	43,000	9,500		125,000	81,000
3,950		75,000	43,000	9,800		133,000	87,000
4,000		75,000	43,000	10,000		133,000	87,000
4,200		75,000	43,000	10,500		133,000	87,000
4,300		80,000	47,000	11,500		142,000	94,000
4,400		80,000	47,000	12,000		151,000	101,000
4,500		80,000	47,000	12,500		151,000	101,000
4,600		80,000	47,000	13,000		151,000	101,000
4,700		80,000	47,000	13,500		160,000	108,000
4,800		86,000	52,000	14,000		160,000	108,000
4,900		86,000	52,000	15,000		169,000	114,000
5,000		86,000	52,000				



Brocas espirales cil., cortas

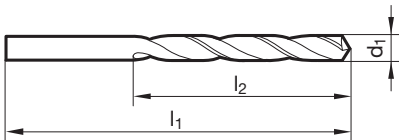
Artículo N° 81040



P	M	K	N	S	H
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vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • ranuras amplias • ideal para prof. de taladro sup. a 3xD
fundición gris • aceros de hasta 1400 N/mm² 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,800		30,000	10,000	3,300		65,000	36,000
1,000		34,000	12,000	3,350		65,000	36,000
1,100		36,000	14,000	3,400		70,000	39,000
1,200		38,000	16,000	3,450		70,000	39,000
1,300		38,000	16,000	3,500		70,000	39,000
1,350		40,000	18,000	3,550		70,000	39,000
1,400		40,000	18,000	3,600		70,000	39,000
1,450		40,000	18,000	3,700		70,000	39,000
1,500		40,000	18,000	3,800		75,000	43,000
1,550		43,000	20,000	3,900		75,000	43,000
1,570		43,000	20,000	3,950		75,000	43,000
1,600		43,000	20,000	4,000		75,000	43,000
1,650		43,000	20,000	4,050		75,000	43,000
1,700		43,000	20,000	4,090		75,000	43,000
1,800		46,000	22,000	4,100		75,000	43,000
1,850		46,000	22,000	4,200		75,000	43,000
1,900		46,000	22,000	4,250		75,000	43,000
1,950		49,000	24,000	4,300		80,000	47,000
2,000		49,000	24,000	4,400		80,000	47,000
2,050		49,000	24,000	4,500		80,000	47,000
2,100		49,000	24,000	4,550		80,000	47,000
2,150		53,000	27,000	4,600		80,000	47,000
2,200		53,000	27,000	4,650		80,000	47,000
2,300		53,000	27,000	4,700		80,000	47,000
2,350		53,000	27,000	4,800		86,000	52,000
2,400		57,000	30,000	4,900		86,000	52,000
2,490		57,000	30,000	4,920		86,000	52,000
2,500		57,000	30,000	5,000		86,000	52,000
2,550		57,000	30,000	5,030		86,000	52,000
2,600		57,000	30,000	5,100		86,000	52,000
2,700		61,000	33,000	5,200		86,000	52,000
2,750		61,000	33,000	5,250		86,000	52,000
2,800		61,000	33,000	5,300		86,000	52,000
2,850		61,000	33,000	5,400		93,000	57,000
2,900		61,000	33,000	5,500		93,000	57,000
3,000		61,000	33,000	5,600		93,000	57,000
3,050		65,000	36,000	5,700		93,000	57,000
3,100		65,000	36,000	5,800		93,000	57,000
3,150		65,000	36,000	5,850		93,000	57,000
3,200		65,000	36,000	5,900		93,000	57,000
3,250		65,000	36,000	5,950	15/64	93,000	57,000
3,260		65,000	36,000	6,000		93,000	57,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
6,050		101,000	63,000	9,800		133,000	87,000
6,100		101,000	63,000	9,900		133,000	87,000
6,200		101,000	63,000	10,000		133,000	87,000
6,300		101,000	63,000	10,200		133,000	87,000
6,400		101,000	63,000	10,300		133,000	87,000
6,450		101,000	63,000	10,400		133,000	87,000
6,500		101,000	63,000	10,500		133,000	87,000
6,600		101,000	63,000	10,600		133,000	87,000
6,700		101,000	63,000	10,700		142,000	94,000
6,750	17/64	109,000	69,000	10,800		142,000	94,000
6,800		109,000	69,000	10,900		142,000	94,000
6,900		109,000	69,000	11,000		142,000	94,000
7,000		109,000	69,000	11,100		142,000	94,000
7,100		109,000	69,000	11,200		142,000	94,000
7,200		109,000	69,000	11,300		142,000	94,000
7,300		109,000	69,000	11,400		142,000	94,000
7,400		109,000	69,000	11,500		142,000	94,000
7,500		109,000	69,000	11,600		142,000	94,000
7,600		117,000	75,000	11,700		142,000	94,000
7,700		117,000	75,000	11,800		142,000	94,000
7,750		117,000	75,000	12,000		151,000	101,000
7,800		117,000	75,000	12,200		151,000	101,000
7,900		117,000	75,000	12,300	31/64	151,000	101,000
8,000		117,000	75,000	12,400		151,000	101,000
8,100		117,000	75,000	12,500		151,000	101,000
8,200		117,000	75,000	12,800		151,000	101,000
8,250		117,000	75,000	13,000		151,000	101,000
8,300		117,000	75,000	13,500		160,000	108,000
8,400		117,000	75,000	14,000		160,000	108,000
8,500		117,000	75,000	14,500		169,000	114,000
8,600		125,000	81,000	15,000		169,000	114,000
8,700		125,000	81,000	15,400		178,000	120,000
8,800		125,000	81,000	15,500		178,000	120,000
8,900		125,000	81,000	16,000		178,000	120,000
9,000		125,000	81,000				
9,100		125,000	81,000				
9,200		125,000	81,000				
9,300		125,000	81,000				
9,400		125,000	81,000				
9,500		125,000	81,000				
9,600		133,000	87,000				
9,700		133,000	87,000				



Brocas espirales cil., cortas

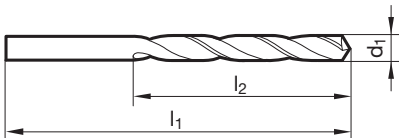
Artículo N° 81045



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 1,400$ • entrada cónica • ranuras amplias • ideal para prof. de taladro sup. a 3xD
fundición gris • aceros de hasta 1400 N/mm² 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,400		40,000	18,000	5,000		86,000	52,000
1,500		40,000	18,000	5,100		86,000	52,000
1,600		43,000	20,000	5,200		86,000	52,000
1,700		43,000	20,000	5,300		86,000	52,000
1,800		46,000	22,000	5,400		93,000	57,000
1,900		46,000	22,000	5,500		93,000	57,000
2,000		49,000	24,000	5,600		93,000	57,000
2,100		49,000	24,000	5,700		93,000	57,000
2,200		53,000	27,000	5,800		93,000	57,000
2,300		53,000	27,000	5,900		93,000	57,000
2,400		57,000	30,000	6,000		93,000	57,000
2,500		57,000	30,000	6,100		101,000	63,000
2,550		57,000	30,000	6,200		101,000	63,000
2,600		57,000	30,000	6,500		101,000	63,000
2,700		61,000	33,000	6,600		101,000	63,000
2,750		61,000	33,000	6,700		101,000	63,000
2,780	7/64	61,000	33,000	6,800		109,000	69,000
2,800		61,000	33,000	6,900		109,000	69,000
2,900		61,000	33,000	7,000		109,000	69,000
3,000		61,000	33,000	7,100		109,000	69,000
3,100		65,000	36,000	7,200		109,000	69,000
3,150		65,000	36,000	7,300		109,000	69,000
3,170	1/8	65,000	36,000	7,400		109,000	69,000
3,200		65,000	36,000	7,500		109,000	69,000
3,250		65,000	36,000	7,700		117,000	75,000
3,300		65,000	36,000	7,800		117,000	75,000
3,400		70,000	39,000	7,900		117,000	75,000
3,500		70,000	39,000	8,000		117,000	75,000
3,600		70,000	39,000	8,400		117,000	75,000
3,650		70,000	39,000	8,500		117,000	75,000
3,700		70,000	39,000	8,600		125,000	81,000
3,800		75,000	43,000	8,700		125,000	81,000
3,900		75,000	43,000	8,800		125,000	81,000
4,000		75,000	43,000	8,900		125,000	81,000
4,100		75,000	43,000	9,000		125,000	81,000
4,200		75,000	43,000	9,200		125,000	81,000
4,300		80,000	47,000	9,300		125,000	81,000
4,500		80,000	47,000	9,500		125,000	81,000
4,600		80,000	47,000	9,600		133,000	87,000
4,700		80,000	47,000	9,700		133,000	87,000
4,800		86,000	52,000	9,900		133,000	87,000
4,900		86,000	52,000	10,000		133,000	87,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
10,100		133,000	87,000	11,900		151,000	101,000
10,300		133,000	87,000	13,500		160,000	108,000
10,400		133,000	87,000	14,500		169,000	114,000
10,500		133,000	87,000	15,000		169,000	114,000
10,600		133,000	87,000	15,500		178,000	120,000
10,700		142,000	94,000	16,000		178,000	120,000
10,800		142,000	94,000				
11,000		142,000	94,000				
11,100		142,000	94,000				
11,300		142,000	94,000				
11,500		142,000	94,000				
11,700		142,000	94,000				



Brocas espirales cil., cortas

Artículo N° 84406

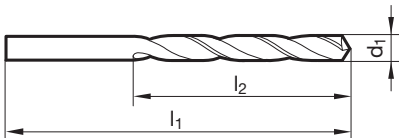


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • recubrimiento de la cabeza

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		34,000	12,000	4,300		80,000	47,000
1,100		36,000	14,000	4,370	11/64	80,000	47,000
1,190	3/64	38,000	16,000	4,400		80,000	47,000
1,200		38,000	16,000	4,500		80,000	47,000
1,300		38,000	16,000	4,600		80,000	47,000
1,400		40,000	18,000	4,700		80,000	47,000
1,500		40,000	18,000	4,760	3/16	86,000	52,000
1,590	1/16	43,000	20,000	4,800		86,000	52,000
1,600		43,000	20,000	4,900		86,000	52,000
1,700		43,000	20,000	5,000		86,000	52,000
1,800		46,000	22,000	5,100		86,000	52,000
1,900		46,000	22,000	5,160	13/64	86,000	52,000
1,980	5/64	49,000	24,000	5,200		86,000	52,000
2,000		49,000	24,000	5,300		86,000	52,000
2,100		49,000	24,000	5,400		93,000	57,000
2,200		53,000	27,000	5,500		93,000	57,000
2,300		53,000	27,000	5,560	7/32	93,000	57,000
2,380	3/32	57,000	30,000	5,600		93,000	57,000
2,400		57,000	30,000	5,700		93,000	57,000
2,440		57,000	30,000	5,800		93,000	57,000
2,500		57,000	30,000	5,900		93,000	57,000
2,600		57,000	30,000	5,950	15/64	93,000	57,000
2,700		61,000	33,000	6,000		93,000	57,000
2,780	7/64	61,000	33,000	6,100		101,000	63,000
2,800		61,000	33,000	6,200		101,000	63,000
2,900		61,000	33,000	6,300		101,000	63,000
3,000		61,000	33,000	6,350	1/4	101,000	63,000
3,100		65,000	36,000	6,400		101,000	63,000
3,170	1/8	65,000	36,000	6,500		101,000	63,000
3,200		65,000	36,000	6,600		101,000	63,000
3,300		65,000	36,000	6,700		101,000	63,000
3,400		70,000	39,000	6,750	17/64	109,000	69,000
3,500		70,000	39,000	6,800		109,000	69,000
3,570	9/64	70,000	39,000	6,900		109,000	69,000
3,600		70,000	39,000	7,000		109,000	69,000
3,700		70,000	39,000	7,100		109,000	69,000
3,800		75,000	43,000	7,140	9/32	109,000	69,000
3,900		75,000	43,000	7,200		109,000	69,000
3,970	5/32	75,000	43,000	7,300		109,000	69,000
4,000		75,000	43,000	7,400		109,000	69,000
4,100		75,000	43,000	7,500		109,000	69,000
4,200		75,000	43,000	7,540	19/64	117,000	75,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
7,600		117,000	75,000	11,500		142,000	94,000
7,700		117,000	75,000	11,510	29/64	142,000	94,000
7,800		117,000	75,000	11,600		142,000	94,000
7,900		117,000	75,000	11,700		142,000	94,000
7,940	5/16	117,000	75,000	11,800		142,000	94,000
8,000		117,000	75,000	11,900		151,000	101,000
8,100		117,000	75,000	11,910	15/32	151,000	101,000
8,200		117,000	75,000	12,000		151,000	101,000
8,300		117,000	75,000	12,100		151,000	101,000
8,330	21/64	117,000	75,000	12,200		151,000	101,000
8,400		117,000	75,000	12,300	31/64	151,000	101,000
8,500		117,000	75,000	12,400		151,000	101,000
8,600		125,000	81,000	12,500		151,000	101,000
8,700		125,000	81,000	12,600		151,000	101,000
8,730	11/32	125,000	81,000	12,700	1/2	151,000	101,000
8,800		125,000	81,000	12,800		151,000	101,000
8,900		125,000	81,000	12,900		151,000	101,000
9,000		125,000	81,000	13,000		151,000	101,000
9,100		125,000	81,000	13,100	33/64	151,000	101,000
9,130	23/64	125,000	81,000	13,200		151,000	101,000
9,200		125,000	81,000	13,250		160,000	108,000
9,300		125,000	81,000	13,300		160,000	108,000
9,400		125,000	81,000	13,400		160,000	108,000
9,500		125,000	81,000	13,490	17/32	160,000	108,000
9,520	3/8	133,000	87,000	13,500		160,000	108,000
9,600		133,000	87,000	13,600		160,000	108,000
9,700		133,000	87,000	13,700		160,000	108,000
9,800		133,000	87,000	13,750		160,000	108,000
9,900		133,000	87,000	13,800		160,000	108,000
9,920	25/64	133,000	87,000	13,890	35/64	160,000	108,000
10,000		133,000	87,000	13,900		160,000	108,000
10,100		133,000	87,000	14,000		160,000	108,000
10,200		133,000	87,000	14,250		169,000	114,000
10,300		133,000	87,000	14,290	9/16	169,000	114,000
10,320	13/32	133,000	87,000	14,500		169,000	114,000
10,400		133,000	87,000	14,680	37/64	169,000	114,000
10,500		133,000	87,000	14,750		169,000	114,000
10,600		133,000	87,000	15,000		169,000	114,000
10,700		142,000	94,000	15,080	19/32	178,000	120,000
10,720	27/64	142,000	94,000	15,250		178,000	120,000
10,800		142,000	94,000	15,480	39/64	178,000	120,000
10,900		142,000	94,000	15,500		178,000	120,000
11,000		142,000	94,000	15,750		178,000	120,000
11,100		142,000	94,000	16,000		178,000	120,000
11,110	7/16	142,000	94,000				
11,200		142,000	94,000				
11,300		142,000	94,000				
11,400		142,000	94,000				

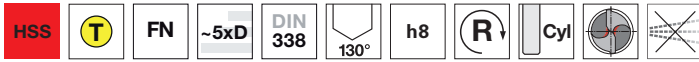


Brocas espirales cil., cortas

Artículo N° 84415



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • ranuras amplias • ideal para prof. de taladro sup. a 3xD
 fundición gris • aceros de hasta 1400 N/mm² 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares

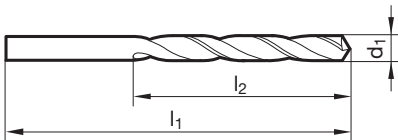
Artículo N° 84502



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • ranuras amplias • ideal para prof. de taladro sup. a 3xD
 fundición gris • aceros de hasta 1400 N/mm² 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1		l1	l2	d1		l1	l2
mm	inch	mm	mm	mm	inch	mm	mm
1,000		34,000	12,000	3,900		75,000	43,000
1,100		36,000	14,000	4,000		75,000	43,000
1,200		38,000	16,000	4,100		75,000	43,000
1,300		38,000	16,000	4,200		75,000	43,000
1,400		40,000	18,000	4,300		80,000	47,000
1,500		40,000	18,000	4,400		80,000	47,000
1,600		43,000	20,000	4,500		80,000	47,000
1,700		43,000	20,000	4,600		80,000	47,000
1,800		46,000	22,000	4,700		80,000	47,000
1,900		46,000	22,000	4,800		86,000	52,000
2,000		49,000	24,000	4,900		86,000	52,000
2,100		49,000	24,000	5,000		86,000	52,000
2,200		53,000	27,000	5,100		86,000	52,000
2,300		53,000	27,000	5,200		86,000	52,000
2,400		57,000	30,000	5,300		86,000	52,000
2,500		57,000	30,000	5,400		93,000	57,000
2,600		57,000	30,000	5,500		93,000	57,000
2,700		61,000	33,000	5,600		93,000	57,000
2,800		61,000	33,000	5,700		93,000	57,000
2,900		61,000	33,000	5,800		93,000	57,000
3,000		61,000	33,000	5,900		93,000	57,000
3,100		65,000	36,000	6,000		93,000	57,000
3,170	1/8	65,000	36,000	6,100		101,000	63,000
3,200		65,000	36,000	6,200		101,000	63,000
3,300		65,000	36,000	6,300		101,000	63,000
3,400		70,000	39,000	6,400		101,000	63,000
3,500		70,000	39,000	6,500		101,000	63,000
3,600		70,000	39,000	6,600		101,000	63,000
3,700		70,000	39,000	6,700		101,000	63,000
3,800		75,000	43,000	6,800		109,000	69,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
6,900		109,000	69,000	9,900		133,000	87,000
7,000		109,000	69,000	10,000		133,000	87,000
7,100		109,000	69,000	10,100		133,000	87,000
7,200		109,000	69,000	10,200		133,000	87,000
7,300		109,000	69,000	10,300		133,000	87,000
7,400		109,000	69,000	10,400		133,000	87,000
7,500		109,000	69,000	10,500		133,000	87,000
7,600		117,000	75,000	10,700		142,000	94,000
7,700		117,000	75,000	10,800		142,000	94,000
7,800		117,000	75,000	11,000		142,000	94,000
7,900		117,000	75,000	11,400		142,000	94,000
8,000		117,000	75,000	11,500		142,000	94,000
8,100		117,000	75,000	11,600		142,000	94,000
8,200		117,000	75,000	11,700		142,000	94,000
8,300		117,000	75,000	11,800		142,000	94,000
8,400		117,000	75,000	12,000		151,000	101,000
8,500		117,000	75,000	12,100		151,000	101,000
8,600		125,000	81,000	12,200		151,000	101,000
8,700		125,000	81,000	12,300	31/64	151,000	101,000
8,800		125,000	81,000	12,500		151,000	101,000
8,900		125,000	81,000	12,700	1/2	151,000	101,000
9,000		125,000	81,000	12,800		151,000	101,000
9,100		125,000	81,000	13,000		151,000	101,000
9,200		125,000	81,000	13,500		160,000	108,000
9,300		125,000	81,000	14,000		160,000	108,000
9,400		125,000	81,000	15,000		169,000	114,000
9,500		125,000	81,000	16,000		178,000	120,000
9,600		133,000	87,000				
9,700		133,000	87,000				
9,800		133,000	87,000				

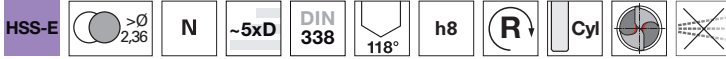


Brocas espirales cil., cortas

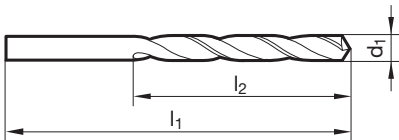
Artículo N° 81011



P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste
 aceros y fundición de aceros (aleados y sin alea) • fundición de dureza sup. a 800 N/mm² • aceros para trab. en frío y en caliente
 • aceros para rodamientos • aceros altamente aleados • aceros de cementación, de bonificación



d1	inch	l1	l2	d1	inch	l1	l2
mm		mm	mm	mm		mm	mm
0,200		19,000	2,500	1,850		46,000	22,000
0,250		19,000	3,000	1,860		46,000	22,000
0,300		19,000	3,000	1,900		46,000	22,000
0,350		19,000	4,000	1,950		49,000	24,000
0,400		20,000	5,000	2,000		49,000	24,000
0,430		20,000	5,000	2,030		49,000	24,000
0,450		20,000	5,000	2,050		49,000	24,000
0,500		22,000	6,000	2,100		49,000	24,000
0,550		24,000	7,000	2,150		53,000	27,000
0,600		24,000	7,000	2,200		53,000	27,000
0,650		26,000	8,000	2,250		53,000	27,000
0,680		28,000	9,000	2,300		53,000	27,000
0,700		28,000	9,000	2,400		57,000	30,000
0,750		28,000	9,000	2,450		57,000	30,000
0,800		30,000	10,000	2,500		57,000	30,000
0,850		30,000	10,000	2,550		57,000	30,000
0,860		32,000	11,000	2,600		57,000	30,000
0,870		32,000	11,000	2,650		57,000	30,000
0,900		32,000	11,000	2,700		61,000	33,000
0,950		32,000	11,000	2,750		61,000	33,000
0,980		34,000	12,000	2,800		61,000	33,000
1,000		34,000	12,000	2,850		61,000	33,000
1,050		34,000	12,000	2,900		61,000	33,000
1,100		36,000	14,000	2,950		61,000	33,000
1,150		36,000	14,000	3,000		61,000	33,000
1,170		36,000	14,000	3,050		65,000	36,000
1,200		38,000	16,000	3,100		65,000	36,000
1,230		38,000	16,000	3,150		65,000	36,000
1,250		38,000	16,000	3,200		65,000	36,000
1,300		38,000	16,000	3,250		65,000	36,000
1,350		40,000	18,000	3,300		65,000	36,000
1,370		40,000	18,000	3,400		70,000	39,000
1,400		40,000	18,000	3,500		70,000	39,000
1,450		40,000	18,000	3,600		70,000	39,000
1,500		40,000	18,000	3,700		70,000	39,000
1,550		43,000	20,000	3,750		70,000	39,000
1,600		43,000	20,000	3,800		75,000	43,000
1,650		43,000	20,000	3,900		75,000	43,000
1,700		43,000	20,000	4,000		75,000	43,000
1,750		46,000	22,000	4,050		75,000	43,000
1,800		46,000	22,000	4,100		75,000	43,000
1,820		46,000	22,000	4,200		75,000	43,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,250		75,000	43,000	9,400		125,000	81,000
4,300		80,000	47,000	9,500		125,000	81,000
4,400		80,000	47,000	9,520	3/8	133,000	87,000
4,500		80,000	47,000	9,600		133,000	87,000
4,550		80,000	47,000	9,700		133,000	87,000
4,600		80,000	47,000	9,800		133,000	87,000
4,700		80,000	47,000	9,900		133,000	87,000
4,800		86,000	52,000	10,000		133,000	87,000
4,850		86,000	52,000	10,050		133,000	87,000
4,900		86,000	52,000	10,100		133,000	87,000
5,000		86,000	52,000	10,200		133,000	87,000
5,020		86,000	52,000	10,250		133,000	87,000
5,050		86,000	52,000	10,300		133,000	87,000
5,100		86,000	52,000	10,400		133,000	87,000
5,150		86,000	52,000	10,500		133,000	87,000
5,200		86,000	52,000	10,600		133,000	87,000
5,250		86,000	52,000	10,720	27/64	142,000	94,000
5,300		86,000	52,000	10,800		142,000	94,000
5,400		93,000	57,000	10,900		142,000	94,000
5,500		93,000	57,000	11,000		142,000	94,000
5,600		93,000	57,000	11,100		142,000	94,000
5,700		93,000	57,000	11,200		142,000	94,000
5,800		93,000	57,000	11,250		142,000	94,000
5,900		93,000	57,000	11,300		142,000	94,000
6,000		93,000	57,000	11,500		142,000	94,000
6,050		101,000	63,000	11,700		142,000	94,000
6,100		101,000	63,000	11,750		142,000	94,000
6,150		101,000	63,000	11,800		142,000	94,000
6,200		101,000	63,000	12,000		151,000	101,000
6,300		101,000	63,000	12,200		151,000	101,000
6,350	1/4	101,000	63,000	12,400		151,000	101,000
6,400		101,000	63,000	12,500		151,000	101,000
6,500		101,000	63,000	12,600		151,000	101,000
6,600		101,000	63,000	12,700	1/2	151,000	101,000
6,700		101,000	63,000	12,800		151,000	101,000
6,750	17/64	109,000	69,000	12,900		151,000	101,000
6,800		109,000	69,000	13,000		151,000	101,000
6,900		109,000	69,000	13,200		151,000	101,000
7,000		109,000	69,000	13,300		160,000	108,000
7,100		109,000	69,000	13,400		160,000	108,000
7,140	9/32	109,000	69,000	13,500		160,000	108,000
7,200		109,000	69,000	13,600		160,000	108,000
7,300		109,000	69,000	13,700		160,000	108,000
7,400		109,000	69,000	13,800		160,000	108,000
7,500		109,000	69,000	14,000		160,000	108,000
7,600		117,000	75,000	14,200		169,000	114,000
7,700		117,000	75,000	14,500		169,000	114,000
7,800		117,000	75,000	15,000		169,000	114,000
7,900		117,000	75,000	15,250		178,000	120,000
8,000		117,000	75,000	15,500		178,000	120,000
8,100		117,000	75,000	15,870	5/8	178,000	120,000
8,200		117,000	75,000	16,000		178,000	120,000
8,300		117,000	75,000	16,500		184,000	125,000
8,400		117,000	75,000	17,000		184,000	125,000
8,500		117,000	75,000	17,500		191,000	130,000
8,600		125,000	81,000	19,000		198,000	135,000
8,700		125,000	81,000	20,000		205,000	140,000
8,730	11/32	125,000	81,000				
8,750		125,000	81,000				
8,800		125,000	81,000				
8,900		125,000	81,000				
9,000		125,000	81,000				
9,100		125,000	81,000				
9,200		125,000	81,000				
9,250		125,000	81,000				
9,300		125,000	81,000				



Brocas espirales cil., cortas

Artículo N° 81041

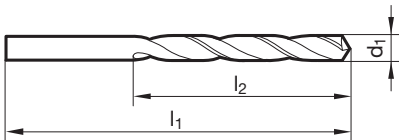


P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste • ranuras amplias • ideal para prof. de taladro sup. a 3xD

fundición gris y aceros de más de 80 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • aceros altamente aleados • aceros de cementación, de bonificación



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		34,000	12,000	3,650		70,000	39,000
1,100		36,000	14,000	3,700		70,000	39,000
1,200		38,000	16,000	3,800		75,000	43,000
1,250		38,000	16,000	3,900		75,000	43,000
1,300		38,000	16,000	4,000		75,000	43,000
1,400		40,000	18,000	4,050		75,000	43,000
1,500		40,000	18,000	4,100		75,000	43,000
1,550		43,000	20,000	4,200		75,000	43,000
1,600		43,000	20,000	4,300		80,000	47,000
1,650		43,000	20,000	4,400		80,000	47,000
1,700		43,000	20,000	4,500		80,000	47,000
1,800		46,000	22,000	4,600		80,000	47,000
1,850		46,000	22,000	4,700		80,000	47,000
1,900		46,000	22,000	4,800		86,000	52,000
1,950		49,000	24,000	4,900		86,000	52,000
2,000		49,000	24,000	5,000		86,000	52,000
2,050		49,000	24,000	5,100		86,000	52,000
2,100		49,000	24,000	5,200		86,000	52,000
2,200		53,000	27,000	5,300		86,000	52,000
2,300		53,000	27,000	5,400		93,000	57,000
2,350		53,000	27,000	5,500		93,000	57,000
2,400		57,000	30,000	5,600		93,000	57,000
2,500		57,000	30,000	5,700		93,000	57,000
2,550		57,000	30,000	5,800		93,000	57,000
2,600		57,000	30,000	5,900		93,000	57,000
2,650		57,000	30,000	6,000		93,000	57,000
2,700		61,000	33,000	6,100		101,000	63,000
2,750		61,000	33,000	6,200		101,000	63,000
2,780	7/64	61,000	33,000	6,300		101,000	63,000
2,800		61,000	33,000	6,400		101,000	63,000
2,900		61,000	33,000	6,500		101,000	63,000
3,000		61,000	33,000	6,600		101,000	63,000
3,050		65,000	36,000	6,700		101,000	63,000
3,100		65,000	36,000	6,750	17/64	109,000	69,000
3,150		65,000	36,000	6,800		109,000	69,000
3,200		65,000	36,000	6,900		109,000	69,000
3,250		65,000	36,000	7,000		109,000	69,000
3,300		65,000	36,000	7,100		109,000	69,000
3,400		70,000	39,000	7,200		109,000	69,000
3,450		70,000	39,000	7,300		109,000	69,000
3,500		70,000	39,000	7,400		109,000	69,000
3,600		70,000	39,000	7,500		109,000	69,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
7,600		117,000	75,000	10,200		133,000	87,000
7,700		117,000	75,000	10,300		133,000	87,000
7,800		117,000	75,000	10,700		142,000	94,000
7,900		117,000	75,000	10,800		142,000	94,000
8,000		117,000	75,000	10,900		142,000	94,000
8,100		117,000	75,000	11,000		142,000	94,000
8,200		117,000	75,000	11,100		142,000	94,000
8,300		117,000	75,000	11,200		142,000	94,000
8,400		117,000	75,000	11,400		142,000	94,000
8,500		117,000	75,000	11,600		142,000	94,000
8,600		125,000	81,000	11,700		142,000	94,000
8,700		125,000	81,000	11,800		142,000	94,000
8,800		125,000	81,000	12,000		151,000	101,000
8,900		125,000	81,000	12,500		151,000	101,000
9,000		125,000	81,000	12,700	1/2	151,000	101,000
9,100		125,000	81,000				
9,200		125,000	81,000				
9,300		125,000	81,000				
9,400		125,000	81,000				
9,500		125,000	81,000				
9,700		133,000	87,000				
9,800		133,000	87,000				
9,900		133,000	87,000				
10,000		133,000	87,000				

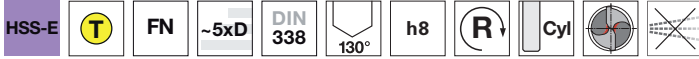


Brocas espirales cil., cortas

Artículo N° 84800



P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste • ranuras amplias • ideal para prof. de taladro sup. a 3xD

fundición gris y aceros de más de 80 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • aceros altamente aleados • aceros de cementación, de bonificación

Artículo N° 84504

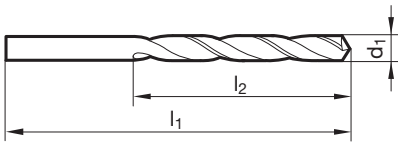


P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • ranuras amplias • más resistencia al desgaste • ideal para prof. de taladro sup. a 3xD

fundición gris y aceros de más de 80 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • aceros altamente aleados • aceros de cementación, de bonificación



d1	inch	l1	l2	d1	inch	l1	l2
mm		mm	mm	mm		mm	mm
1,000		34,000	12,000	3,500		70,000	39,000
1,100		36,000	14,000	3,600		70,000	39,000
1,200		38,000	16,000	3,700		70,000	39,000
1,300		38,000	16,000	3,800		75,000	43,000
1,400		40,000	18,000	3,900		75,000	43,000
1,500		40,000	18,000	4,000		75,000	43,000
1,600		43,000	20,000	4,100		75,000	43,000
1,700		43,000	20,000	4,200		75,000	43,000
1,800		46,000	22,000	4,300		80,000	47,000
1,900		46,000	22,000	4,400		80,000	47,000
1,930		49,000	24,000	4,500		80,000	47,000
2,000		49,000	24,000	4,600		80,000	47,000
2,100		49,000	24,000	4,700		80,000	47,000
2,200		53,000	27,000	4,800		86,000	52,000
2,250		53,000	27,000	4,900		86,000	52,000
2,300		53,000	27,000	5,000		86,000	52,000
2,400		57,000	30,000	5,100		86,000	52,000
2,450		57,000	30,000	5,200		86,000	52,000
2,500		57,000	30,000	5,300		86,000	52,000
2,600		57,000	30,000	5,400		93,000	57,000
2,700		61,000	33,000	5,500		93,000	57,000
2,800		61,000	33,000	5,560	7/32	93,000	57,000
2,900		61,000	33,000	5,600		93,000	57,000
2,950		61,000	33,000	5,700		93,000	57,000
3,000		61,000	33,000	5,800		93,000	57,000
3,100		65,000	36,000	5,900		93,000	57,000
3,200		65,000	36,000	6,000		93,000	57,000
3,250		65,000	36,000	6,100		101,000	63,000
3,300		65,000	36,000	6,200		101,000	63,000
3,400		70,000	39,000	6,300		101,000	63,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
6,400		101,000	63,000	9,400		125,000	81,000
6,500		101,000	63,000	9,500		125,000	81,000
6,600		101,000	63,000	9,600		133,000	87,000
6,700		101,000	63,000	9,700		133,000	87,000
6,800		109,000	69,000	9,800		133,000	87,000
6,900		109,000	69,000	9,900		133,000	87,000
7,000		109,000	69,000	10,000		133,000	87,000
7,100		109,000	69,000	10,100		133,000	87,000
7,200		109,000	69,000	10,200		133,000	87,000
7,300		109,000	69,000	10,300		133,000	87,000
7,400		109,000	69,000	10,400		133,000	87,000
7,500		109,000	69,000	10,500		133,000	87,000
7,600		117,000	75,000	10,700		142,000	94,000
7,700		117,000	75,000	10,800		142,000	94,000
7,800		117,000	75,000	11,000		142,000	94,000
7,900		117,000	75,000	11,200		142,000	94,000
8,000		117,000	75,000	11,500		142,000	94,000
8,100		117,000	75,000	11,700		142,000	94,000
8,200		117,000	75,000	11,800		142,000	94,000
8,300		117,000	75,000	12,000		151,000	101,000
8,400		117,000	75,000	12,500		151,000	101,000
8,500		117,000	75,000	13,000		151,000	101,000
8,600		125,000	81,000				
8,700		125,000	81,000				
8,800		125,000	81,000				
8,900		125,000	81,000				
9,000		125,000	81,000				
9,100		125,000	81,000				
9,200		125,000	81,000				
9,300		125,000	81,000				



Brocas espirales cil., cortas

Artículo N° 84804



P	M	K	N	S	H
•	•	•	•		



vaciado de punta $\geq \varnothing 1,000$ • afilado plano • acero rápido al cobalto • se requiere poca fuerza de avance • se requiere poco par • aplicación universal

aceros aleados y no aleados fundición de dureza hasta a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • metales no ferríticos • fundición • aceros inoxidables • plásticos

Artículo N° 84802

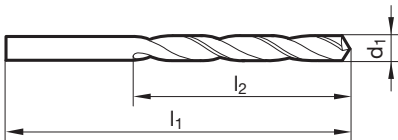


P	M	K	N	S	H
•	•	•	•		



vaciado de punta $\geq \varnothing 1,000$ • afilado plano • acero rápido al cobalto • se requiere poca fuerza de avance • se requiere poco par • más resistencia al desgaste • aplicación universal

aceros aleados y no aleados fundición de dureza hasta a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • metales no ferríticos • fundición • aceros inoxidables • plásticos



d1		l1	l2	d1		l1	l2
mm	inch	mm	mm	mm	inch	mm	mm
1,000		34,000	12,000	3,600		70,000	39,000
1,100		36,000	14,000	3,700		70,000	39,000
1,200		38,000	16,000	3,800		75,000	43,000
1,300		38,000	16,000	3,900		75,000	43,000
1,400		40,000	18,000	3,970	5/32	75,000	43,000
1,500		40,000	18,000	4,000		75,000	43,000
1,600		43,000	20,000	4,100		75,000	43,000
1,700		43,000	20,000	4,200		75,000	43,000
1,800		46,000	22,000	4,300		80,000	47,000
1,900		46,000	22,000	4,370	11/64	80,000	47,000
2,000		49,000	24,000	4,400		80,000	47,000
2,100		49,000	24,000	4,500		80,000	47,000
2,200		53,000	27,000	4,600		80,000	47,000
2,300		53,000	27,000	4,650		80,000	47,000
2,380	3/32	57,000	30,000	4,700		80,000	47,000
2,400		57,000	30,000	4,760	3/16	86,000	52,000
2,500		57,000	30,000	4,800		86,000	52,000
2,600		57,000	30,000	4,900		86,000	52,000
2,700		61,000	33,000	5,000		86,000	52,000
2,780	7/64	61,000	33,000	5,100		86,000	52,000
2,800		61,000	33,000	5,160	13/64	86,000	52,000
2,900		61,000	33,000	5,200		86,000	52,000
3,000		61,000	33,000	5,300		86,000	52,000
3,100		65,000	36,000	5,400		93,000	57,000
3,170	1/8	65,000	36,000	5,500		93,000	57,000
3,200		65,000	36,000	5,550		93,000	57,000
3,300		65,000	36,000	5,560	7/32	93,000	57,000
3,400		70,000	39,000	5,600		93,000	57,000
3,500		70,000	39,000	5,700		93,000	57,000
3,570	9/64	70,000	39,000	5,800		93,000	57,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
5,900		93,000	57,000	9,000		125,000	81,000
5,950	15/64	93,000	57,000	9,100		125,000	81,000
6,000		93,000	57,000	9,200		125,000	81,000
6,100		101,000	63,000	9,250		125,000	81,000
6,200		101,000	63,000	9,300		125,000	81,000
6,300		101,000	63,000	9,400		125,000	81,000
6,350	1/4	101,000	63,000	9,500		125,000	81,000
6,400		101,000	63,000	9,600		133,000	87,000
6,500		101,000	63,000	9,700		133,000	87,000
6,600		101,000	63,000	9,800		133,000	87,000
6,700		101,000	63,000	9,900		133,000	87,000
6,800		109,000	69,000	10,000		133,000	87,000
6,900		109,000	69,000	10,100		133,000	87,000
7,000		109,000	69,000	10,200		133,000	87,000
7,100		109,000	69,000	10,300		133,000	87,000
7,140	9/32	109,000	69,000	10,500		133,000	87,000
7,200		109,000	69,000	11,000		142,000	94,000
7,300		109,000	69,000	11,110	7/16	142,000	94,000
7,400		109,000	69,000	11,200		142,000	94,000
7,500		109,000	69,000	11,500		142,000	94,000
7,600		117,000	75,000	12,000		151,000	101,000
7,700		117,000	75,000	12,500		151,000	101,000
7,800		117,000	75,000	13,000		151,000	101,000
7,900		117,000	75,000	13,500		160,000	108,000
7,940	5/16	117,000	75,000	14,000		160,000	108,000
8,000		117,000	75,000				
8,100		117,000	75,000				
8,200		117,000	75,000				
8,300		117,000	75,000				
8,400		117,000	75,000				
8,500		117,000	75,000				
8,600		125,000	81,000				
8,700		125,000	81,000				
8,730	11/32	125,000	81,000				
8,800		125,000	81,000				
8,900		125,000	81,000				



Brocas espirales cil., cortas

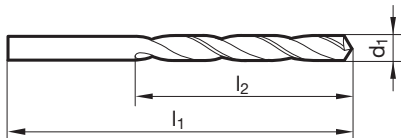
Artículo N° 81013



P	M	K	N	S	H
○	●	○	○	○	○



Broca INOX • entrada cónica • acero rápido al cobalto • más resistencia al desgaste
aceros austeníticos inoxidables y resistentes
a los ácidos y al calor (V2A y V4A)



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		34,000	12,000	5,100		86,000	52,000
1,100		36,000	14,000	5,200		86,000	52,000
1,200		38,000	16,000	5,300		86,000	52,000
1,300		38,000	16,000	5,400		93,000	57,000
1,400		40,000	18,000	5,500		93,000	57,000
1,500		40,000	18,000	5,600		93,000	57,000
1,600		43,000	20,000	5,700		93,000	57,000
1,700		43,000	20,000	5,800		93,000	57,000
1,800		46,000	22,000	5,900		93,000	57,000
1,900		46,000	22,000	6,000		93,000	57,000
2,000		49,000	24,000	6,100		101,000	63,000
2,100		49,000	24,000	6,200		101,000	63,000
2,200		53,000	27,000	6,300		101,000	63,000
2,300		53,000	27,000	6,400		101,000	63,000
2,400		57,000	30,000	6,500		101,000	63,000
2,500		57,000	30,000	6,600		101,000	63,000
2,600		57,000	30,000	6,700		101,000	63,000
2,700		61,000	33,000	6,800		109,000	69,000
2,800		61,000	33,000	6,900		109,000	69,000
2,900		61,000	33,000	7,000		109,000	69,000
3,000		61,000	33,000	7,100		109,000	69,000
3,100		65,000	36,000	7,200		109,000	69,000
3,200		65,000	36,000	7,300		109,000	69,000
3,300		65,000	36,000	7,400		109,000	69,000
3,400		70,000	39,000	7,500		109,000	69,000
3,500		70,000	39,000	7,600		117,000	75,000
3,570	9/64	70,000	39,000	7,700		117,000	75,000
3,600		70,000	39,000	7,800		117,000	75,000
3,700		70,000	39,000	7,900		117,000	75,000
3,800		75,000	43,000	8,000		117,000	75,000
3,900		75,000	43,000	8,100		117,000	75,000
4,000		75,000	43,000	8,200		117,000	75,000
4,100		75,000	43,000	8,300		117,000	75,000
4,200		75,000	43,000	8,400		117,000	75,000
4,300		80,000	47,000	8,500		117,000	75,000
4,400		80,000	47,000	8,600		125,000	81,000
4,500		80,000	47,000	8,700		125,000	81,000
4,600		80,000	47,000	8,800		125,000	81,000
4,700		80,000	47,000	8,900		125,000	81,000
4,800		86,000	52,000	9,000		125,000	81,000
4,900		86,000	52,000	9,100		125,000	81,000
5,000		86,000	52,000	9,200		125,000	81,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
9,300		125,000	81,000	10,500		133,000	87,000
9,400		125,000	81,000	10,600		133,000	87,000
9,500		125,000	81,000	11,000		142,000	94,000
9,600		133,000	87,000	11,100		142,000	94,000
9,700		133,000	87,000	11,200		142,000	94,000
9,800		133,000	87,000	11,500		142,000	94,000
9,900		133,000	87,000	11,600		142,000	94,000
10,000		133,000	87,000	11,800		142,000	94,000
10,100		133,000	87,000	12,000		151,000	101,000
10,200		133,000	87,000	12,500		151,000	101,000
10,300		133,000	87,000	13,000		151,000	101,000
10,400		133,000	87,000				



Brocas espirales cil., cortas

Artículo N° 81061

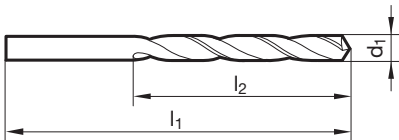


P	M	K	N	S	H
○	●			●	



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste titanio y aleaciones de titanio

• aceros austeníticos inoxidables y resistentes a los ácidos y al calor • aceros de gran resistencia a partir de 900 N/mm² y cifras más elevadas • Hastelloy, Inconel, Nimonic



d1	inch	l1	l2	d1	inch	l1	l2
mm		mm	mm	mm		mm	mm
0,200		19,000	2,500	1,850		46,000	22,000
0,300		19,000	3,000	1,900		46,000	22,000
0,400		20,000	5,000	1,950		49,000	24,000
0,500		22,000	6,000	1,990		49,000	24,000
0,550		24,000	7,000	2,000		49,000	24,000
0,580		24,000	7,000	2,030		49,000	24,000
0,600		24,000	7,000	2,050		49,000	24,000
0,650		26,000	8,000	2,080		49,000	24,000
0,700		28,000	9,000	2,100		49,000	24,000
0,750		28,000	9,000	2,200		53,000	27,000
0,800		30,000	10,000	2,250		53,000	27,000
0,820		30,000	10,000	2,300		53,000	27,000
0,840		30,000	10,000	2,350		53,000	27,000
0,850		30,000	10,000	2,380	3/32	57,000	30,000
0,900		32,000	11,000	2,400		57,000	30,000
0,950		32,000	11,000	2,450		57,000	30,000
1,000		34,000	12,000	2,500		57,000	30,000
1,050		34,000	12,000	2,550		57,000	30,000
1,100		36,000	14,000	2,600		57,000	30,000
1,150		36,000	14,000	2,700		61,000	33,000
1,180		36,000	14,000	2,750		61,000	33,000
1,190	3/64	38,000	16,000	2,800		61,000	33,000
1,200		38,000	16,000	2,850		61,000	33,000
1,210		38,000	16,000	2,900		61,000	33,000
1,250		38,000	16,000	2,950		61,000	33,000
1,300		38,000	16,000	3,000		61,000	33,000
1,350		40,000	18,000	3,050		65,000	36,000
1,400		40,000	18,000	3,100		65,000	36,000
1,450		40,000	18,000	3,200		65,000	36,000
1,500		40,000	18,000	3,250		65,000	36,000
1,510		43,000	20,000	3,300		65,000	36,000
1,520		43,000	20,000	3,350		65,000	36,000
1,530		43,000	20,000	3,400		70,000	39,000
1,550		43,000	20,000	3,450		70,000	39,000
1,600		43,000	20,000	3,500		70,000	39,000
1,630		43,000	20,000	3,600		70,000	39,000
1,650		43,000	20,000	3,700		70,000	39,000
1,700		43,000	20,000	3,800		75,000	43,000
1,730		46,000	22,000	3,900		75,000	43,000
1,750		46,000	22,000	4,000		75,000	43,000
1,800		46,000	22,000	4,050		75,000	43,000
1,820		46,000	22,000	4,100		75,000	43,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,200		75,000	43,000	8,600		125,000	81,000
4,250		75,000	43,000	8,700		125,000	81,000
4,300		80,000	47,000	8,800		125,000	81,000
4,400		80,000	47,000	8,900		125,000	81,000
4,500		80,000	47,000	9,000		125,000	81,000
4,600		80,000	47,000	9,100		125,000	81,000
4,700		80,000	47,000	9,200		125,000	81,000
4,750		80,000	47,000	9,300		125,000	81,000
4,800		86,000	52,000	9,400		125,000	81,000
4,850		86,000	52,000	9,500		125,000	81,000
4,900		86,000	52,000	9,600		133,000	87,000
5,000		86,000	52,000	9,700		133,000	87,000
5,100		86,000	52,000	9,800		133,000	87,000
5,200		86,000	52,000	9,900		133,000	87,000
5,300		86,000	52,000	10,000		133,000	87,000
5,400		93,000	57,000	10,100		133,000	87,000
5,500		93,000	57,000	10,200		133,000	87,000
5,600		93,000	57,000	10,300		133,000	87,000
5,700		93,000	57,000	10,400		133,000	87,000
5,800		93,000	57,000	10,500		133,000	87,000
5,900		93,000	57,000	10,600		133,000	87,000
6,000		93,000	57,000	10,700		142,000	94,000
6,100		101,000	63,000	10,800		142,000	94,000
6,200		101,000	63,000	11,000		142,000	94,000
6,300		101,000	63,000	11,100		142,000	94,000
6,400		101,000	63,000	11,200		142,000	94,000
6,500		101,000	63,000	11,300		142,000	94,000
6,600		101,000	63,000	11,500		142,000	94,000
6,700		101,000	63,000	11,700		142,000	94,000
6,750	17/64	109,000	69,000	11,800		142,000	94,000
6,800		109,000	69,000	12,000		151,000	101,000
6,900		109,000	69,000	12,100		151,000	101,000
7,000		109,000	69,000	12,200		151,000	101,000
7,100		109,000	69,000	12,300	31/64	151,000	101,000
7,200		109,000	69,000	12,500		151,000	101,000
7,300		109,000	69,000	12,700	1/2	151,000	101,000
7,400		109,000	69,000	13,000		151,000	101,000
7,500		109,000	69,000	13,500		160,000	108,000
7,600		117,000	75,000	14,000		160,000	108,000
7,700		117,000	75,000	14,500		169,000	114,000
7,800		117,000	75,000	15,000		169,000	114,000
7,900		117,000	75,000	15,500		178,000	120,000
8,000		117,000	75,000	16,000		178,000	120,000
8,100		117,000	75,000	16,500		184,000	125,000
8,200		117,000	75,000	17,000		184,000	125,000
8,300		117,000	75,000	17,500		191,000	130,000
8,400		117,000	75,000				
8,500		117,000	75,000				



Brocas espirales cil., cortas

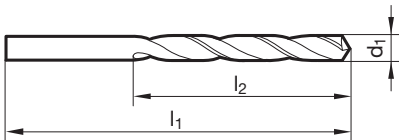
Artículo N° 81062



P	M	K	N	S	H
●	○	○	○		



entrada cónica • aplicación universal con afilado de leva • acero rápido al cobalto • más resistencia al desgaste
aceros de hasta 1400 N/mm² 1000 N/mm² • aleaciones de AISi



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
1,000	34,000	12,000	5,200	86,000	52,000
1,100	36,000	14,000	5,300	86,000	52,000
1,200	38,000	16,000	5,400	93,000	57,000
1,300	38,000	16,000	5,500	93,000	57,000
1,400	40,000	18,000	5,600	93,000	57,000
1,500	40,000	18,000	5,700	93,000	57,000
1,600	43,000	20,000	5,800	93,000	57,000
1,700	43,000	20,000	5,900	93,000	57,000
1,800	46,000	22,000	6,000	93,000	57,000
1,900	46,000	22,000	6,100	101,000	63,000
2,000	49,000	24,000	6,200	101,000	63,000
2,100	49,000	24,000	6,300	101,000	63,000
2,200	53,000	27,000	6,400	101,000	63,000
2,300	53,000	27,000	6,500	101,000	63,000
2,400	57,000	30,000	6,600	101,000	63,000
2,500	57,000	30,000	6,700	101,000	63,000
2,600	57,000	30,000	6,800	109,000	69,000
2,700	61,000	33,000	6,900	109,000	69,000
2,800	61,000	33,000	7,000	109,000	69,000
2,900	61,000	33,000	7,100	109,000	69,000
3,000	61,000	33,000	7,200	109,000	69,000
3,100	65,000	36,000	7,300	109,000	69,000
3,200	65,000	36,000	7,400	109,000	69,000
3,300	65,000	36,000	7,500	109,000	69,000
3,400	70,000	39,000	7,600	117,000	75,000
3,500	70,000	39,000	7,700	117,000	75,000
3,600	70,000	39,000	7,800	117,000	75,000
3,700	70,000	39,000	7,900	117,000	75,000
3,800	75,000	43,000	8,000	117,000	75,000
3,900	75,000	43,000	8,100	117,000	75,000
4,000	75,000	43,000	8,200	117,000	75,000
4,100	75,000	43,000	8,300	117,000	75,000
4,200	75,000	43,000	8,400	117,000	75,000
4,300	80,000	47,000	8,500	117,000	75,000
4,400	80,000	47,000	8,600	125,000	81,000
4,500	80,000	47,000	8,700	125,000	81,000
4,600	80,000	47,000	8,800	125,000	81,000
4,700	80,000	47,000	8,900	125,000	81,000
4,800	86,000	52,000	9,000	125,000	81,000
4,900	86,000	52,000	9,100	125,000	81,000
5,000	86,000	52,000	9,200	125,000	81,000
5,100	86,000	52,000	9,300	125,000	81,000



Brocas espirales cil., cortas

d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
9,400	125,000	81,000	12,500	151,000	101,000
9,500	125,000	81,000	13,000	151,000	101,000
9,600	133,000	87,000			
9,700	133,000	87,000			
9,800	133,000	87,000			
9,900	133,000	87,000			
10,000	133,000	87,000			
10,200	133,000	87,000			
10,500	133,000	87,000			
11,000	142,000	94,000			
11,500	142,000	94,000			
12,000	151,000	101,000			

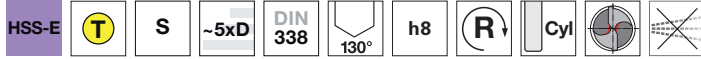


Brocas espirales cil., cortas

Artículo N° 84807



P	M	K	N	S	H
○	●			●	



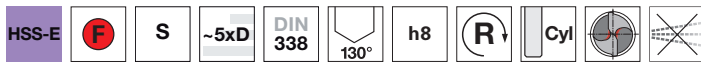
vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste titanio y aleaciones de titanio

• aceros austeníticos inoxidables y resistentes a los ácidos y al calor • aceros de gran resistencia a partir de 900 N/mm² y cifras más elevadas • Hastelloy, Inconel, Nimonic

Artículo N° 84505

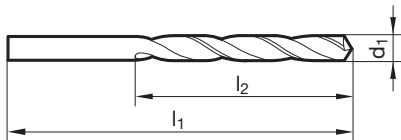


P	M	K	N	S	H
○	●			●	



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste titanio y aleaciones de titanio

• aceros austeníticos inoxidables y resistentes a los ácidos y al calor • aceros de gran resistencia a partir de 900 N/mm² y cifras más elevadas • Hastelloy, Inconel, Nimonic



d1	inch	l1	l2	d1	inch	l1	l2
mm		mm	mm	mm		mm	mm
0,500		22,000	6,000	2,600		57,000	30,000
0,650		26,000	8,000	2,700		61,000	33,000
0,700		28,000	9,000	2,800		61,000	33,000
0,750		28,000	9,000	2,900		61,000	33,000
0,800		30,000	10,000	3,000		61,000	33,000
0,850		30,000	10,000	3,100		65,000	36,000
0,900		32,000	11,000	3,200		65,000	36,000
0,950		32,000	11,000	3,300		65,000	36,000
1,000		34,000	12,000	3,350		65,000	36,000
1,050		34,000	12,000	3,400		70,000	39,000
1,100		36,000	14,000	3,500		70,000	39,000
1,200		38,000	16,000	3,600		70,000	39,000
1,250		38,000	16,000	3,700		70,000	39,000
1,300		38,000	16,000	3,800		75,000	43,000
1,350		40,000	18,000	3,900		75,000	43,000
1,400		40,000	18,000	4,000		75,000	43,000
1,500		40,000	18,000	4,100		75,000	43,000
1,550		43,000	20,000	4,200		75,000	43,000
1,600		43,000	20,000	4,300		80,000	47,000
1,700		43,000	20,000	4,400		80,000	47,000
1,800		46,000	22,000	4,500		80,000	47,000
1,850		46,000	22,000	4,600		80,000	47,000
1,900		46,000	22,000	4,700		80,000	47,000
2,000		49,000	24,000	4,800		86,000	52,000
2,050		49,000	24,000	4,900		86,000	52,000
2,100		49,000	24,000	5,000		86,000	52,000
2,200		53,000	27,000	5,050		86,000	52,000
2,300		53,000	27,000	5,100		86,000	52,000
2,400		57,000	30,000	5,200		86,000	52,000
2,500		57,000	30,000	5,300		86,000	52,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
5,400		93,000	57,000	9,000		125,000	81,000
5,500		93,000	57,000	9,100		125,000	81,000
5,600		93,000	57,000	9,200		125,000	81,000
5,700		93,000	57,000	9,300		125,000	81,000
5,800		93,000	57,000	9,400		125,000	81,000
5,900		93,000	57,000	9,500		125,000	81,000
6,000		93,000	57,000	9,600		133,000	87,000
6,100		101,000	63,000	9,700		133,000	87,000
6,200		101,000	63,000	9,800		133,000	87,000
6,300		101,000	63,000	9,900		133,000	87,000
6,400		101,000	63,000	10,000		133,000	87,000
6,500		101,000	63,000	10,100		133,000	87,000
6,600		101,000	63,000	10,200		133,000	87,000
6,700		101,000	63,000	10,300		133,000	87,000
6,800		109,000	69,000	10,400		133,000	87,000
6,900		109,000	69,000	10,500		133,000	87,000
7,000		109,000	69,000	10,800		142,000	94,000
7,100		109,000	69,000	11,000		142,000	94,000
7,200		109,000	69,000	11,200		142,000	94,000
7,300		109,000	69,000	11,500		142,000	94,000
7,400		109,000	69,000	12,000		151,000	101,000
7,500		109,000	69,000	12,300	31/64	151,000	101,000
7,600		117,000	75,000	12,500		151,000	101,000
7,700		117,000	75,000	12,700	1/2	151,000	101,000
7,800		117,000	75,000	13,000		151,000	101,000
7,900		117,000	75,000				
8,000		117,000	75,000				
8,100		117,000	75,000				
8,200		117,000	75,000				
8,300		117,000	75,000				
8,400		117,000	75,000				
8,500		117,000	75,000				
8,600		125,000	81,000				
8,700		125,000	81,000				
8,800		125,000	81,000				
8,900		125,000	81,000				



Brocas espirales cil., cortas

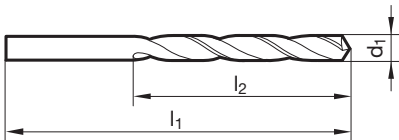
Artículo N° 81063



P	M	K	N	S	H
●	○	○	○		



entrada cónica • aplicación universal con afilado de leva • más resistencia al desgaste • acero rápido al cobalto
 aceros de hasta 1400 N/mm² 1000 N/mm² • aleaciones de AISi



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
3,300	65,000	36,000	9,500	125,000	81,000
3,500	70,000	39,000	10,000	133,000	87,000
4,200	75,000	43,000	10,500	133,000	87,000
4,500	80,000	47,000	11,000	142,000	94,000
5,000	86,000	52,000	12,000	151,000	101,000
6,000	93,000	57,000			
6,500	101,000	63,000			
6,800	109,000	69,000			
7,500	109,000	69,000			
8,000	117,000	75,000			
8,500	117,000	75,000			
9,000	125,000	81,000			

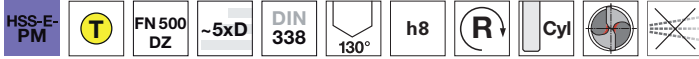


Brocas espirales cil., cortas

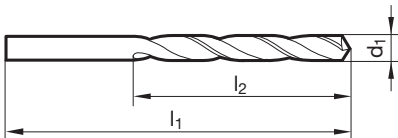
Artículo N° 84811



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • PM acero rápido al cobalto • estabilidad muy buena • alta resistencia al desgaste
 aceros altamente aleados • aceros de cementación, de bonificación • hierro fundido, latón y bronce



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		34,000	12,000	5,560	7/32	93,000	57,000
1,200		38,000	16,000	5,950	15/64	93,000	57,000
1,300		38,000	16,000	6,000		93,000	57,000
1,400		40,000	18,000	6,300		101,000	63,000
1,500		40,000	18,000	6,350	1/4	101,000	63,000
1,600		43,000	20,000	6,700		101,000	63,000
1,700		43,000	20,000	6,800		109,000	69,000
1,900		46,000	22,000	7,000		109,000	69,000
2,000		49,000	24,000	7,140	9/32	109,000	69,000
2,100		49,000	24,000	7,400		109,000	69,000
2,200		53,000	27,000	7,900		117,000	75,000
2,300		53,000	27,000	7,940	5/16	117,000	75,000
2,380	3/32	57,000	30,000	8,000		117,000	75,000
2,500		57,000	30,000	8,500		117,000	75,000
2,600		57,000	30,000	8,730	11/32	125,000	81,000
2,780	7/64	61,000	33,000	9,000		125,000	81,000
2,800		61,000	33,000	9,300		125,000	81,000
2,900		61,000	33,000	9,500		125,000	81,000
3,000		61,000	33,000	9,800		133,000	87,000
3,100		65,000	36,000	10,000		133,000	87,000
3,170	1/8	65,000	36,000	10,200		133,000	87,000
3,300		65,000	36,000	10,500		133,000	87,000
3,500		70,000	39,000	11,000		142,000	94,000
3,570	9/64	70,000	39,000	11,110	7/16	142,000	94,000
3,600		70,000	39,000	11,500		142,000	94,000
3,700		70,000	39,000	12,000		151,000	101,000
3,900		75,000	43,000	12,500		151,000	101,000
4,000		75,000	43,000	13,000		151,000	101,000
4,100		75,000	43,000	13,500		160,000	108,000
4,200		75,000	43,000	14,000		160,000	108,000
4,760	3/16	86,000	52,000				
4,800		86,000	52,000				
5,000		86,000	52,000				
5,160	13/64	86,000	52,000				
5,400		93,000	57,000				
5,500		93,000	57,000				



Brocas espirales cil., cortas

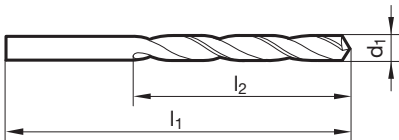
Artículo N° 81012



P	M	K	N	S	H
●	○	○	●	●	○



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • alta resistencia al desgaste • acero altamente aleado CoMo
 aleación dura o muy dura
 con una base de CrNi • aceros inoxidables y resistentes
 al ácido y al calor • chapas resistentes al desgaste • aceros o bronce con una resistencia
 de hasta 1400 N/mm² • Hastelloy, Inconel, Nimonic



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
1,000	34,000	12,000	5,200	86,000	52,000
1,100	36,000	14,000	5,300	86,000	52,000
1,200	38,000	16,000	5,400	93,000	57,000
1,300	38,000	16,000	5,500	93,000	57,000
1,400	40,000	18,000	5,600	93,000	57,000
1,500	40,000	18,000	5,700	93,000	57,000
1,600	43,000	20,000	5,800	93,000	57,000
1,700	43,000	20,000	5,900	93,000	57,000
1,800	46,000	22,000	6,000	93,000	57,000
1,900	46,000	22,000	6,100	101,000	63,000
2,000	49,000	24,000	6,200	101,000	63,000
2,100	49,000	24,000	6,300	101,000	63,000
2,200	53,000	27,000	6,400	101,000	63,000
2,300	53,000	27,000	6,500	101,000	63,000
2,400	57,000	30,000	6,600	101,000	63,000
2,500	57,000	30,000	6,700	101,000	63,000
2,600	57,000	30,000	6,800	109,000	69,000
2,700	61,000	33,000	6,900	109,000	69,000
2,800	61,000	33,000	7,000	109,000	69,000
2,900	61,000	33,000	7,100	109,000	69,000
3,000	61,000	33,000	7,200	109,000	69,000
3,100	65,000	36,000	7,300	109,000	69,000
3,200	65,000	36,000	7,400	109,000	69,000
3,300	65,000	36,000	7,500	109,000	69,000
3,400	70,000	39,000	7,600	117,000	75,000
3,500	70,000	39,000	7,700	117,000	75,000
3,600	70,000	39,000	7,800	117,000	75,000
3,700	70,000	39,000	7,900	117,000	75,000
3,800	75,000	43,000	8,000	117,000	75,000
3,900	75,000	43,000	8,100	117,000	75,000
4,000	75,000	43,000	8,200	117,000	75,000
4,100	75,000	43,000	8,300	117,000	75,000
4,200	75,000	43,000	8,400	117,000	75,000
4,300	80,000	47,000	8,500	117,000	75,000
4,400	80,000	47,000	8,600	125,000	81,000
4,500	80,000	47,000	8,700	125,000	81,000
4,600	80,000	47,000	8,800	125,000	81,000
4,700	80,000	47,000	8,900	125,000	81,000
4,800	86,000	52,000	9,000	125,000	81,000
4,900	86,000	52,000	9,100	125,000	81,000
5,000	86,000	52,000	9,200	125,000	81,000
5,100	86,000	52,000	9,300	125,000	81,000



Brocas espirales cil., cortas

d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
9,400	125,000	81,000	12,500	151,000	101,000
9,500	125,000	81,000	13,000	151,000	101,000
9,600	133,000	87,000	14,000	160,000	108,000
9,700	133,000	87,000			
9,800	133,000	87,000			
9,900	133,000	87,000			
10,000	133,000	87,000			
10,200	133,000	87,000			
10,500	133,000	87,000			
11,000	142,000	94,000			
11,500	142,000	94,000			
12,000	151,000	101,000			



Brocas espirales cil., cortas

Artículo N° 89244

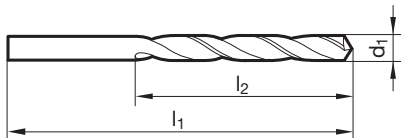


P	M	K	N	S	H
○	○	○	●	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal

aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • fundición gris • bronce, latón
• aluminio y sus aleaciones • magnesio y sus aleaciones • plásticos y plásticos con refuerzo de fibras



d1		l1	l2	d1		l1	l2
mm	inch	mm	mm	mm	inch	mm	mm
1,000		34,000	12,000	4,600		80,000	47,000
1,100		36,000	14,000	4,700		80,000	47,000
1,200		38,000	16,000	4,760	3/16	86,000	52,000
1,300		38,000	16,000	4,800		86,000	52,000
1,400		40,000	18,000	4,900		86,000	52,000
1,500		40,000	18,000	5,000		86,000	52,000
1,600		43,000	20,000	5,100		86,000	52,000
1,700		43,000	20,000	5,160	13/64	86,000	52,000
1,800		46,000	22,000	5,200		86,000	52,000
1,900		46,000	22,000	5,300		86,000	52,000
2,000		49,000	24,000	5,400		93,000	57,000
2,100		49,000	24,000	5,500		93,000	57,000
2,200		53,000	27,000	5,560	7/32	93,000	57,000
2,300		53,000	27,000	5,600		93,000	57,000
2,380	3/32	57,000	30,000	5,700		93,000	57,000
2,400		57,000	30,000	5,800		93,000	57,000
2,500		57,000	30,000	5,900		93,000	57,000
2,600		57,000	30,000	5,950	15/64	93,000	57,000
2,700		61,000	33,000	6,000		93,000	57,000
2,780	7/64	61,000	33,000	6,100		101,000	63,000
2,800		61,000	33,000	6,200		101,000	63,000
2,900		61,000	33,000	6,300		101,000	63,000
3,000		61,000	33,000	6,350	1/4	101,000	63,000
3,100		65,000	36,000	6,400		101,000	63,000
3,170	1/8	65,000	36,000	6,500		101,000	63,000
3,200		65,000	36,000	6,600		101,000	63,000
3,300		65,000	36,000	6,700		101,000	63,000
3,400		70,000	39,000	6,800		109,000	69,000
3,500		70,000	39,000	6,900		109,000	69,000
3,570	9/64	70,000	39,000	7,000		109,000	69,000
3,600		70,000	39,000	7,100		109,000	69,000
3,700		70,000	39,000	7,140	9/32	109,000	69,000
3,800		75,000	43,000	7,200		109,000	69,000
3,900		75,000	43,000	7,300		109,000	69,000
3,970	5/32	75,000	43,000	7,400		109,000	69,000
4,000		75,000	43,000	7,500		109,000	69,000
4,100		75,000	43,000	7,600		117,000	75,000
4,200		75,000	43,000	7,700		117,000	75,000
4,300		80,000	47,000	7,800		117,000	75,000
4,370	11/64	80,000	47,000	7,900		117,000	75,000
4,400		80,000	47,000	7,940	5/16	117,000	75,000
4,500		80,000	47,000	8,000		117,000	75,000



Brocas espirales cil., cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
8,200		117,000	75,000	9,900		133,000	87,000
8,300		117,000	75,000	10,000		133,000	87,000
8,400		117,000	75,000	10,200		133,000	87,000
8,500		117,000	75,000	10,300		133,000	87,000
8,600		125,000	81,000	10,500		133,000	87,000
8,700		125,000	81,000	10,720	27/64	142,000	94,000
8,730	11/32	125,000	81,000	11,000		142,000	94,000
8,800		125,000	81,000	11,110	7/16	142,000	94,000
8,900		125,000	81,000	11,500		142,000	94,000
9,000		125,000	81,000	11,910	15/32	151,000	101,000
9,100		125,000	81,000	12,000		151,000	101,000
9,200		125,000	81,000				
9,300		125,000	81,000				
9,400		125,000	81,000				
9,500		125,000	81,000				
9,600		133,000	87,000				
9,700		133,000	87,000				
9,800		133,000	87,000				



Brocas espirales extra cortas

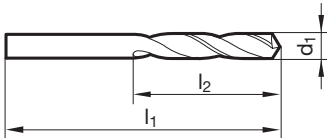
Artículo N° 81110



P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • para aplic. en tornos autom./revolver • para máquinas de taladrar manuales
 secciones delgadas • aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro
 sinterizado, argentón y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,500		20,000	3,000	3,100		49,000	18,000
0,600		21,000	3,500	3,200		49,000	18,000
0,700		23,000	4,500	3,250		49,000	18,000
0,800		24,000	5,000	3,300		49,000	18,000
0,850		24,000	5,000	3,350		49,000	18,000
0,900		25,000	5,500	3,400		52,000	20,000
1,000		26,000	6,000	3,500		52,000	20,000
1,050		26,000	6,000	3,600		52,000	20,000
1,100		28,000	7,000	3,650		52,000	20,000
1,200		30,000	8,000	3,700		52,000	20,000
1,250		30,000	8,000	3,750		52,000	20,000
1,300		30,000	8,000	3,800		55,000	22,000
1,350		32,000	9,000	3,850		55,000	22,000
1,400		32,000	9,000	3,900		55,000	22,000
1,500		32,000	9,000	4,000		55,000	22,000
1,550		34,000	10,000	4,100		55,000	22,000
1,600		34,000	10,000	4,200		55,000	22,000
1,650		34,000	10,000	4,250		55,000	22,000
1,700		34,000	10,000	4,300		58,000	24,000
1,750		36,000	11,000	4,400		58,000	24,000
1,800		36,000	11,000	4,500		58,000	24,000
1,900		36,000	11,000	4,600		58,000	24,000
1,950		38,000	12,000	4,650		58,000	24,000
2,000		38,000	12,000	4,700		58,000	24,000
2,050		38,000	12,000	4,750		58,000	24,000
2,100		38,000	12,000	4,800		62,000	26,000
2,200		40,000	13,000	4,850		62,000	26,000
2,250		40,000	13,000	4,900		62,000	26,000
2,300		40,000	13,000	4,950		62,000	26,000
2,400		43,000	14,000	5,000		62,000	26,000
2,450		43,000	14,000	5,050		62,000	26,000
2,500		43,000	14,000	5,100		62,000	26,000
2,550		43,000	14,000	5,200		62,000	26,000
2,600		43,000	14,000	5,250		62,000	26,000
2,650		43,000	14,000	5,300		62,000	26,000
2,700		46,000	16,000	5,400		66,000	28,000
2,750		46,000	16,000	5,500		66,000	28,000
2,800		46,000	16,000	5,600		66,000	28,000
2,900		46,000	16,000	5,700		66,000	28,000
2,950		46,000	16,000	5,750		66,000	28,000
3,000		46,000	16,000	5,800		66,000	28,000
3,050		49,000	18,000	5,850		66,000	28,000



Brocas espirales extra cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
5,900		66,000	28,000	11,500		95,000	47,000
6,000		66,000	28,000	11,700		95,000	47,000
6,100		70,000	31,000	11,800		95,000	47,000
6,150		70,000	31,000	12,000		102,000	51,000
6,200		70,000	31,000	12,050		102,000	51,000
6,250		70,000	31,000	12,200		102,000	51,000
6,300		70,000	31,000	12,300	31/64	102,000	51,000
6,350	1/4	70,000	31,000	12,500		102,000	51,000
6,400		70,000	31,000	12,600		102,000	51,000
6,500		70,000	31,000	12,700		102,000	51,000
6,600		70,000	31,000	12,750		102,000	51,000
6,700		70,000	31,000	12,900		102,000	51,000
6,750	17/64	74,000	34,000	13,000		102,000	51,000
6,800		74,000	34,000	13,100	33/64	102,000	51,000
6,900		74,000	34,000	13,200		102,000	51,000
7,000		74,000	34,000	13,500		107,000	54,000
7,100		74,000	34,000	13,600		107,000	54,000
7,200		74,000	34,000	13,750		107,000	54,000
7,300		74,000	34,000	14,000		107,000	54,000
7,400		74,000	34,000	14,200		111,000	56,000
7,500		74,000	34,000	14,250		111,000	56,000
7,600		79,000	37,000	14,300		111,000	56,000
7,700		79,000	37,000	14,500		111,000	56,000
7,750		79,000	37,000	14,750		111,000	56,000
7,800		79,000	37,000	15,000		111,000	56,000
7,900		79,000	37,000	15,250		115,000	58,000
8,000		79,000	37,000	15,500		115,000	58,000
8,100		79,000	37,000	15,750		115,000	58,000
8,200		79,000	37,000	16,000		115,000	58,000
8,250		79,000	37,000	16,250		119,000	60,000
8,300		79,000	37,000	16,270	41/64	119,000	60,000
8,400		79,000	37,000	16,500		119,000	60,000
8,500		79,000	37,000	17,000		119,000	60,000
8,600		84,000	40,000	17,500		123,000	62,000
8,700		84,000	40,000	18,000		123,000	62,000
8,750		84,000	40,000	18,200		127,000	64,000
8,800		84,000	40,000	18,500		127,000	64,000
8,900		84,000	40,000	18,750		127,000	64,000
9,000		84,000	40,000	19,000		127,000	64,000
9,100		84,000	40,000	19,100		131,000	66,000
9,200		84,000	40,000	19,500		131,000	66,000
9,250		84,000	40,000	20,000		131,000	66,000
9,300		84,000	40,000	20,500		136,000	68,000
9,400		84,000	40,000	21,000		136,000	68,000
9,500		84,000	40,000	21,500		141,000	70,000
9,600		89,000	43,000	22,000		141,000	70,000
9,700		89,000	43,000	22,500		146,000	72,000
9,750		89,000	43,000	23,000		146,000	72,000
9,800		89,000	43,000	23,500		146,000	72,000
9,900		89,000	43,000	24,000		151,000	75,000
10,000		89,000	43,000	24,500		151,000	75,000
10,050		89,000	43,000	25,000	63/64	151,000	75,000
10,100		89,000	43,000	26,000		156,000	78,000
10,200		89,000	43,000	26,500		156,000	78,000
10,250		89,000	43,000	27,000		162,000	81,000
10,300		89,000	43,000	27,500		162,000	81,000
10,400		89,000	43,000	28,000		162,000	81,000
10,500		89,000	43,000	28,750		168,000	84,000
10,700		95,000	47,000	29,000		168,000	84,000
10,750		95,000	47,000	30,000		168,000	84,000
10,800		95,000	47,000	31,000		174,000	87,000
10,900		95,000	47,000	32,000		180,000	90,000
11,000		95,000	47,000	39,500		200,000	100,000
11,100		95,000	47,000				
11,200		95,000	47,000				
11,400		95,000	47,000				



Brocas espirales extra cortas

Artículo N° 81115

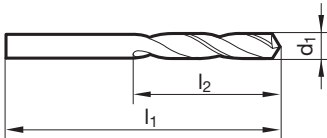


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 14,200$ • entrada cónica • para aplic. en tornos autom./revolver

secciones delgadas • aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argentón y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,500		20,000	3,000	3,350		49,000	18,000
0,550		21,000	3,500	3,400		52,000	20,000
0,700		23,000	4,500	3,450		52,000	20,000
0,750		23,000	4,500	3,500		52,000	20,000
0,800		24,000	5,000	3,600		52,000	20,000
0,850		24,000	5,000	3,700		52,000	20,000
0,950		25,000	5,500	3,750		52,000	20,000
1,000		26,000	6,000	3,800		55,000	22,000
1,150		28,000	7,000	3,850		55,000	22,000
1,180		28,000	7,000	4,000		55,000	22,000
1,250		30,000	8,000	4,100		55,000	22,000
1,330		32,000	9,000	4,150		55,000	22,000
1,350		32,000	9,000	4,200		55,000	22,000
1,500		32,000	9,000	4,250		55,000	22,000
1,550		34,000	10,000	4,300		58,000	24,000
1,600		34,000	10,000	4,400		58,000	24,000
1,700		34,000	10,000	4,450		58,000	24,000
1,710		36,000	11,000	4,500		58,000	24,000
1,800		36,000	11,000	4,600		58,000	24,000
1,830		36,000	11,000	4,700		58,000	24,000
1,900		36,000	11,000	4,750		58,000	24,000
1,980	5/64	38,000	12,000	4,800		62,000	26,000
2,000		38,000	12,000	4,850		62,000	26,000
2,100		38,000	12,000	4,900		62,000	26,000
2,200		40,000	13,000	5,000		62,000	26,000
2,400		43,000	14,000	5,100		62,000	26,000
2,420		43,000	14,000	5,200		62,000	26,000
2,500		43,000	14,000	5,250		62,000	26,000
2,550		43,000	14,000	5,300		62,000	26,000
2,600		43,000	14,000	5,400		66,000	28,000
2,720		46,000	16,000	5,500		66,000	28,000
2,800		46,000	16,000	5,600		66,000	28,000
2,820		46,000	16,000	5,700		66,000	28,000
2,850		46,000	16,000	5,750		66,000	28,000
2,900		46,000	16,000	5,800		66,000	28,000
3,000		46,000	16,000	5,900		66,000	28,000
3,010		49,000	18,000	5,950	15/64	66,000	28,000
3,050		49,000	18,000	6,000		66,000	28,000
3,100		49,000	18,000	6,100		70,000	31,000
3,200		49,000	18,000	6,150		70,000	31,000
3,250		49,000	18,000	6,200		70,000	31,000
3,300		49,000	18,000	6,400		70,000	31,000



Brocas espirales extra cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
6,500		70,000	31,000	11,250		95,000	47,000
6,600		70,000	31,000	11,300		95,000	47,000
6,700		70,000	31,000	11,500		95,000	47,000
6,750	17/64	74,000	34,000	11,750		95,000	47,000
6,800		74,000	34,000	11,800		95,000	47,000
6,900		74,000	34,000	11,900		102,000	51,000
7,000		74,000	34,000	12,000		102,000	51,000
7,100		74,000	34,000	12,100		102,000	51,000
7,200		74,000	34,000	12,200		102,000	51,000
7,300		74,000	34,000	12,500		102,000	51,000
7,400		74,000	34,000	12,750		102,000	51,000
7,500		74,000	34,000	12,900		102,000	51,000
7,600		79,000	37,000	13,000		102,000	51,000
7,700		79,000	37,000	13,200		102,000	51,000
7,750		79,000	37,000	13,250		107,000	54,000
7,800		79,000	37,000	13,400		107,000	54,000
7,900		79,000	37,000	13,500		107,000	54,000
8,000		79,000	37,000	13,600		107,000	54,000
8,100		79,000	37,000	13,750		107,000	54,000
8,200		79,000	37,000	13,800		107,000	54,000
8,300		79,000	37,000	14,000		107,000	54,000
8,400		79,000	37,000	14,200		111,000	56,000
8,500		79,000	37,000	14,250		111,000	56,000
8,600		84,000	40,000	14,300		111,000	56,000
8,700		84,000	40,000	14,500		111,000	56,000
8,750		84,000	40,000	14,700		111,000	56,000
8,800		84,000	40,000	14,750		111,000	56,000
8,900		84,000	40,000	15,000		111,000	56,000
9,000		84,000	40,000	15,200		115,000	58,000
9,100		84,000	40,000	15,600		115,000	58,000
9,200		84,000	40,000	15,700		115,000	58,000
9,250		84,000	40,000	16,000		115,000	58,000
9,300		84,000	40,000	16,500		119,000	60,000
9,400		84,000	40,000	17,000		119,000	60,000
9,500		84,000	40,000	18,000		123,000	62,000
9,600		89,000	43,000	19,000		127,000	64,000
9,700		89,000	43,000	20,000		131,000	66,000
9,750		89,000	43,000	29,750		168,000	84,000
10,000		89,000	43,000	30,000		168,000	84,000
10,100		89,000	43,000	31,500		174,000	87,000
10,200		89,000	43,000	36,000		193,000	96,000
10,300		89,000	43,000	36,500		193,000	96,000
10,500		89,000	43,000				
10,600		89,000	43,000				
10,700		95,000	47,000				
10,800		95,000	47,000				
11,000		95,000	47,000				
11,200		95,000	47,000				



Brocas espirales extra cortas

Artículo N° 84400



P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • para aplic. en tornos autom./revolver • para máquinas de taladrar manuales
secciones delgadas • aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argentón y grafito

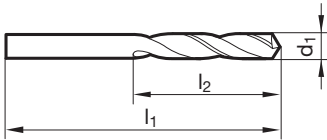
Artículo N° 84501



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • para aplic. en tornos autom./revolver • para máquinas de taladrar manuales
secciones delgadas • aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argentón y grafito



d1		l1	l2	d1		l1	l2
mm	inch	mm	mm	mm	inch	mm	mm
1,000		26,000	6,000	3,650		52,000	20,000
1,100		28,000	7,000	3,700		52,000	20,000
1,200		30,000	8,000	3,800		55,000	22,000
1,300		30,000	8,000	3,900		55,000	22,000
1,350		32,000	9,000	4,000		55,000	22,000
1,400		32,000	9,000	4,100		55,000	22,000
1,450		32,000	9,000	4,200		55,000	22,000
1,500		32,000	9,000	4,300		58,000	24,000
1,600		34,000	10,000	4,400		58,000	24,000
1,700		34,000	10,000	4,500		58,000	24,000
1,800		36,000	11,000	4,600		58,000	24,000
1,900		36,000	11,000	4,700		58,000	24,000
2,000		38,000	12,000	4,800		62,000	26,000
2,100		38,000	12,000	4,900		62,000	26,000
2,200		40,000	13,000	5,000		62,000	26,000
2,300		40,000	13,000	5,100		62,000	26,000
2,400		43,000	14,000	5,200		62,000	26,000
2,500		43,000	14,000	5,300		62,000	26,000
2,600		43,000	14,000	5,400		66,000	28,000
2,700		46,000	16,000	5,500		66,000	28,000
2,800		46,000	16,000	5,600		66,000	28,000
2,900		46,000	16,000	5,700		66,000	28,000
3,000		46,000	16,000	5,800		66,000	28,000
3,100		49,000	18,000	5,900		66,000	28,000
3,200		49,000	18,000	6,000		66,000	28,000
3,300		49,000	18,000	6,100		70,000	31,000
3,400		52,000	20,000	6,200		70,000	31,000
3,450		52,000	20,000	6,300		70,000	31,000
3,500		52,000	20,000	6,400		70,000	31,000
3,600		52,000	20,000	6,500		70,000	31,000



Brocas espirales extra cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
6,600		70,000	31,000	11,700		95,000	47,000
6,700		70,000	31,000	11,800		95,000	47,000
6,800		74,000	34,000	11,900		102,000	51,000
6,900		74,000	34,000	12,000		102,000	51,000
7,000		74,000	34,000	12,100		102,000	51,000
7,100		74,000	34,000	12,200		102,000	51,000
7,200		74,000	34,000	12,300	31/64	102,000	51,000
7,300		74,000	34,000	12,500		102,000	51,000
7,400		74,000	34,000	12,700	1/2	102,000	51,000
7,500		74,000	34,000	12,800		102,000	51,000
7,600		79,000	37,000	13,000		102,000	51,000
7,700		79,000	37,000	13,200		102,000	51,000
7,800		79,000	37,000	13,500		107,000	54,000
7,900		79,000	37,000	13,800		107,000	54,000
8,000		79,000	37,000	14,000		107,000	54,000
8,100		79,000	37,000	14,200		111,000	56,000
8,200		79,000	37,000	14,500		111,000	56,000
8,300		79,000	37,000	14,800		111,000	56,000
8,400		79,000	37,000	15,000		111,000	56,000
8,500		79,000	37,000	15,300		115,000	58,000
8,600		84,000	40,000	15,500		115,000	58,000
8,700		84,000	40,000	16,000		115,000	58,000
8,800		84,000	40,000	16,500		119,000	60,000
8,900		84,000	40,000	17,000		119,000	60,000
9,000		84,000	40,000	17,500		123,000	62,000
9,100		84,000	40,000	18,000		123,000	62,000
9,200		84,000	40,000	19,000		127,000	64,000
9,300		84,000	40,000	19,500		131,000	66,000
9,400		84,000	40,000	20,000		131,000	66,000
9,500		84,000	40,000	20,500		136,000	68,000
9,600		89,000	43,000	21,000		136,000	68,000
9,700		89,000	43,000	21,500		141,000	70,000
9,800		89,000	43,000	22,000		141,000	70,000
9,900		89,000	43,000	22,500		146,000	72,000
10,000		89,000	43,000	23,000		146,000	72,000
10,100		89,000	43,000	24,000		151,000	75,000
10,200		89,000	43,000	24,500		151,000	75,000
10,300		89,000	43,000	25,000		151,000	75,000
10,400		89,000	43,000				
10,500		89,000	43,000				
10,600		89,000	43,000				
10,720	27/64	95,000	47,000				
10,800		95,000	47,000				
11,000		95,000	47,000				
11,200		95,000	47,000				
11,300		95,000	47,000				
11,400		95,000	47,000				
11,500		95,000	47,000				

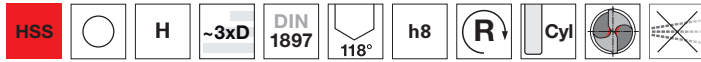


Brocas espirales extra cortas

Artículo N° 81120

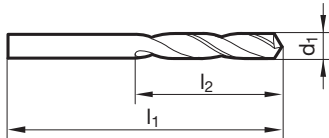


P	M	K	N	S	H
			•		



vaciado de punta $\geq \varnothing 15,000$ • entrada cónica

materiales duros y quebradizos • latón, aleaciones de magnesio • bronce y bronce al fósforo • pizarra, mica, Pertinax

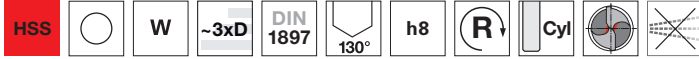


d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,200		30,000	8,000	5,000		62,000	26,000
1,400		32,000	9,000	5,200		62,000	26,000
1,500		32,000	9,000	5,300		62,000	26,000
1,600		34,000	10,000	5,400		66,000	28,000
1,700		34,000	10,000	5,500		66,000	28,000
1,900		36,000	11,000	5,600		66,000	28,000
2,000		38,000	12,000	5,700		66,000	28,000
2,350		40,000	13,000	5,800		66,000	28,000
2,380	3/32	43,000	14,000	6,000		66,000	28,000
2,400		43,000	14,000	6,100		70,000	31,000
2,500		43,000	14,000	6,200		70,000	31,000
2,600		43,000	14,000	6,500		70,000	31,000
2,650		43,000	14,000	7,000		74,000	34,000
2,700		46,000	16,000	7,500		74,000	34,000
2,800		46,000	16,000	8,000		79,000	37,000
2,950		46,000	16,000	8,500		79,000	37,000
3,000		46,000	16,000	8,600		84,000	40,000
3,100		49,000	18,000	9,000		84,000	40,000
3,200		49,000	18,000	9,500		84,000	40,000
3,250		49,000	18,000	10,000		89,000	43,000
3,300		49,000	18,000	10,200		89,000	43,000
3,400		52,000	20,000	10,500		89,000	43,000
3,500		52,000	20,000	11,000		95,000	47,000
3,700		52,000	20,000	12,000		102,000	51,000
3,800		55,000	22,000	13,000		102,000	51,000
3,900		55,000	22,000	14,000		107,000	54,000
4,000		55,000	22,000	15,000		111,000	56,000
4,100		55,000	22,000				
4,200		55,000	22,000				
4,300		58,000	24,000				
4,400		58,000	24,000				
4,500		58,000	24,000				
4,600		58,000	24,000				
4,700		58,000	24,000				
4,800		62,000	26,000				
4,900		62,000	26,000				



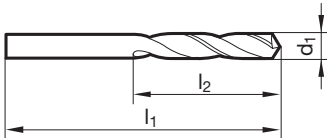
Brocas espirales extra cortas

Artículo N° 81130



vaciado de punta $\geq \varnothing 2,500$ • entrada cónica

mat. blandos y de viruta larga • aluminio, alea. de alum. (de vir. larga) • zink, cobre fino, siluminio, electrón • plásticos (blandos), madera



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
1,500	32,000	9,000	5,700	66,000	28,000
2,000	38,000	12,000	5,800	66,000	28,000
2,200	40,000	13,000	6,000	66,000	28,000
2,500	43,000	14,000	6,400	70,000	31,000
2,600	43,000	14,000	6,500	70,000	31,000
2,700	46,000	16,000	6,800	74,000	34,000
2,800	46,000	16,000	7,000	74,000	34,000
3,000	46,000	16,000	7,500	74,000	34,000
3,100	49,000	18,000	7,800	79,000	37,000
3,200	49,000	18,000	8,000	79,000	37,000
3,300	49,000	18,000	8,500	79,000	37,000
3,400	52,000	20,000	9,000	84,000	40,000
3,500	52,000	20,000	9,500	84,000	40,000
3,800	55,000	22,000	10,000	89,000	43,000
3,900	55,000	22,000	10,500	89,000	43,000
4,000	55,000	22,000	11,000	95,000	47,000
4,100	55,000	22,000	12,000	102,000	51,000
4,200	55,000	22,000	12,500	102,000	51,000
4,300	58,000	24,000	13,000	102,000	51,000
4,500	58,000	24,000	14,000	107,000	54,000
4,900	62,000	26,000	15,000	111,000	56,000
5,000	62,000	26,000	16,000	115,000	58,000
5,100	62,000	26,000			
5,300	62,000	26,000			



Brocas espirales extra cortas

Artículo N° 81140

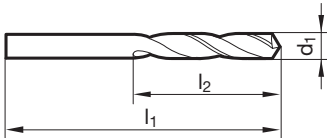


P	M	K	N	S	H
●	○	○	●		



vaciado de punta $\geq \varnothing 1,500$ • entrada cónica • para aceros muy duros

aceros para tornos automáticos • aceros inoxidables y resistentes al ácido • aceros templados y revenidos de dureza hasta aprox. 800 N/mm² • aleaciones de cobre y de Al de virutas cortas o semilargas



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,500		32,000	9,000	6,100		70,000	31,000
1,600		34,000	10,000	6,300		70,000	31,000
1,800		36,000	11,000	6,400		70,000	31,000
2,000		38,000	12,000	6,500		70,000	31,000
2,100		38,000	12,000	6,600		70,000	31,000
2,200		40,000	13,000	6,700		70,000	31,000
2,300		40,000	13,000	6,800		74,000	34,000
2,350		40,000	13,000	7,000		74,000	34,000
2,400		43,000	14,000	7,100		74,000	34,000
2,500		43,000	14,000	7,400		74,000	34,000
2,600		43,000	14,000	7,800		79,000	37,000
2,700		46,000	16,000	8,000		79,000	37,000
2,800		46,000	16,000	8,100		79,000	37,000
2,900		46,000	16,000	8,300		79,000	37,000
3,000		46,000	16,000	8,400		79,000	37,000
3,100		49,000	18,000	8,500		79,000	37,000
3,150		49,000	18,000	8,600		84,000	40,000
3,200		49,000	18,000	8,900		84,000	40,000
3,300		49,000	18,000	9,000		84,000	40,000
3,400		52,000	20,000	9,100		84,000	40,000
3,500		52,000	20,000	9,200		84,000	40,000
3,700		52,000	20,000	9,300		84,000	40,000
4,000		55,000	22,000	9,400		84,000	40,000
4,100		55,000	22,000	9,500		84,000	40,000
4,200		55,000	22,000	9,600		89,000	43,000
4,300		58,000	24,000	9,700		89,000	43,000
4,500		58,000	24,000	10,000		89,000	43,000
4,600		58,000	24,000	10,500		89,000	43,000
4,700		58,000	24,000	11,000		95,000	47,000
4,800		62,000	26,000	11,500		95,000	47,000
4,900		62,000	26,000	12,300	31/64	102,000	51,000
5,000		62,000	26,000	12,500		102,000	51,000
5,100		62,000	26,000	13,000		102,000	51,000
5,200		62,000	26,000	15,000		111,000	56,000
5,300		62,000	26,000	15,500		115,000	58,000
5,400		66,000	28,000				
5,500		66,000	28,000				
5,600		66,000	28,000				
5,700		66,000	28,000				
5,800		66,000	28,000				
5,900		66,000	28,000				
6,000		66,000	28,000				



Brocas espirales extra cortas

Artículo N° 81145

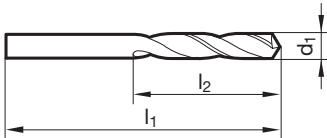


P	M	K	N	S	H
•	○	○	•		



vaciado de punta $\ge \varnothing 1,000$ • entrada cónica • para aceros muy duros

aceros para tornos automáticos • aceros inoxidables y resistentes al ácido • aceros templados y revenidos de dureza hasta aprox. 800 N/mm² • aleaciones de cobre y de Al de virutas cortas o semilargas



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		26,000	6,000	3,700		52,000	20,000
1,100		28,000	7,000	3,800		55,000	22,000
1,250		30,000	8,000	3,900		55,000	22,000
1,300		30,000	8,000	4,000		55,000	22,000
1,400		32,000	9,000	4,100		55,000	22,000
1,500		32,000	9,000	4,200		55,000	22,000
1,600		34,000	10,000	4,300		58,000	24,000
1,650		34,000	10,000	4,400		58,000	24,000
1,700		34,000	10,000	4,500		58,000	24,000
1,800		36,000	11,000	4,600		58,000	24,000
1,850		36,000	11,000	4,650		58,000	24,000
1,900		36,000	11,000	4,700		58,000	24,000
2,000		38,000	12,000	4,800		62,000	26,000
2,100		38,000	12,000	4,900		62,000	26,000
2,200		40,000	13,000	5,000		62,000	26,000
2,250		40,000	13,000	5,100		62,000	26,000
2,300		40,000	13,000	5,200		62,000	26,000
2,350		40,000	13,000	5,300		62,000	26,000
2,400		43,000	14,000	5,400		66,000	28,000
2,500		43,000	14,000	5,500		66,000	28,000
2,550		43,000	14,000	5,600		66,000	28,000
2,600		43,000	14,000	5,700		66,000	28,000
2,650		43,000	14,000	5,800		66,000	28,000
2,700		46,000	16,000	5,900		66,000	28,000
2,750		46,000	16,000	6,000		66,000	28,000
2,780	7/64	46,000	16,000	6,100		70,000	31,000
2,800		46,000	16,000	6,200		70,000	31,000
2,850		46,000	16,000	6,300		70,000	31,000
2,870		46,000	16,000	6,500		70,000	31,000
2,900		46,000	16,000	6,600		70,000	31,000
2,950		46,000	16,000	6,700		70,000	31,000
3,000		46,000	16,000	6,800		74,000	34,000
3,100		49,000	18,000	6,900		74,000	34,000
3,150		49,000	18,000	7,000		74,000	34,000
3,170	1/8	49,000	18,000	7,500		74,000	34,000
3,200		49,000	18,000	7,600		79,000	37,000
3,250		49,000	18,000	7,800		79,000	37,000
3,300		49,000	18,000	7,900		79,000	37,000
3,400		52,000	20,000	8,000		79,000	37,000
3,500		52,000	20,000	8,200		79,000	37,000
3,650		52,000	20,000	8,300		79,000	37,000
3,680		52,000	20,000	8,400		79,000	37,000



Brocas espirales extra cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
8,500		79,000	37,000	12,500		102,000	51,000
8,600		84,000	40,000	16,000		115,000	58,000
8,700		84,000	40,000				
8,800		84,000	40,000				
9,000		84,000	40,000				
9,200		84,000	40,000				
9,500		84,000	40,000				
9,700		89,000	43,000				
10,000		89,000	43,000				
10,500		89,000	43,000				
11,000		95,000	47,000				
11,500		95,000	47,000				



Brocas espirales extra cortas

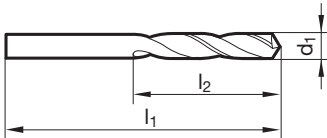
Artículo N° 81173



P	M	K	N	S	H
○	●	○	○	○	○



Broca INOX • entrada cónica • acero rápido al cobalto • más resistencia al desgaste
aceros austeníticos inoxidables y resistentes
a los ácidos y al calor (V2A y V4A)



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
1,000	26,000	6,000	5,600	66,000	28,000
1,100	28,000	7,000	5,800	66,000	28,000
1,200	30,000	8,000	5,900	66,000	28,000
1,300	30,000	8,000	6,000	66,000	28,000
1,400	32,000	9,000	6,100	70,000	31,000
1,500	32,000	9,000	6,300	70,000	31,000
1,600	34,000	10,000	6,500	70,000	31,000
1,700	34,000	10,000	6,600	70,000	31,000
1,800	36,000	11,000	6,700	70,000	31,000
2,000	38,000	12,000	6,800	74,000	34,000
2,100	38,000	12,000	6,900	74,000	34,000
2,200	40,000	13,000	7,000	74,000	34,000
2,300	40,000	13,000	7,100	74,000	34,000
2,400	43,000	14,000	7,400	74,000	34,000
2,500	43,000	14,000	7,500	74,000	34,000
2,600	43,000	14,000	7,600	79,000	37,000
2,700	46,000	16,000	7,800	79,000	37,000
2,800	46,000	16,000	7,900	79,000	37,000
2,900	46,000	16,000	8,000	79,000	37,000
3,000	46,000	16,000	8,100	79,000	37,000
3,100	49,000	18,000	8,200	79,000	37,000
3,200	49,000	18,000	8,500	79,000	37,000
3,300	49,000	18,000	8,700	84,000	40,000
3,400	52,000	20,000	9,000	84,000	40,000
3,500	52,000	20,000	9,200	84,000	40,000
3,600	52,000	20,000	9,500	84,000	40,000
3,800	55,000	22,000	10,000	89,000	43,000
3,900	55,000	22,000	10,200	89,000	43,000
4,000	55,000	22,000	10,500	89,000	43,000
4,100	55,000	22,000	11,000	95,000	47,000
4,200	55,000	22,000	11,500	95,000	47,000
4,300	58,000	24,000	12,000	102,000	51,000
4,500	58,000	24,000			
4,600	58,000	24,000			
4,700	58,000	24,000			
4,800	62,000	26,000			
4,900	62,000	26,000			
5,000	62,000	26,000			
5,100	62,000	26,000			
5,200	62,000	26,000			
5,300	62,000	26,000			
5,500	66,000	28,000			



Brocas espirales extra cortas

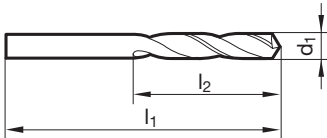
Artículo N° 81171



P	M	K	N	S	H
•	•	•	○	•	○



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste
 aceros inoxidables y resistentes al ácido • aceros de muelles • aceros austeníticos • Hastelloy, Inconel, Nimonic



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,400		19,000	2,500	2,450		43,000	14,000
0,500		20,000	3,000	2,470		43,000	14,000
0,600		21,000	3,500	2,500		43,000	14,000
0,650		22,000	4,000	2,550		43,000	14,000
0,700		23,000	4,500	2,600		43,000	14,000
0,750		23,000	4,500	2,650		43,000	14,000
0,800		24,000	5,000	2,700		46,000	16,000
0,860		25,000	5,500	2,750		46,000	16,000
0,870		25,000	5,500	2,800		46,000	16,000
0,900		25,000	5,500	2,900		46,000	16,000
0,950		25,000	5,500	3,000		46,000	16,000
1,000		26,000	6,000	3,050		49,000	18,000
1,030		26,000	6,000	3,100		49,000	18,000
1,100		28,000	7,000	3,200		49,000	18,000
1,150		28,000	7,000	3,250		49,000	18,000
1,200		30,000	8,000	3,300		49,000	18,000
1,250		30,000	8,000	3,400		52,000	20,000
1,280		30,000	8,000	3,500		52,000	20,000
1,300		30,000	8,000	3,550		52,000	20,000
1,350		32,000	9,000	3,600		52,000	20,000
1,400		32,000	9,000	3,700		52,000	20,000
1,450		32,000	9,000	3,750		52,000	20,000
1,500		32,000	9,000	3,800		55,000	22,000
1,550		34,000	10,000	3,900		55,000	22,000
1,600		34,000	10,000	4,000		55,000	22,000
1,650		34,000	10,000	4,100		55,000	22,000
1,700		34,000	10,000	4,200		55,000	22,000
1,750		36,000	11,000	4,250		55,000	22,000
1,800		36,000	11,000	4,300		58,000	24,000
1,850		36,000	11,000	4,400		58,000	24,000
1,900		36,000	11,000	4,500		58,000	24,000
1,950		38,000	12,000	4,600		58,000	24,000
1,970		38,000	12,000	4,650		58,000	24,000
1,980	5/64	38,000	12,000	4,800		62,000	26,000
2,000		38,000	12,000	4,900		62,000	26,000
2,030		38,000	12,000	5,000		62,000	26,000
2,050		38,000	12,000	5,050		62,000	26,000
2,100		38,000	12,000	5,100		62,000	26,000
2,200		40,000	13,000	5,200		62,000	26,000
2,250		40,000	13,000	5,300		62,000	26,000
2,300		40,000	13,000	5,400		66,000	28,000
2,400		43,000	14,000	5,500		66,000	28,000



Brocas espirales extra cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
5,550		66,000	28,000	10,300		89,000	43,000
5,600		66,000	28,000	10,400		89,000	43,000
5,700		66,000	28,000	10,500		89,000	43,000
5,800		66,000	28,000	10,600		89,000	43,000
5,900		66,000	28,000	10,700		95,000	47,000
5,950	15/64	66,000	28,000	10,800		95,000	47,000
6,000		66,000	28,000	10,900		95,000	47,000
6,100		70,000	31,000	11,000		95,000	47,000
6,200		70,000	31,000	11,100		95,000	47,000
6,250		70,000	31,000	11,200		95,000	47,000
6,300		70,000	31,000	11,500		95,000	47,000
6,400		70,000	31,000	11,800		95,000	47,000
6,500		70,000	31,000	12,000		102,000	51,000
6,600		70,000	31,000	12,200		102,000	51,000
6,700		70,000	31,000	12,300	31/64	102,000	51,000
6,750	17/64	74,000	34,000	12,400		102,000	51,000
6,800		74,000	34,000	12,500		102,000	51,000
6,900		74,000	34,000	12,600		102,000	51,000
7,000		74,000	34,000	12,800		102,000	51,000
7,100		74,000	34,000	12,900		102,000	51,000
7,200		74,000	34,000	13,000		102,000	51,000
7,300		74,000	34,000	13,500		107,000	54,000
7,400		74,000	34,000	13,750		107,000	54,000
7,500		74,000	34,000	13,800		107,000	54,000
7,600		79,000	37,000	14,000		107,000	54,000
7,700		79,000	37,000	14,500		111,000	56,000
7,800		79,000	37,000	15,000		111,000	56,000
7,900		79,000	37,000	15,500		115,000	58,000
8,000		79,000	37,000	15,750		115,000	58,000
8,100		79,000	37,000	16,000		115,000	58,000
8,200		79,000	37,000	16,500		119,000	60,000
8,250		79,000	37,000	17,000		119,000	60,000
8,300		79,000	37,000	17,500		123,000	62,000
8,400		79,000	37,000	18,000		123,000	62,000
8,500		79,000	37,000	18,500		127,000	64,000
8,600		84,000	40,000	19,000		127,000	64,000
8,700		84,000	40,000	19,500		131,000	66,000
8,800		84,000	40,000	20,000		131,000	66,000
8,900		84,000	40,000	20,500		136,000	68,000
9,000		84,000	40,000	21,000		136,000	68,000
9,100		84,000	40,000	22,000		141,000	70,000
9,200		84,000	40,000	22,200		141,000	70,000
9,300		84,000	40,000	23,000		146,000	72,000
9,400		84,000	40,000	24,000		151,000	75,000
9,500		84,000	40,000	25,000	63/64	151,000	75,000
9,600		89,000	43,000				
9,700		89,000	43,000				
9,750		89,000	43,000				
9,800		89,000	43,000				
9,900		89,000	43,000				
10,000		89,000	43,000				
10,050		89,000	43,000				
10,100		89,000	43,000				
10,200		89,000	43,000				

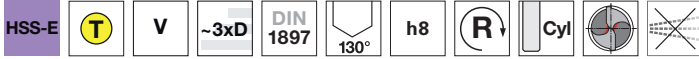


Brocas espirales extra cortas

Artículo N° 84803



P	M	K	N	S	H
•	•	•	○	•	○



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste
 aceros inoxidables y resistentes al ácido • aceros de muelles • aceros austeníticos • Hastelloy, Inconel, Nimonic

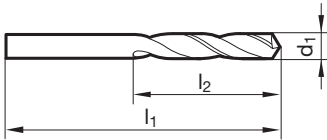
Artículo N° 84503



P	M	K	N	S	H
•	•	•	○	•	○



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste
 aceros inoxidables y resistentes al ácido • aceros de muelles • aceros austeníticos • Hastelloy, Inconel, Nimonic



d1		l1	l2	d1		l1	l2
mm	inch	mm	mm	mm	inch	mm	mm
0,500		20,000	3,000	3,100		49,000	18,000
0,700		23,000	4,500	3,200		49,000	18,000
1,000		26,000	6,000	3,250		49,000	18,000
1,100		28,000	7,000	3,300		49,000	18,000
1,200		30,000	8,000	3,350		49,000	18,000
1,300		30,000	8,000	3,400		52,000	20,000
1,400		32,000	9,000	3,450		52,000	20,000
1,500		32,000	9,000	3,500		52,000	20,000
1,600		34,000	10,000	3,600		52,000	20,000
1,700		34,000	10,000	3,700		52,000	20,000
1,800		36,000	11,000	3,800		55,000	22,000
1,850		36,000	11,000	3,900		55,000	22,000
1,900		36,000	11,000	4,000		55,000	22,000
2,000		38,000	12,000	4,100		55,000	22,000
2,050		38,000	12,000	4,200		55,000	22,000
2,100		38,000	12,000	4,300		58,000	24,000
2,200		40,000	13,000	4,400		58,000	24,000
2,300		40,000	13,000	4,500		58,000	24,000
2,350		40,000	13,000	4,600		58,000	24,000
2,400		43,000	14,000	4,700		58,000	24,000
2,450		43,000	14,000	4,800		62,000	26,000
2,500		43,000	14,000	4,900		62,000	26,000
2,550		43,000	14,000	5,000		62,000	26,000
2,600		43,000	14,000	5,100		62,000	26,000
2,700		46,000	16,000	5,200		62,000	26,000
2,800		46,000	16,000	5,300		62,000	26,000
2,900		46,000	16,000	5,400		66,000	28,000
2,950		46,000	16,000	5,500		66,000	28,000
3,000		46,000	16,000	5,600		66,000	28,000
3,050		49,000	18,000	5,700		66,000	28,000



Brocas espirales extra cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
5,800		66,000	28,000	8,600		84,000	40,000
5,900		66,000	28,000	8,700		84,000	40,000
6,000		66,000	28,000	8,800		84,000	40,000
6,050		70,000	31,000	9,000		84,000	40,000
6,100		70,000	31,000	9,100		84,000	40,000
6,200		70,000	31,000	9,200		84,000	40,000
6,300		70,000	31,000	9,300		84,000	40,000
6,350	1/4	70,000	31,000	9,500		84,000	40,000
6,400		70,000	31,000	9,600		89,000	43,000
6,500		70,000	31,000	9,700		89,000	43,000
6,600		70,000	31,000	9,800		89,000	43,000
6,700		70,000	31,000	9,900		89,000	43,000
6,800		74,000	34,000	10,000		89,000	43,000
6,900		74,000	34,000	10,200		89,000	43,000
7,000		74,000	34,000	10,500		89,000	43,000
7,100		74,000	34,000	11,000		95,000	47,000
7,200		74,000	34,000	11,500		95,000	47,000
7,300		74,000	34,000	12,000		102,000	51,000
7,400		74,000	34,000	12,500		102,000	51,000
7,500		74,000	34,000	13,000		102,000	51,000
7,600		79,000	37,000	14,000		107,000	54,000
7,700		79,000	37,000	14,500		111,000	56,000
7,800		79,000	37,000	15,000		111,000	56,000
7,900		79,000	37,000				
8,000		79,000	37,000				
8,100		79,000	37,000				
8,200		79,000	37,000				
8,300		79,000	37,000				
8,400		79,000	37,000				
8,500		79,000	37,000				



Brocas espirales extra cortas

Artículo N° 84806



P	M	K	N	S	H
•	•	•	•		



vaciado de punta $\geq \varnothing 1,000$ • afilado plano • acero rápido al cobalto • se requiere poca fuerza de avance • se requiere poco par
• aplicación universal

aceros aleados y no aleados fundición de dureza hasta a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos
• metales no ferríticos • fundición • aceros inoxidable • plásticos

Artículo N° 84808

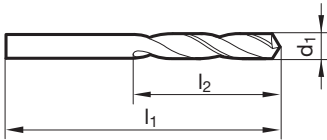


P	M	K	N	S	H
•	•	•	○		



vaciado de punta $\geq \varnothing 1,000$ • afilado plano • acero rápido al cobalto • se requiere poca fuerza de avance • se requiere poco par
• aplicación universal

aceros aleados y no aleados fundición de dureza hasta a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos
• metales no ferríticos • fundición • aceros inoxidable • plásticos



d1		l1	l2	d1		l1	l2
mm	inch	mm	mm	mm	inch	mm	mm
1,000		26,000	6,000	3,600		52,000	20,000
1,100		28,000	7,000	3,700		52,000	20,000
1,200		30,000	8,000	3,800		55,000	22,000
1,300		30,000	8,000	3,900		55,000	22,000
1,400		32,000	9,000	3,970	5/32	55,000	22,000
1,500		32,000	9,000	4,000		55,000	22,000
1,600		34,000	10,000	4,100		55,000	22,000
1,700		34,000	10,000	4,200		55,000	22,000
1,800		36,000	11,000	4,300		58,000	24,000
1,900		36,000	11,000	4,370	11/64	58,000	24,000
2,000		38,000	12,000	4,400		58,000	24,000
2,100		38,000	12,000	4,500		58,000	24,000
2,200		40,000	13,000	4,600		58,000	24,000
2,300		40,000	13,000	4,700		58,000	24,000
2,380	3/32	43,000	14,000	4,760	3/16	62,000	26,000
2,400		43,000	14,000	4,800		62,000	26,000
2,500		43,000	14,000	4,900		62,000	26,000
2,600		43,000	14,000	5,000		62,000	26,000
2,700		46,000	16,000	5,100		62,000	26,000
2,780	7/64	46,000	16,000	5,160	13/64	62,000	26,000
2,800		46,000	16,000	5,200		62,000	26,000
2,900		46,000	16,000	5,300		62,000	26,000
3,000		46,000	16,000	5,400		66,000	28,000
3,100		49,000	18,000	5,500		66,000	28,000
3,170	1/8	49,000	18,000	5,560	7/32	66,000	28,000
3,200		49,000	18,000	5,600		66,000	28,000
3,300		49,000	18,000	5,700		66,000	28,000
3,400		52,000	20,000	5,800		66,000	28,000
3,500		52,000	20,000	5,900		66,000	28,000
3,570	9/64	52,000	20,000	5,950	15/64	66,000	28,000



Brocas espirales extra cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
6,000		66,000	28,000	8,700		84,000	40,000
6,100		70,000	31,000	8,730	11/32	84,000	40,000
6,200		70,000	31,000	8,800		84,000	40,000
6,300		70,000	31,000	8,900		84,000	40,000
6,350	1/4	70,000	31,000	9,000		84,000	40,000
6,400		70,000	31,000	9,100		84,000	40,000
6,500		70,000	31,000	9,200		84,000	40,000
6,600		70,000	31,000	9,300		84,000	40,000
6,700		70,000	31,000	9,400		84,000	40,000
6,800		74,000	34,000	9,500		84,000	40,000
6,900		74,000	34,000	9,600		89,000	43,000
7,000		74,000	34,000	9,700		89,000	43,000
7,100		74,000	34,000	9,800		89,000	43,000
7,140	9/32	74,000	34,000	9,900		89,000	43,000
7,200		74,000	34,000	10,000		89,000	43,000
7,300		74,000	34,000	10,100		89,000	43,000
7,400		74,000	34,000	10,200		89,000	43,000
7,500		74,000	34,000	10,300		89,000	43,000
7,600		79,000	37,000	10,400		89,000	43,000
7,700		79,000	37,000	10,500		89,000	43,000
7,800		79,000	37,000	11,000		95,000	47,000
7,900		79,000	37,000	11,110	7/16	95,000	47,000
7,940	5/16	79,000	37,000	11,500		95,000	47,000
8,000		79,000	37,000	12,000		102,000	51,000
8,100		79,000	37,000	12,500		102,000	51,000
8,200		79,000	37,000	13,000		102,000	51,000
8,300		79,000	37,000	13,500		107,000	54,000
8,400		79,000	37,000	14,000		107,000	54,000
8,500		79,000	37,000				
8,600		84,000	40,000				



Brocas espirales extra cortas

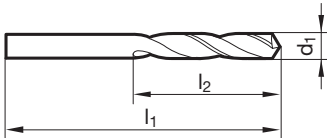
Artículo N° 84511



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • PM acero rápido al cobalto • estabilidad muy buena • alta resistencia al desgaste materiales más duros, aceros de aleación alta • aceros de cementación, de bonificación • hierro fundido, latón y bronce



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		26,000	6,000	4,900		62,000	26,000
1,200		30,000	8,000	4,980		62,000	26,000
1,500		32,000	9,000	5,000		62,000	26,000
2,000		38,000	12,000	5,100		62,000	26,000
2,100		38,000	12,000	5,160	13/64	62,000	26,000
2,200		40,000	13,000	5,200		62,000	26,000
2,300		40,000	13,000	5,300		62,000	26,000
2,380	3/32	43,000	14,000	5,400		66,000	28,000
2,400		43,000	14,000	5,410		66,000	28,000
2,500		43,000	14,000	5,500		66,000	28,000
2,600		43,000	14,000	5,550		66,000	28,000
2,700		46,000	16,000	5,560	7/32	66,000	28,000
2,780	7/64	46,000	16,000	5,600		66,000	28,000
2,800		46,000	16,000	5,700		66,000	28,000
2,900		46,000	16,000	5,800		66,000	28,000
3,000		46,000	16,000	5,900		66,000	28,000
3,100		49,000	18,000	5,950	15/64	66,000	28,000
3,170	1/8	49,000	18,000	6,000		66,000	28,000
3,200		49,000	18,000	6,100		70,000	31,000
3,260		49,000	18,000	6,200		70,000	31,000
3,300		49,000	18,000	6,300		70,000	31,000
3,400		52,000	20,000	6,350	1/4	70,000	31,000
3,500		52,000	20,000	6,400		70,000	31,000
3,570	9/64	52,000	20,000	6,500		70,000	31,000
3,600		52,000	20,000	6,600		70,000	31,000
3,700		52,000	20,000	6,700		70,000	31,000
3,800		55,000	22,000	6,750	17/64	74,000	34,000
3,900		55,000	22,000	6,800		74,000	34,000
3,970	5/32	55,000	22,000	6,900		74,000	34,000
4,000		55,000	22,000	7,000		74,000	34,000
4,090		55,000	22,000	7,100		74,000	34,000
4,100		55,000	22,000	7,140	9/32	74,000	34,000
4,200		55,000	22,000	7,200		74,000	34,000
4,300		58,000	24,000	7,300		74,000	34,000
4,370	11/64	58,000	24,000	7,370		74,000	34,000
4,400		58,000	24,000	7,400		74,000	34,000
4,500		58,000	24,000	7,450		74,000	34,000
4,600		58,000	24,000	7,500		74,000	34,000
4,650		58,000	24,000	7,540	19/64	79,000	37,000
4,700		58,000	24,000	7,600		79,000	37,000
4,760	3/16	62,000	26,000	7,700		79,000	37,000
4,800		62,000	26,000	7,800		79,000	37,000



Brocas espirales extra cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
7,900		79,000	37,000	9,700		89,000	43,000
7,940	5/16	79,000	37,000	9,800		89,000	43,000
8,000		79,000	37,000	9,900		89,000	43,000
8,100		79,000	37,000	9,920	25/64	89,000	43,000
8,200		79,000	37,000	10,000		89,000	43,000
8,300		79,000	37,000	10,200		89,000	43,000
8,330	21/64	79,000	37,000	10,320	13/32	89,000	43,000
8,400		79,000	37,000	10,500		89,000	43,000
8,500		79,000	37,000	10,720	27/64	95,000	47,000
8,600		84,000	40,000	11,000		95,000	47,000
8,700		84,000	40,000	11,110	7/16	95,000	47,000
8,730	11/32	84,000	40,000	11,500		95,000	47,000
8,800		84,000	40,000	11,510	29/64	95,000	47,000
8,900		84,000	40,000	11,800		95,000	47,000
9,000		84,000	40,000	11,910	15/32	102,000	51,000
9,100		84,000	40,000	12,000		102,000	51,000
9,130	23/64	84,000	40,000	12,300	31/64	102,000	51,000
9,200		84,000	40,000	12,500		102,000	51,000
9,300		84,000	40,000	12,700	1/2	102,000	51,000
9,350		84,000	40,000	13,000		102,000	51,000
9,400		84,000	40,000	13,500		107,000	54,000
9,500		84,000	40,000				
9,520	3/8	89,000	43,000				
9,600		89,000	43,000				



Brocas espirales extra cortas

Artículo N° 89235

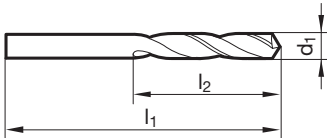


P	M	K	N	S	H
○	○	○	●	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal

aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • fundición gris • bronce, latón
• aluminio y sus aleaciones • magnesio y sus aleaciones • plásticos y plásticos con refuerzo de fibras



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,800		24,000	5,000	4,200		55,000	22,000
0,900		25,000	5,500	4,300		58,000	24,000
1,000		26,000	6,000	4,370	11/64	58,000	24,000
1,100		28,000	7,000	4,400		58,000	24,000
1,200		30,000	8,000	4,500		58,000	24,000
1,300		30,000	8,000	4,600		58,000	24,000
1,400		32,000	9,000	4,700		58,000	24,000
1,500		32,000	9,000	4,760	3/16	62,000	26,000
1,600		34,000	10,000	4,800		62,000	26,000
1,700		34,000	10,000	4,850		62,000	26,000
1,800		36,000	11,000	4,900		62,000	26,000
1,900		36,000	11,000	5,000		62,000	26,000
1,980	5/64	38,000	12,000	5,100		62,000	26,000
2,000		38,000	12,000	5,200		62,000	26,000
2,100		38,000	12,000	5,300		62,000	26,000
2,200		40,000	13,000	5,400		66,000	28,000
2,300		40,000	13,000	5,500		66,000	28,000
2,380	3/32	43,000	14,000	5,560	7/32	66,000	28,000
2,400		43,000	14,000	5,600		66,000	28,000
2,500		43,000	14,000	5,700		66,000	28,000
2,600		43,000	14,000	5,800		66,000	28,000
2,700		46,000	16,000	5,900		66,000	28,000
2,780	7/64	46,000	16,000	6,000		66,000	28,000
2,800		46,000	16,000	6,100		70,000	31,000
2,900		46,000	16,000	6,200		70,000	31,000
3,000		46,000	16,000	6,300		70,000	31,000
3,050		49,000	18,000	6,350	1/4	70,000	31,000
3,100		49,000	18,000	6,400		70,000	31,000
3,170	1/8	49,000	18,000	6,500		70,000	31,000
3,200		49,000	18,000	6,600		70,000	31,000
3,300		49,000	18,000	6,700		70,000	31,000
3,400		52,000	20,000	6,800		74,000	34,000
3,500		52,000	20,000	6,900		74,000	34,000
3,570	9/64	52,000	20,000	7,000		74,000	34,000
3,600		52,000	20,000	7,100		74,000	34,000
3,700		52,000	20,000	7,140	9/32	74,000	34,000
3,800		55,000	22,000	7,200		74,000	34,000
3,900		55,000	22,000	7,300		74,000	34,000
3,970	5/32	55,000	22,000	7,400		74,000	34,000
4,000		55,000	22,000	7,500		74,000	34,000
4,040		55,000	22,000	7,600		79,000	37,000
4,100		55,000	22,000	7,700		79,000	37,000



Brocas espirales extra cortas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
7,800		79,000	37,000	10,200		89,000	43,000
7,900		79,000	37,000	10,300		89,000	43,000
7,940	5/16	79,000	37,000	10,500		89,000	43,000
8,000		79,000	37,000	11,000		95,000	47,000
8,100		79,000	37,000	11,110	7/16	95,000	47,000
8,200		79,000	37,000	11,500		95,000	47,000
8,300		79,000	37,000	11,910	15/32	102,000	51,000
8,400		79,000	37,000	12,000		102,000	51,000
8,500		79,000	37,000	12,300	31/64	102,000	51,000
8,600		84,000	40,000	13,000		102,000	51,000
8,700		84,000	40,000	14,000		107,000	54,000
8,730	11/32	84,000	40,000	15,000		111,000	56,000
8,800		84,000	40,000	16,000		115,000	58,000
8,900		84,000	40,000				
9,000		84,000	40,000				
9,100		84,000	40,000				
9,300		84,000	40,000				
9,400		84,000	40,000				
9,500		84,000	40,000				
9,600		89,000	43,000				
9,700		89,000	43,000				
9,800		89,000	43,000				
9,900		89,000	43,000				
10,000		89,000	43,000				



Brocas espirales extra cortas

Artículo N° 89246

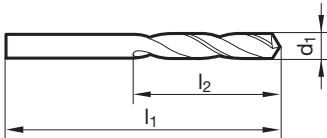


P	M	K	N	S	H
○	○	○	○	○	○



afilado plano • forma recta del corte principal

plásticos reforzados con fibra de vidrio • placas de circ. impresos que pueden ocasionar un rápido desgaste en las superficies y bordes de corte de la broca



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
0,500	30,000	6,500	4,600	50,000	25,000
0,800	30,000	8,500	4,700	50,000	25,000
0,900	30,000	9,500	5,000	50,000	25,000
1,000	30,000	11,000	5,200	50,000	25,000
1,200	30,000	13,000	5,300	50,000	25,000
1,400	30,000	13,000	5,600	50,000	25,000
1,700	40,000	17,500	5,800	50,000	25,000
2,000	40,000	17,500	5,900	50,000	25,000
2,500	40,000	17,500	6,100	65,000	30,000
3,000	45,000	20,000	6,500	65,000	30,000
3,100	50,000	22,000			
3,200	50,000	22,000			
3,400	50,000	22,000			
3,600	50,000	22,000			
4,000	50,000	22,000			
4,100	50,000	25,000			
4,200	50,000	25,000			
4,300	50,000	25,000			



Brocas espirales con mango cil. reforzado

Artículo N° 84805

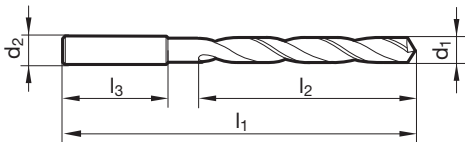


P	M	K	N	S	H
•	•	•	•		



vaciado de punta $\geq \varnothing 2,000$ • afilado plano • acero rápido al cobalto • se requiere poca fuerza de avance • se requiere poco par • más resistencia al desgaste • aplicación universal

aceros aleados y no aleados fundición de dureza hasta a 800 N/mm² • aceros para trab. en frío y en caliente • aceros inoxidables • metales no ferríticos • fundición • plásticos • aceros para rodamientos



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
2,000		3,000	44,000	12,000	28,000	5,300		6,000	70,000	26,000	36,000
2,100		3,000	44,000	12,000	28,000	5,400		6,000	72,000	28,000	36,000
2,200		3,000	45,000	13,000	28,000	5,500		6,000	72,000	28,000	36,000
2,300		3,000	45,000	13,000	28,000	5,550		6,000	72,000	28,000	36,000
2,380	3/32	3,000	46,000	14,000	28,000	5,560	7/32	6,000	72,000	28,000	36,000
2,400		3,000	46,000	14,000	28,000	5,600		6,000	72,000	28,000	36,000
2,500		3,000	46,000	14,000	28,000	5,700		6,000	72,000	28,000	36,000
2,600		3,000	46,000	14,000	28,000	5,800		6,000	72,000	28,000	36,000
2,700		3,000	48,000	16,000	28,000	5,900		6,000	72,000	28,000	36,000
2,780	7/64	3,000	48,000	16,000	28,000	5,950	15/64	6,000	72,000	28,000	36,000
2,800		3,000	48,000	16,000	28,000	6,000		6,000	72,000	28,000	36,000
2,900		3,000	48,000	16,000	28,000	6,100		8,000	75,000	31,000	36,000
3,000		3,000	48,000	16,000	28,000	6,200		8,000	75,000	31,000	36,000
3,100		4,000	50,000	18,000	28,000	6,300		8,000	75,000	31,000	36,000
3,170	1/8	4,000	50,000	18,000	28,000	6,350	1/4	8,000	75,000	31,000	36,000
3,200		4,000	50,000	18,000	28,000	6,400		8,000	75,000	31,000	36,000
3,300		4,000	50,000	18,000	28,000	6,500		8,000	75,000	31,000	36,000
3,400		4,000	52,000	20,000	28,000	6,600		8,000	75,000	31,000	36,000
3,500		4,000	52,000	20,000	28,000	6,700		8,000	75,000	31,000	36,000
3,570	9/64	4,000	52,000	20,000	28,000	6,750	17/64	8,000	78,000	34,000	36,000
3,600		4,000	52,000	20,000	28,000	6,800		8,000	78,000	34,000	36,000
3,700		4,000	52,000	20,000	28,000	6,900		8,000	78,000	34,000	36,000
3,800		4,000	54,000	22,000	28,000	7,000		8,000	78,000	34,000	36,000
3,900		4,000	54,000	22,000	28,000	7,100		8,000	78,000	34,000	36,000
3,970	5/32	4,000	54,000	22,000	28,000	7,140	9/32	8,000	78,000	34,000	36,000
4,000		4,000	54,000	22,000	28,000	7,200		8,000	78,000	34,000	36,000
4,100		6,000	66,000	22,000	36,000	7,300		8,000	78,000	34,000	36,000
4,200		6,000	66,000	22,000	36,000	7,400		8,000	78,000	34,000	36,000
4,300		6,000	68,000	24,000	36,000	7,500		8,000	78,000	34,000	36,000
4,370	11/64	6,000	68,000	24,000	36,000	7,540	19/64	8,000	81,000	37,000	36,000
4,400		6,000	68,000	24,000	36,000	7,550		8,000	81,000	37,000	36,000
4,500		6,000	68,000	24,000	36,000	7,600		8,000	81,000	37,000	36,000
4,600		6,000	68,000	24,000	36,000	7,700		8,000	81,000	37,000	36,000
4,650		6,000	68,000	24,000	36,000	7,800		8,000	81,000	37,000	36,000
4,700		6,000	68,000	24,000	36,000	7,900		8,000	81,000	37,000	36,000
4,760	3/16	6,000	70,000	26,000	36,000	7,940	5/16	8,000	81,000	37,000	36,000
4,800		6,000	70,000	26,000	36,000	8,000		8,000	81,000	37,000	36,000
4,900		6,000	70,000	26,000	36,000	8,100		10,000	87,000	37,000	40,000
5,000		6,000	70,000	26,000	36,000	8,200		10,000	87,000	37,000	40,000
5,100		6,000	70,000	26,000	36,000	8,300		10,000	87,000	37,000	40,000
5,160	13/64	6,000	70,000	26,000	36,000	8,330	21/64	10,000	87,000	37,000	40,000
5,200		6,000	70,000	26,000	36,000	8,400		10,000	87,000	37,000	40,000



Brocas espirales con mango cil. reforzado

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
8,500		10,000	87,000	37,000	40,000	11,800		12,000	104,000	47,000	45,000
8,600		10,000	91,000	40,000	40,000	11,900		12,000	108,000	51,000	45,000
8,700		10,000	91,000	40,000	40,000	11,910	15/32	12,000	108,000	51,000	45,000
8,730	11/32	10,000	91,000	40,000	40,000	12,000		12,000	108,000	51,000	45,000
8,800		10,000	91,000	40,000	40,000	12,100		16,000	111,000	51,000	48,000
8,900		10,000	91,000	40,000	40,000	12,200		16,000	111,000	51,000	48,000
9,000		10,000	91,000	40,000	40,000	12,300	31/64	16,000	111,000	51,000	48,000
9,100		10,000	91,000	40,000	40,000	12,400		16,000	111,000	51,000	48,000
9,130	23/64	10,000	91,000	40,000	40,000	12,500		16,000	111,000	51,000	48,000
9,200		10,000	91,000	40,000	40,000	12,600		16,000	111,000	51,000	48,000
9,300		10,000	91,000	40,000	40,000	12,700	1/2	16,000	111,000	51,000	48,000
9,400		10,000	91,000	40,000	40,000	12,800		16,000	111,000	51,000	48,000
9,500		10,000	91,000	40,000	40,000	12,900		16,000	111,000	51,000	48,000
9,520	3/8	10,000	93,000	43,000	40,000	13,000		16,000	111,000	51,000	48,000
9,550		10,000	93,000	43,000	40,000	13,100	33/64	16,000	111,000	51,000	48,000
9,600		10,000	93,000	43,000	40,000	13,490	17/32	16,000	114,000	54,000	48,000
9,700		10,000	93,000	43,000	40,000	13,500		16,000	114,000	54,000	48,000
9,800		10,000	93,000	43,000	40,000	13,890	35/64	16,000	114,000	54,000	48,000
9,900		10,000	93,000	43,000	40,000	14,000		16,000	114,000	54,000	48,000
9,920	25/64	10,000	93,000	43,000	40,000	14,290	9/16	16,000	116,000	56,000	48,000
10,000		10,000	93,000	43,000	40,000	14,500		16,000	116,000	56,000	48,000
10,100		12,000	100,000	43,000	45,000	15,000		16,000	116,000	56,000	48,000
10,200		12,000	100,000	43,000	45,000	15,500		16,000	118,000	58,000	48,000
10,300		12,000	100,000	43,000	45,000	15,870	5/8	16,000	118,000	58,000	48,000
10,320	13/32	12,000	100,000	43,000	45,000	16,000		16,000	118,000	58,000	48,000
10,400		12,000	100,000	43,000	45,000	16,500		20,000	126,000	60,000	50,000
10,500		12,000	100,000	43,000	45,000	16,670	21/32	20,000	126,000	60,000	50,000
10,600		12,000	100,000	43,000	45,000	17,000		20,000	126,000	60,000	50,000
10,700		12,000	104,000	47,000	45,000	17,500		20,000	128,000	62,000	50,000
10,720	27/64	12,000	104,000	47,000	45,000	18,000		20,000	128,000	62,000	50,000
10,800		12,000	104,000	47,000	45,000	18,500		20,000	130,000	64,000	50,000
10,900		12,000	104,000	47,000	45,000	19,000		20,000	130,000	64,000	50,000
11,000		12,000	104,000	47,000	45,000	19,500		20,000	132,000	66,000	50,000
11,100		12,000	104,000	47,000	45,000	20,000		20,000	132,000	66,000	50,000
11,110	7/16	12,000	104,000	47,000	45,000						
11,200		12,000	104,000	47,000	45,000						
11,300		12,000	104,000	47,000	45,000						
11,400		12,000	104,000	47,000	45,000						
11,500		12,000	104,000	47,000	45,000						
11,510	29/64	12,000	104,000	47,000	45,000						
11,600		12,000	104,000	47,000	45,000						
11,700		12,000	104,000	47,000	45,000						



Brocas espirales con mango cil. reforzado

Artículo N° 84801

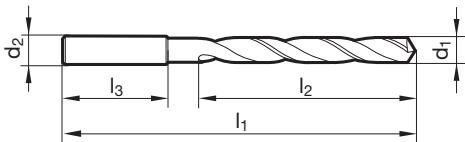


P	M	K	N	S	H
•	•	•	•		



vaciado de punta $\geq \varnothing 2,000$ • afilado plano • acero rápido al cobalto • se requiere poca fuerza de avance • se requiere poco par • más resistencia al desgaste • aplicación universal

aceros aleados y no aleados fundición de dureza hasta a 800 N/mm² • aceros para trab. en frío y en caliente • aceros inoxidables • metales no ferríticos • fundición • plásticos



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
2,000		3,000	56,000	24,000	28,000	5,300		6,000	96,000	52,000	36,000
2,100		3,000	56,000	24,000	28,000	5,400		6,000	101,000	57,000	36,000
2,200		3,000	59,000	27,000	28,000	5,500		6,000	101,000	57,000	36,000
2,300		3,000	59,000	27,000	28,000	5,550		6,000	101,000	57,000	36,000
2,380	3/32	3,000	62,000	30,000	28,000	5,560	7/32	6,000	101,000	57,000	36,000
2,400		3,000	62,000	30,000	28,000	5,600		6,000	101,000	57,000	36,000
2,500		3,000	62,000	30,000	28,000	5,700		6,000	101,000	57,000	36,000
2,600		3,000	62,000	30,000	28,000	5,800		6,000	101,000	57,000	36,000
2,700		3,000	65,000	33,000	28,000	5,900		6,000	101,000	57,000	36,000
2,780	7/64	3,000	65,000	33,000	28,000	5,950	15/64	6,000	101,000	57,000	36,000
2,800		3,000	65,000	33,000	28,000	6,000		6,000	101,000	57,000	36,000
2,900		3,000	65,000	33,000	28,000	6,100		8,000	107,000	63,000	36,000
3,000		3,000	65,000	33,000	28,000	6,200		8,000	107,000	63,000	36,000
3,100		4,000	68,000	36,000	28,000	6,300		8,000	107,000	63,000	36,000
3,170	1/8	4,000	68,000	36,000	28,000	6,350	1/4	8,000	107,000	63,000	36,000
3,200		4,000	68,000	36,000	28,000	6,400		8,000	107,000	63,000	36,000
3,300		4,000	68,000	36,000	28,000	6,500		8,000	107,000	63,000	36,000
3,400		4,000	71,000	39,000	28,000	6,600		8,000	107,000	63,000	36,000
3,500		4,000	71,000	39,000	28,000	6,700		8,000	107,000	63,000	36,000
3,570	9/64	4,000	71,000	39,000	28,000	6,750	17/64	8,000	113,000	69,000	36,000
3,600		4,000	71,000	39,000	28,000	6,800		8,000	113,000	69,000	36,000
3,700		4,000	71,000	39,000	28,000	6,900		8,000	113,000	69,000	36,000
3,800		4,000	75,000	43,000	28,000	7,000		8,000	113,000	69,000	36,000
3,900		4,000	75,000	43,000	28,000	7,100		8,000	113,000	69,000	36,000
3,970	5/32	4,000	75,000	43,000	28,000	7,140	9/32	8,000	113,000	69,000	36,000
4,000		4,000	75,000	43,000	28,000	7,200		8,000	113,000	69,000	36,000
4,100		6,000	87,000	43,000	36,000	7,300		8,000	113,000	69,000	36,000
4,200		6,000	87,000	43,000	36,000	7,400		8,000	113,000	69,000	36,000
4,300		6,000	91,000	47,000	36,000	7,500		8,000	113,000	69,000	36,000
4,370	11/64	6,000	91,000	47,000	36,000	7,540	19/64	8,000	119,000	75,000	36,000
4,400		6,000	91,000	47,000	36,000	7,550		8,000	119,000	75,000	36,000
4,500		6,000	91,000	47,000	36,000	7,600		8,000	119,000	75,000	36,000
4,600		6,000	91,000	47,000	36,000	7,700		8,000	119,000	75,000	36,000
4,650		6,000	91,000	47,000	36,000	7,800		8,000	119,000	75,000	36,000
4,700		6,000	91,000	47,000	36,000	7,900		8,000	119,000	75,000	36,000
4,760	3/16	6,000	96,000	52,000	36,000	7,940	5/16	8,000	119,000	75,000	36,000
4,800		6,000	96,000	52,000	36,000	8,000		8,000	119,000	75,000	36,000
4,900		6,000	96,000	52,000	36,000	8,100		10,000	125,000	75,000	40,000
5,000		6,000	96,000	52,000	36,000	8,200		10,000	125,000	75,000	40,000
5,100		6,000	96,000	52,000	36,000	8,300		10,000	125,000	75,000	40,000
5,160	13/64	6,000	96,000	52,000	36,000	8,330	21/64	10,000	125,000	75,000	40,000
5,200		6,000	96,000	52,000	36,000	8,400		10,000	125,000	75,000	40,000



Brocas espirales con mango cil. reforzado

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
8,500		10,000	125,000	75,000	40,000	11,800		12,000	151,000	94,000	45,000
8,600		10,000	131,000	81,000	40,000	11,900		12,000	158,000	101,000	45,000
8,700		10,000	131,000	81,000	40,000	11,910	15/32	12,000	158,000	101,000	45,000
8,730	11/32	10,000	131,000	81,000	40,000	12,000		12,000	158,000	101,000	45,000
8,800		10,000	131,000	81,000	40,000	12,100		16,000	161,000	101,000	48,000
8,900		10,000	131,000	81,000	40,000	12,200		16,000	161,000	101,000	48,000
9,000		10,000	131,000	81,000	40,000	12,300	31/64	16,000	161,000	101,000	48,000
9,100		10,000	131,000	81,000	40,000	12,400		16,000	161,000	101,000	48,000
9,130	23/64	10,000	131,000	81,000	40,000	12,500		16,000	161,000	101,000	48,000
9,200		10,000	131,000	81,000	40,000	12,600		16,000	161,000	101,000	48,000
9,300		10,000	131,000	81,000	40,000	12,700	1/2	16,000	161,000	101,000	48,000
9,400		10,000	131,000	81,000	40,000	12,800		16,000	161,000	101,000	48,000
9,500		10,000	131,000	81,000	40,000	12,900		16,000	161,000	101,000	48,000
9,520	3/8	10,000	137,000	87,000	40,000	13,000		16,000	161,000	101,000	48,000
9,550		10,000	137,000	87,000	40,000	13,100	33/64	16,000	161,000	101,000	48,000
9,600		10,000	137,000	87,000	40,000	13,490	17/32	16,000	166,000	106,000	48,000
9,700		10,000	137,000	87,000	40,000	13,500		16,000	166,000	106,000	48,000
9,800		10,000	137,000	87,000	40,000	13,890	35/64	16,000	166,000	106,000	48,000
9,900		10,000	137,000	87,000	40,000	14,000		16,000	166,000	106,000	48,000
9,920	25/64	10,000	137,000	87,000	40,000	14,290	9/16	16,000	169,000	109,000	48,000
10,000		10,000	137,000	87,000	40,000	14,500		16,000	169,000	109,000	48,000
10,100		12,000	144,000	87,000	45,000	15,000		16,000	169,000	109,000	48,000
10,200		12,000	144,000	87,000	45,000	15,500		16,000	172,000	112,000	48,000
10,300		12,000	144,000	87,000	45,000	15,870	5/8	16,000	172,000	112,000	48,000
10,320	13/32	12,000	144,000	87,000	45,000	16,000		16,000	172,000	112,000	48,000
10,400		12,000	144,000	87,000	45,000	16,500		20,000	181,000	115,000	50,000
10,500		12,000	144,000	87,000	45,000	16,670	21/32	20,000	181,000	115,000	50,000
10,600		12,000	144,000	87,000	45,000	17,000		20,000	181,000	115,000	50,000
10,700		12,000	151,000	94,000	45,000	17,460	11/16	20,000	184,000	118,000	50,000
10,720	27/64	12,000	151,000	94,000	45,000	17,500		20,000	184,000	118,000	50,000
10,800		12,000	151,000	94,000	45,000	18,000		20,000	184,000	118,000	50,000
10,900		12,000	151,000	94,000	45,000	18,500		20,000	188,000	122,000	50,000
11,000		12,000	151,000	94,000	45,000	19,000		20,000	188,000	122,000	50,000
11,100		12,000	151,000	94,000	45,000	19,500		20,000	191,000	125,000	50,000
11,110	7/16	12,000	151,000	94,000	45,000	20,000		20,000	191,000	125,000	50,000
11,200		12,000	151,000	94,000	45,000						
11,300		12,000	151,000	94,000	45,000						
11,400		12,000	151,000	94,000	45,000						
11,500		12,000	151,000	94,000	45,000						
11,510	29/64	12,000	151,000	94,000	45,000						
11,600		12,000	151,000	94,000	45,000						
11,700		12,000	151,000	94,000	45,000						

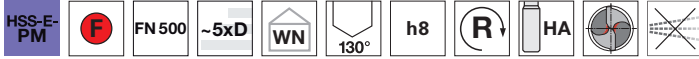


Brocas espirales con mango cil. reforzado

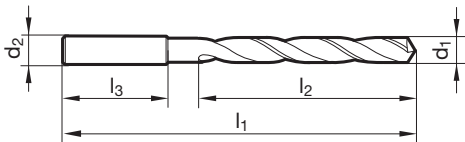
Artículo N° 84507



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • PM acero rápido al cobalto • alta resistencia al desgaste • estabilidad muy buena
 materiales más duros, aceros de aleación alta • aceros de cementación, de bonificación • hierro fundido, latón y bronce



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
2,000		3,000	56,000	24,000	28,000	5,300		6,000	96,000	52,000	36,000
2,100		3,000	56,000	24,000	28,000	5,400		6,000	101,000	57,000	36,000
2,200		3,000	59,000	27,000	28,000	5,500		6,000	101,000	57,000	36,000
2,300		3,000	59,000	27,000	28,000	5,550		6,000	101,000	57,000	36,000
2,380	3/32	3,000	62,000	30,000	28,000	5,560	7/32	6,000	101,000	57,000	36,000
2,400		3,000	62,000	30,000	28,000	5,600		6,000	101,000	57,000	36,000
2,500		3,000	62,000	30,000	28,000	5,700		6,000	101,000	57,000	36,000
2,600		3,000	62,000	30,000	28,000	5,800		6,000	101,000	57,000	36,000
2,700		3,000	65,000	33,000	28,000	5,900		6,000	101,000	57,000	36,000
2,780	7/64	3,000	65,000	33,000	28,000	5,950	15/64	6,000	101,000	57,000	36,000
2,800		3,000	65,000	33,000	28,000	6,000		6,000	101,000	57,000	36,000
2,900		3,000	65,000	33,000	28,000	6,100		8,000	107,000	63,000	36,000
3,000		3,000	65,000	33,000	28,000	6,200		8,000	107,000	63,000	36,000
3,100		4,000	68,000	36,000	28,000	6,300		8,000	107,000	63,000	36,000
3,170	1/8	4,000	68,000	36,000	28,000	6,350	1/4	8,000	107,000	63,000	36,000
3,200		4,000	68,000	36,000	28,000	6,400		8,000	107,000	63,000	36,000
3,300		4,000	68,000	36,000	28,000	6,500		8,000	107,000	63,000	36,000
3,400		4,000	71,000	39,000	28,000	6,600		8,000	107,000	63,000	36,000
3,500		4,000	71,000	39,000	28,000	6,700		8,000	107,000	63,000	36,000
3,570	9/64	4,000	71,000	39,000	28,000	6,750	17/64	8,000	113,000	69,000	36,000
3,600		4,000	71,000	39,000	28,000	6,800		8,000	113,000	69,000	36,000
3,700		4,000	71,000	39,000	28,000	6,900		8,000	113,000	69,000	36,000
3,800		4,000	75,000	43,000	28,000	7,000		8,000	113,000	69,000	36,000
3,900		4,000	75,000	43,000	28,000	7,100		8,000	113,000	69,000	36,000
3,970	5/32	4,000	75,000	43,000	28,000	7,140	9/32	8,000	113,000	69,000	36,000
4,000		4,000	75,000	43,000	28,000	7,200		8,000	113,000	69,000	36,000
4,100		6,000	87,000	43,000	36,000	7,300		8,000	113,000	69,000	36,000
4,200		6,000	87,000	43,000	36,000	7,400		8,000	113,000	69,000	36,000
4,300		6,000	91,000	47,000	36,000	7,500		8,000	113,000	69,000	36,000
4,370	11/64	6,000	91,000	47,000	36,000	7,540	19/64	8,000	119,000	75,000	36,000
4,400		6,000	91,000	47,000	36,000	7,550		8,000	119,000	75,000	36,000
4,500		6,000	91,000	47,000	36,000	7,600		8,000	119,000	75,000	36,000
4,600		6,000	91,000	47,000	36,000	7,700		8,000	119,000	75,000	36,000
4,650		6,000	91,000	47,000	36,000	7,800		8,000	119,000	75,000	36,000
4,700		6,000	91,000	47,000	36,000	7,900		8,000	119,000	75,000	36,000
4,760	3/16	6,000	96,000	52,000	36,000	7,940	5/16	8,000	119,000	75,000	36,000
4,800		6,000	96,000	52,000	36,000	8,000		8,000	119,000	75,000	36,000
4,900		6,000	96,000	52,000	36,000	8,100		10,000	125,000	75,000	40,000
5,000		6,000	96,000	52,000	36,000	8,200		10,000	125,000	75,000	40,000
5,100		6,000	96,000	52,000	36,000	8,300		10,000	125,000	75,000	40,000
5,160	13/64	6,000	96,000	52,000	36,000	8,330	21/64	10,000	125,000	75,000	40,000
5,200		6,000	96,000	52,000	36,000	8,400		10,000	125,000	75,000	40,000



Brocas espirales con mango cil. reforzado

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
8,500		10,000	125,000	75,000	40,000	10,800		12,000	151,000	94,000	45,000
8,600		10,000	131,000	81,000	40,000	10,900		12,000	151,000	94,000	45,000
8,700		10,000	131,000	81,000	40,000	11,000		12,000	151,000	94,000	45,000
8,730	11/32	10,000	131,000	81,000	40,000	11,100		12,000	151,000	94,000	45,000
8,800		10,000	131,000	81,000	40,000	11,110	7/16	12,000	151,000	94,000	45,000
8,900		10,000	131,000	81,000	40,000	11,200		12,000	151,000	94,000	45,000
9,000		10,000	131,000	81,000	40,000	11,300		12,000	151,000	94,000	45,000
9,100		10,000	131,000	81,000	40,000	11,400		12,000	151,000	94,000	45,000
9,130	23/64	10,000	131,000	81,000	40,000	11,500		12,000	151,000	94,000	45,000
9,200		10,000	131,000	81,000	40,000	11,510	29/64	12,000	151,000	94,000	45,000
9,300		10,000	131,000	81,000	40,000	11,600		12,000	151,000	94,000	45,000
9,400		10,000	131,000	81,000	40,000	11,700		12,000	151,000	94,000	45,000
9,500		10,000	131,000	81,000	40,000	11,800		12,000	151,000	94,000	45,000
9,520	3/8	10,000	137,000	87,000	40,000	11,900		12,000	158,000	101,000	45,000
9,550		10,000	137,000	87,000	40,000	11,910	15/32	12,000	158,000	101,000	45,000
9,600		10,000	137,000	87,000	40,000	12,000		12,000	158,000	101,000	45,000
9,700		10,000	137,000	87,000	40,000	12,100		14,000	161,000	101,000	45,000
9,800		10,000	137,000	87,000	40,000	12,200		14,000	161,000	101,000	45,000
9,900		10,000	137,000	87,000	40,000	12,300	31/64	14,000	161,000	101,000	45,000
9,920	25/64	10,000	137,000	87,000	40,000	12,400		14,000	161,000	101,000	45,000
10,000		10,000	137,000	87,000	40,000	12,500		14,000	161,000	101,000	45,000
10,100		12,000	144,000	87,000	45,000	12,600		14,000	161,000	101,000	45,000
10,200		12,000	144,000	87,000	45,000	12,700	1/2	14,000	161,000	101,000	45,000
10,300		12,000	144,000	87,000	45,000	12,800		14,000	161,000	101,000	45,000
10,320	13/32	12,000	144,000	87,000	45,000	12,900		14,000	161,000	101,000	45,000
10,400		12,000	144,000	87,000	45,000	13,000		14,000	161,000	101,000	45,000
10,500		12,000	144,000	87,000	45,000						
10,600		12,000	144,000	87,000	45,000						
10,700		12,000	151,000	94,000	45,000						
10,720	27/64	12,000	151,000	94,000	45,000						

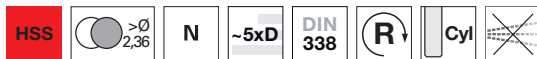


Juego de brocas helicoidales

Artículo N° 88013



P	M	K	N	S	H
•		•	○		



Set en cassette de plástico • entrada cónica

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argénton y grafito

d1	ascendente en mm	N° de htas. per juego	Código N°
1,0-10,0	0,5	19	0,013
1,0-13,0	0,5	25	0,014
1,0-5,9	0,1	50	0,015
6,0-10,0	0,1	41	0,016
1,0-10,5	0,5	32	0,019

Artículo N° 88014



P	M	K	N	S	H
•	○	○	○		



Set en cassette de plástico • entrada cónica

d1	ascendente en mm	N° de htas. per juego	Código N°
1,0-5,0	0,1	41	0,011
5,1-10,0	0,1	50	0,012
1,0-10,0	0,5	19	0,013
1,0-13,0	0,5	25	0,014
1,0-10,5	0,5	24	0,018



HARTNER

Juego de brocas helicoidales

Artículo N° 88015



P	M	K	N	S	H
•	○	○	○		



Set en cassette metálica • entrada cónica

d1	ascendente en mm	N° de htas. per juego	Código N°
1,0-5,0	0,1	41	0,011
5,1-10,0	0,1	50	0,012
1,0-10,0	0,5	19	0,013
1,0-13,0	0,5	25	0,014
1,0-10,5	0,5	24	0,018

Artículo N° 88016



P	M	K	N	S	H
•		•	○		



Set en cassette de plástico • entrada cónica • recubrimiento de la cabeza
aceros y fundición de aceros (aleados y sin alear) • fundición gris, fundición maleable, fundición esférica • hierro sinterizado y grafito

d1	ascendente en mm	N° de htas. per juego	Código N°
1,0-13,0	0,5	25	6,014
1,0-5,9	0,1	50	6,015
6,0-10,0	0,1	41	6,016
1,0-10,5	0,5	24	6,018



Juego de brocas helicoidales

Artículo N° 88026



P	M	K	N	S	H
•		•	○		



Set en cassette de plástico • entrada cónica

aceros y fundición de aceros (aleados y sin alear) • fundición de dureza sup. a 800 N/mm² • aceros para trab. en frío y en caliente
 • aceros para rodamientos • aceros altamente aleados • aceros de cementación, de bonificación

d1	ascendente en mm	N° de htas. per juego	Código N°
1,0-10,0	0,5	19	3,013
1,0-13,0	0,5	25	3,014



HARTNER

Juego de brocas helicoidales

Artículo N° 88303



Cassette vacío

d1	ascendente en mm	N° de htas. per juego	Código N°
1,0-10,0	0,5	19	0,213
1,0-13,0	0,5	25	0,214
1,0-5,9	0,1	50	0,215
6,0-10,0	0,1	41	0,216

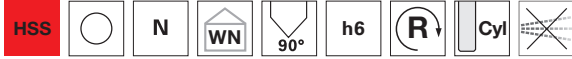


Brocas de puntear NC

Artículo N° 81192



P	M	K	N	S	H
•	○	•	•	○	

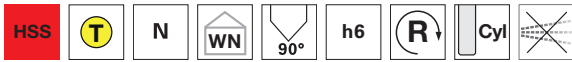


entrada cónica • solo para puntear
uso general

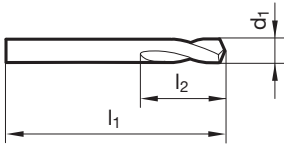
Artículo N° 84435



P	M	K	N	S	H
•	○	•	•	○	



entrada cónica • solo para puntear
uso general



d1		l1	l2	d1		l1	l2
mm	inch	mm	mm	mm	inch	mm	mm
3,000		46,000	12,000	10,000		89,000	25,000
4,000		55,000	12,000	12,000		102,000	30,000
5,000		62,000	14,000	14,000		107,000	33,500
6,000		66,000	16,000	16,000		115,000	37,500
6,350		70,000	17,000	20,000		131,000	45,000
8,000		79,000	21,000	25,000	63/64	151,000	53,000

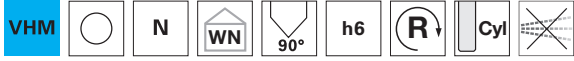


Brocas de puntear NC

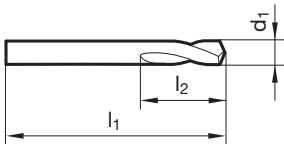
Artículo N° 89243



P	M	K	N	S	H
○	○	○	○	○	○



afilado plano • solo para puntear
uso general



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
4,000	55,000	12,000	16,000	115,000	37,500
5,000	62,000	14,000	20,000	131,000	45,000
6,000	66,000	16,000			
8,000	79,000	21,000			
10,000	89,000	25,000			
12,000	102,000	30,000			



Brocas de puntear NC

Artículo N° 81191



P	M	K	N	S	H
•	○	•	•	○	



entrada cónica • solo para puntear
uso general

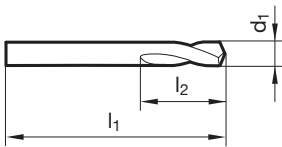
Artículo N° 84434



P	M	K	N	S	H
•	○	•	•	○	



entrada cónica • solo para puntear
uso general



d1	inch	l1	l2	d1	inch	l1	l2
mm		mm	mm	mm		mm	mm
3,000		46,000	12,000	25,000	63/64	151,000	53,000
4,000		55,000	12,000				
5,000		62,000	14,000				
6,000		66,000	16,000				
8,000		79,000	21,000				
10,000		89,000	25,000				
12,000		102,000	30,000				
14,000		107,000	33,500				
15,000		111,000	33,500				
16,000		115,000	37,500				
19,050		131,000	45,000				
20,000		131,000	45,000				



Brocas de puntear NC

Artículo N° 89242



P	M	K	N	S	H
○	○	○	○	○	○

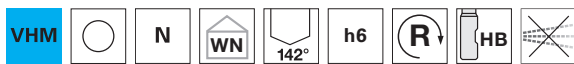


vaciado de punta $\geq \varnothing 16,000$ • afilado plano • solo para puntear
uso general

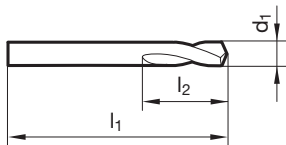
Artículo N° 89249



P	M	K	N	S	H
○	○	○	○	○	○



afilado plano • solo para puntear
uso general



d1	inch	l1	l2	d1	inch	l1	l2
mm		mm	mm	mm		mm	mm
4,000		55,000	12,000	12,700	1/2	102,000	30,000
5,000		62,000	14,000	16,000		115,000	37,500
6,000		66,000	16,000	20,000		131,000	45,000
8,000		79,000	21,000				
10,000		89,000	25,000				
12,000		102,000	30,000				



Brocas para carrocería

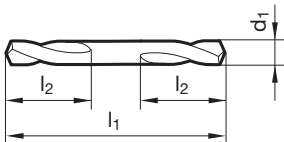
Artículo N° 81190



P	M	K	N	S	H
•	○	•	•	○	



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • para uso por los dos lados • en taladradoras de mano para carrocerías secciones delgadas



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
2,000	38,000	7,500	4,900	62,000	17,000
2,100	38,000	7,500	5,000	62,000	17,000
2,300	40,000	8,500	5,100	62,000	17,000
2,400	43,000	9,500	5,200	62,000	17,000
2,500	43,000	9,500	5,300	62,000	17,000
2,600	43,000	9,500	5,400	66,000	19,000
2,700	46,000	10,600	5,500	66,000	19,000
2,800	46,000	10,600	5,700	66,000	19,000
2,900	46,000	10,600	5,800	66,000	19,000
3,000	46,000	10,600	5,900	66,000	19,000
3,100	49,000	11,200	6,000	66,000	19,000
3,200	49,000	11,200	6,300	70,000	21,200
3,300	49,000	11,200	6,500	70,000	21,200
3,400	52,000	12,500	7,500	74,000	23,600
3,500	52,000	12,500	8,000	79,000	25,000
3,600	52,000	12,500	8,500	79,000	25,000
3,800	55,000	14,000	9,000	84,000	25,000
3,900	55,000	14,000	9,500	84,000	25,000
4,000	55,000	14,000	10,000	89,000	25,000
4,100	55,000	14,000			
4,200	55,000	14,000			
4,500	58,000	15,500			
4,700	58,000	15,500			
4,800	62,000	17,000			

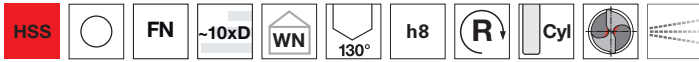


Brocas con canal de refrigeración

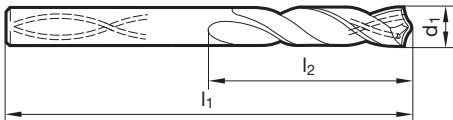
Artículo N° 82710



P	M	K	N	S	H
•	○	•	•	○	



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • para taladrar casquillos • ideal para prof. de taladro sup. a 5xD
 paquetes de chapas • aceros y fundición de aceros, fundición gris • aceros austeníticos hasta aprox. 800 N/mm²



d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000	3,000	100,000	66,000	34,000	8,500	8,500	165,000	109,000	56,000
3,300	3,300	106,000	69,000	37,000	9,000	9,000	175,000	115,000	60,000
4,000	4,000	119,000	78,000	41,000	9,500	9,500	175,000	115,000	60,000
4,500	4,500	126,000	82,000	44,000	10,000	10,000	184,000	121,000	63,000
5,000	5,000	132,000	87,000	45,000	10,200	10,200	184,000	121,000	63,000
5,500	5,500	139,000	91,000	48,000	10,500	10,500	184,000	121,000	63,000
6,000	6,000	139,000	91,000	48,000	11,000	11,000	195,000	128,000	67,000
6,500	6,500	148,000	97,000	51,000	11,500	11,500	195,000	128,000	67,000
6,800	6,800	156,000	102,000	54,000	12,000	12,000	205,000	134,000	71,000
7,000	7,000	156,000	102,000	54,000	13,000	13,000	205,000	134,000	71,000
7,500	7,500	156,000	102,000	54,000					
8,000	8,000	165,000	109,000	56,000					

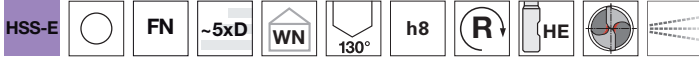


Brocas con canal de refrigeración

Artículo N° 82761



P	M	K	N	S	H
•	•	•	•	•	



vaciado de punta $\geq \varnothing 5,000$ • entrada cónica • acero rápido al cobalto

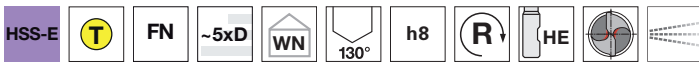
materiales de viruta larga de hasta 1000 N/mm²

- aceros inoxidables • fundición • metales no ferríticos

Artículo N° 84461



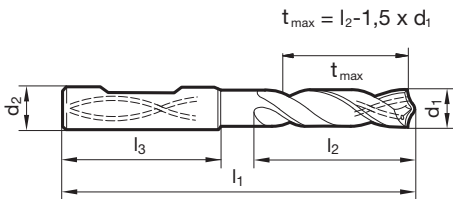
P	M	K	N	S	H
•	•	•	•	•	○



vaciado de punta $\geq \varnothing 5,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste

materiales de viruta larga de hasta 1000 N/mm²

- aceros inoxidables • fundición • metales no ferríticos



d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
5,000	6,000	82,000	44,000	36,000	12,500	14,000	124,000	77,000	45,000
5,500	6,000	82,000	44,000	36,000	13,000	14,000	124,000	77,000	45,000
6,000	6,000	82,000	44,000	36,000	13,500	14,000	124,000	77,000	45,000
6,500	8,000	91,000	53,000	36,000	14,000	14,000	124,000	77,000	45,000
6,800	8,000	91,000	53,000	36,000	14,500	16,000	133,000	83,000	48,000
7,000	8,000	91,000	53,000	36,000	15,000	16,000	133,000	83,000	48,000
7,500	8,000	91,000	53,000	36,000	15,500	16,000	133,000	83,000	48,000
7,800	8,000	91,000	53,000	36,000	16,000	16,000	133,000	83,000	48,000
8,000	8,000	91,000	53,000	36,000	16,500	18,000	143,000	93,000	48,000
8,500	10,000	103,000	61,000	40,000	17,000	18,000	143,000	93,000	48,000
9,000	10,000	103,000	61,000	40,000	17,500	18,000	143,000	93,000	48,000
9,500	10,000	103,000	61,000	40,000	18,000	18,000	143,000	93,000	48,000
10,000	10,000	103,000	61,000	40,000	18,500	20,000	153,000	101,000	50,000
10,200	12,000	118,000	71,000	45,000	19,000	20,000	153,000	101,000	50,000
10,500	12,000	118,000	71,000	45,000	19,500	20,000	153,000	101,000	50,000
11,000	12,000	118,000	71,000	45,000	20,000	20,000	153,000	101,000	50,000
11,500	12,000	118,000	71,000	45,000					
12,000	12,000	118,000	71,000	45,000					



Brocas para casquillos

Artículo N° 81210

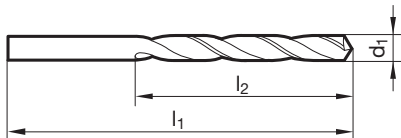


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • para taladrar casquillos
 • con arrastre según DIN 1809

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argentón y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,800		42,000	22,000	4,600		102,000	69,000
0,900		45,000	24,000	4,700		102,000	69,000
0,950		45,000	24,000	4,800		108,000	74,000
1,000		48,000	26,000	4,900		108,000	74,000
1,200		52,000	30,000	5,000		108,000	74,000
1,250		52,000	30,000	5,100		108,000	74,000
1,350		55,000	33,000	5,200		108,000	74,000
1,400		55,000	33,000	5,300		108,000	74,000
1,450		55,000	33,000	5,350		116,000	80,000
1,500		55,000	33,000	5,400		116,000	80,000
1,620		58,000	35,000	5,500		116,000	80,000
1,700		58,000	35,000	5,550		116,000	80,000
1,800		62,000	38,000	5,600		116,000	80,000
1,900		62,000	38,000	5,700		116,000	80,000
1,990		66,000	41,000	5,750		116,000	80,000
2,000		66,000	41,000	5,800		116,000	80,000
2,100		66,000	41,000	5,900		116,000	80,000
2,350		70,000	44,000	5,950	15/64	116,000	80,000
2,400		74,000	47,000	6,000		116,000	80,000
2,450		74,000	47,000	6,100		124,000	86,000
2,500		74,000	47,000	6,200		124,000	86,000
2,600		74,000	47,000	6,400		124,000	86,000
2,900		79,000	51,000	6,500		124,000	86,000
3,000		79,000	51,000	6,600		124,000	86,000
3,050		84,000	55,000	6,700		124,000	86,000
3,100		84,000	55,000	6,750	17/64	133,000	93,000
3,200		84,000	55,000	6,900		133,000	93,000
3,250		84,000	55,000	7,000		133,000	93,000
3,300		84,000	55,000	7,100		133,000	93,000
3,400		91,000	60,000	7,200		133,000	93,000
3,500		91,000	60,000	7,300		133,000	93,000
3,600		91,000	60,000	7,400		133,000	93,000
3,700		91,000	60,000	7,500		133,000	93,000
3,750		91,000	60,000	7,600		142,000	100,000
3,800		96,000	64,000	7,700		142,000	100,000
3,900		96,000	64,000	7,800		142,000	100,000
4,000		96,000	64,000	7,900		142,000	100,000
4,050		96,000	64,000	8,000		142,000	100,000
4,200		96,000	64,000	8,200		142,000	100,000
4,300		102,000	69,000	8,250		142,000	100,000
4,400		102,000	69,000	8,300		142,000	100,000
4,500		102,000	69,000	8,400		142,000	100,000



Brocas para casquillos

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
8,500		142,000	100,000	10,600		162,000	116,000
8,600		151,000	107,000	10,800		173,000	125,000
8,700		151,000	107,000	11,000		173,000	125,000
8,800		151,000	107,000	11,500		173,000	125,000
8,900		151,000	107,000	11,750		173,000	125,000
9,000		151,000	107,000	12,000		184,000	134,000
9,100		151,000	107,000	12,200		184,000	134,000
9,200		151,000	107,000	12,400		184,000	134,000
9,300		151,000	107,000	12,500		184,000	134,000
9,400		151,000	107,000	13,000		184,000	134,000
9,500		151,000	107,000	13,500		194,000	142,000
9,600		162,000	116,000	14,000		194,000	142,000
9,700		162,000	116,000	14,200		202,000	147,000
9,800		162,000	116,000	14,500		202,000	147,000
9,900		162,000	116,000	15,500		211,000	153,000
10,000		162,000	116,000	16,500		218,000	159,000
10,200		162,000	116,000	18,000		226,000	165,000
10,500		162,000	116,000	19,000		234,000	171,000



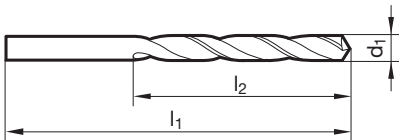
Brocas espirales cil., largas

Artículo N° 81310

P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • para taladros profundos
 aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argénton y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,400		30,000	10,000	2,800		100,000	66,000
0,500		32,000	12,000	2,850		100,000	66,000
0,600		35,000	15,000	2,900		100,000	66,000
0,650		38,000	18,000	2,950		100,000	66,000
0,700		42,000	21,000	3,000		100,000	66,000
0,750		42,000	21,000	3,050		106,000	69,000
0,800		46,000	25,000	3,100		106,000	69,000
0,850		46,000	25,000	3,150		106,000	69,000
0,900		51,000	29,000	3,200		106,000	69,000
0,910		51,000	29,000	3,250		106,000	69,000
0,950		51,000	29,000	3,300		106,000	69,000
1,000		56,000	33,000	3,350		106,000	69,000
1,100		60,000	37,000	3,400		112,000	73,000
1,150		60,000	37,000	3,450		112,000	73,000
1,200		65,000	41,000	3,500		112,000	73,000
1,250		65,000	41,000	3,550		112,000	73,000
1,300		65,000	41,000	3,600		112,000	73,000
1,350		70,000	45,000	3,650		112,000	73,000
1,400		70,000	45,000	3,700		112,000	73,000
1,500		70,000	45,000	3,750		112,000	73,000
1,550		76,000	50,000	3,800		119,000	78,000
1,600		76,000	50,000	3,850		119,000	78,000
1,700		76,000	50,000	3,900		119,000	78,000
1,750		80,000	53,000	3,950		119,000	78,000
1,800		80,000	53,000	4,000		119,000	78,000
1,900		80,000	53,000	4,040		119,000	78,000
1,950		85,000	56,000	4,050		119,000	78,000
2,000		85,000	56,000	4,100		119,000	78,000
2,050		85,000	56,000	4,150		119,000	78,000
2,100		85,000	56,000	4,200		119,000	78,000
2,200		90,000	59,000	4,250		119,000	78,000
2,250		90,000	59,000	4,300		126,000	82,000
2,300		90,000	59,000	4,400		126,000	82,000
2,350		90,000	59,000	4,450		126,000	82,000
2,400		95,000	62,000	4,500		126,000	82,000
2,450		95,000	62,000	4,550		126,000	82,000
2,500		95,000	62,000	4,600		126,000	82,000
2,550		95,000	62,000	4,650		126,000	82,000
2,600		95,000	62,000	4,700		126,000	82,000
2,650		95,000	62,000	4,750		126,000	82,000
2,700		100,000	66,000	4,760	3/16	132,000	87,000
2,750		100,000	66,000	4,800		132,000	87,000



Brocas espirales cil., largas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,850		132,000	87,000	9,750		184,000	121,000
4,900		132,000	87,000	9,800		184,000	121,000
4,950		132,000	87,000	9,900		184,000	121,000
5,000		132,000	87,000	9,920	25/64	184,000	121,000
5,050		132,000	87,000	10,000		184,000	121,000
5,100		132,000	87,000	10,100		184,000	121,000
5,150		132,000	87,000	10,200		184,000	121,000
5,200		132,000	87,000	10,250		184,000	121,000
5,250		132,000	87,000	10,400		184,000	121,000
5,300		132,000	87,000	10,500		184,000	121,000
5,350		139,000	91,000	10,600		184,000	121,000
5,400		139,000	91,000	10,700		195,000	128,000
5,450		139,000	91,000	10,720	27/64	195,000	128,000
5,500		139,000	91,000	10,750		195,000	128,000
5,600		139,000	91,000	10,900		195,000	128,000
5,650		139,000	91,000	11,000		195,000	128,000
5,700		139,000	91,000	11,200		195,000	128,000
5,750		139,000	91,000	11,250		195,000	128,000
5,800		139,000	91,000	11,500		195,000	128,000
5,900		139,000	91,000	11,600		195,000	128,000
5,950	15/64	139,000	91,000	11,700		195,000	128,000
6,000		139,000	91,000	11,750		195,000	128,000
6,100		148,000	97,000	11,800		195,000	128,000
6,200		148,000	97,000	12,000		205,000	134,000
6,250		148,000	97,000	12,100		205,000	134,000
6,300		148,000	97,000	12,200		205,000	134,000
6,350	1/4	148,000	97,000	12,300	31/64	205,000	134,000
6,400		148,000	97,000	12,500		205,000	134,000
6,500		148,000	97,000	12,600		205,000	134,000
6,600		148,000	97,000	12,700	1/2	205,000	134,000
6,700		148,000	97,000	12,800		205,000	134,000
6,750	17/64	156,000	102,000	13,000		205,000	134,000
6,800		156,000	102,000	13,200		205,000	134,000
6,900		156,000	102,000	13,490	17/32	214,000	140,000
7,000		156,000	102,000	13,500		214,000	140,000
7,100		156,000	102,000	14,000		214,000	140,000
7,200		156,000	102,000	14,200		220,000	144,000
7,250		156,000	102,000	14,250		220,000	144,000
7,300		156,000	102,000	14,500		220,000	144,000
7,400		156,000	102,000	14,900		220,000	144,000
7,500		156,000	102,000	15,000		220,000	144,000
7,600		165,000	109,000	15,200		227,000	149,000
7,700		165,000	109,000	15,250		227,000	149,000
7,750		165,000	109,000	15,500		227,000	149,000
7,800		165,000	109,000	15,600		227,000	149,000
7,900		165,000	109,000	16,000		227,000	149,000
7,940	5/16	165,000	109,000	17,000		235,000	154,000
8,000		165,000	109,000	17,500		241,000	158,000
8,100		165,000	109,000	18,000		241,000	158,000
8,200		165,000	109,000	18,500		247,000	162,000
8,250		165,000	109,000	19,000		247,000	162,000
8,300		165,000	109,000	20,000		254,000	166,000
8,400		165,000	109,000	20,500		261,000	171,000
8,500		165,000	109,000	21,000		261,000	171,000
8,600		175,000	115,000	21,500		268,000	176,000
8,700		175,000	115,000	22,000		268,000	176,000
8,800		175,000	115,000	23,500		275,000	180,000
8,900		175,000	115,000				
9,000		175,000	115,000				
9,100		175,000	115,000				
9,200		175,000	115,000				
9,300		175,000	115,000				
9,400		175,000	115,000				
9,500		175,000	115,000				
9,600		184,000	121,000				
9,700		184,000	121,000				



HARTNER

Brocas espirales cil., largas

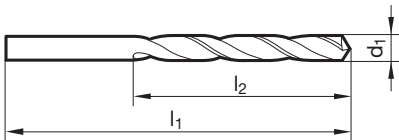
Artículo N° 81315



P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 15,000$ • entrada cónica • para taladros profundos • para taladrar casquillos
 aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esférica • hierro sinterizado,
 argentón y grafito



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
0,900	51,000	29,000	5,800	139,000	91,000
1,200	65,000	41,000	6,000	139,000	91,000
1,250	65,000	41,000	6,500	148,000	97,000
1,500	70,000	45,000	7,500	156,000	102,000
1,550	76,000	50,000	7,900	165,000	109,000
1,800	80,000	53,000	8,000	165,000	109,000
2,800	100,000	66,000	8,500	165,000	109,000
2,900	100,000	66,000	9,000	175,000	115,000
3,000	100,000	66,000	10,000	184,000	121,000
3,200	106,000	69,000	11,000	195,000	128,000
3,500	112,000	73,000	12,000	205,000	134,000
3,800	119,000	78,000	15,000	220,000	144,000
4,000	119,000	78,000			
4,200	119,000	78,000			
4,500	126,000	82,000			
5,000	132,000	87,000			
5,200	132,000	87,000			
5,700	139,000	91,000			



Brocas espirales cil., largas

Artículo N° 81317

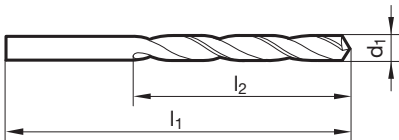


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 3,100$ • entrada cónica • con arrastre

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argentón y grafito



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
3,100	106,000	69,000	7,400	156,000	102,000
3,400	112,000	73,000	7,500	156,000	102,000
3,600	112,000	73,000	7,900	165,000	109,000
3,700	112,000	73,000	8,000	165,000	109,000
4,000	119,000	78,000	8,250	165,000	109,000
4,300	126,000	82,000	8,400	165,000	109,000
4,500	126,000	82,000	9,900	184,000	121,000
5,000	132,000	87,000	10,000	184,000	121,000
5,500	139,000	91,000			
6,100	148,000	97,000			
6,600	148,000	97,000			
7,000	156,000	102,000			

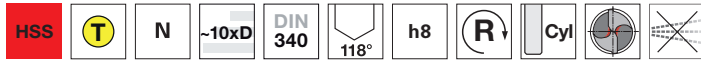


Brocas espirales cil., largas

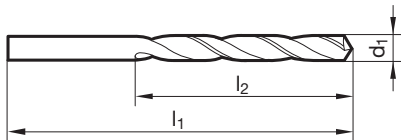
Artículo N° 84418



P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • para taladros profundos • para taladrar casquillos
 aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esférica • hierro sinterizado, argentón y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,500		32,000	12,000	5,800		139,000	91,000
0,700		42,000	21,000	5,900		139,000	91,000
0,800		46,000	25,000	6,000		139,000	91,000
1,000		56,000	33,000	6,100		148,000	97,000
1,100		60,000	37,000	6,200		148,000	97,000
1,200		65,000	41,000	6,300		148,000	97,000
1,400		70,000	45,000	6,400		148,000	97,000
1,500		70,000	45,000	6,500		148,000	97,000
1,600		76,000	50,000	6,600		148,000	97,000
1,700		76,000	50,000	6,700		148,000	97,000
1,800		80,000	53,000	6,800		156,000	102,000
1,900		80,000	53,000	6,900		156,000	102,000
2,000		85,000	56,000	7,000		156,000	102,000
2,200		90,000	59,000	7,200		156,000	102,000
2,400		95,000	62,000	7,300		156,000	102,000
2,500		95,000	62,000	7,500		156,000	102,000
2,700		100,000	66,000	7,600		165,000	109,000
2,800		100,000	66,000	7,700		165,000	109,000
2,900		100,000	66,000	7,800		165,000	109,000
3,000		100,000	66,000	7,900		165,000	109,000
3,100		106,000	69,000	8,000		165,000	109,000
3,300		106,000	69,000	8,100		165,000	109,000
3,400		112,000	73,000	8,200		165,000	109,000
3,500		112,000	73,000	8,500		165,000	109,000
3,800		119,000	78,000	8,600		175,000	115,000
3,900		119,000	78,000	8,700		175,000	115,000
4,000		119,000	78,000	8,800		175,000	115,000
4,100		119,000	78,000	8,900		175,000	115,000
4,200		119,000	78,000	9,000		175,000	115,000
4,300		126,000	82,000	9,100		175,000	115,000
4,500		126,000	82,000	9,200		175,000	115,000
4,600		126,000	82,000	9,400		175,000	115,000
4,700		126,000	82,000	9,500		175,000	115,000
4,800		132,000	87,000	9,800		184,000	121,000
4,900		132,000	87,000	9,900		184,000	121,000
5,000		132,000	87,000	10,000		184,000	121,000
5,200		132,000	87,000	10,200		184,000	121,000
5,300		132,000	87,000	10,800		195,000	128,000
5,400		139,000	91,000	11,000		195,000	128,000
5,500		139,000	91,000	11,500		195,000	128,000
5,600		139,000	91,000	12,000		205,000	134,000
5,700		139,000	91,000	12,500		205,000	134,000



Brocas espirales cil., largas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
12,700	1/2	205,000	134,000	15,000		220,000	144,000
13,000		205,000	134,000	15,500		227,000	149,000
13,500		214,000	140,000	16,000		227,000	149,000
14,000		214,000	140,000				
14,500		220,000	144,000				
14,800		220,000	144,000				

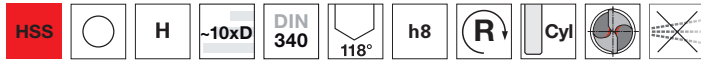


Brocas espirales cil., largas

Artículo N° 81320

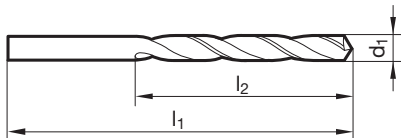


P	M	K	N	S	H
			•		



vaciado de punta $\geq \varnothing 14,500$ • entrada cónica • para taladros profundos

materiales duros y quebradizos • latón, aleaciones de magnesio • bronce y bronce al fósforo • pizarra, mica, Pertinax



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
0,600	35,000	15,000	4,700	126,000	82,000
0,700	42,000	21,000	4,800	132,000	87,000
0,750	42,000	21,000	4,900	132,000	87,000
0,800	46,000	25,000	5,000	132,000	87,000
0,900	51,000	29,000	5,200	132,000	87,000
1,000	56,000	33,000	5,300	132,000	87,000
1,050	56,000	33,000	5,400	139,000	91,000
1,100	60,000	37,000	5,500	139,000	91,000
1,150	60,000	37,000	5,700	139,000	91,000
1,200	65,000	41,000	5,800	139,000	91,000
1,300	65,000	41,000	5,900	139,000	91,000
1,500	70,000	45,000	6,000	139,000	91,000
1,600	76,000	50,000	6,200	148,000	97,000
1,700	76,000	50,000	6,300	148,000	97,000
1,750	80,000	53,000	6,500	148,000	97,000
1,800	80,000	53,000	6,600	148,000	97,000
1,850	80,000	53,000	6,700	148,000	97,000
2,000	85,000	56,000	6,800	156,000	102,000
2,050	85,000	56,000	6,900	156,000	102,000
2,200	90,000	59,000	7,000	156,000	102,000
2,300	90,000	59,000	7,200	156,000	102,000
2,500	95,000	62,000	7,500	156,000	102,000
2,600	95,000	62,000	8,000	165,000	109,000
2,700	100,000	66,000	8,200	165,000	109,000
2,900	100,000	66,000	8,250	165,000	109,000
3,000	100,000	66,000	8,800	175,000	115,000
3,100	106,000	69,000	9,000	175,000	115,000
3,150	106,000	69,000	9,250	175,000	115,000
3,200	106,000	69,000	9,500	175,000	115,000
3,250	106,000	69,000	10,000	184,000	121,000
3,300	106,000	69,000	11,250	195,000	128,000
3,400	112,000	73,000	14,000	214,000	140,000
3,500	112,000	73,000	14,500	220,000	144,000
3,600	112,000	73,000	15,000	220,000	144,000
3,900	119,000	78,000			
4,000	119,000	78,000			
4,100	119,000	78,000			
4,200	119,000	78,000			
4,300	126,000	82,000			
4,400	126,000	82,000			
4,500	126,000	82,000			
4,600	126,000	82,000			

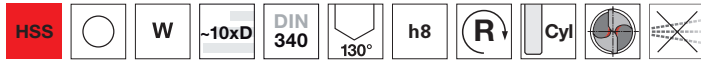


Brocas espirales cil., largas

Artículo N° 81330

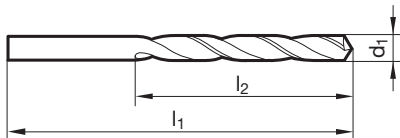


P	M	K	N	S	H
			•		



vaciado de punta $\geq \varnothing 14,250$ • entrada cónica • para taladros profundos

mat. blandos y de viruta larga • aluminio, alea. de alum. (de vir. larga) • zink, cobre fino, siluminio, electrón • plásticos (blandos), madera



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,500		32,000	12,000	3,500		112,000	73,000
0,600		35,000	15,000	3,600		112,000	73,000
0,700		42,000	21,000	3,650		112,000	73,000
0,800		46,000	25,000	3,700		112,000	73,000
0,900		51,000	29,000	3,750		112,000	73,000
0,950		51,000	29,000	3,800		119,000	78,000
1,000		56,000	33,000	3,900		119,000	78,000
1,050		56,000	33,000	4,000		119,000	78,000
1,100		60,000	37,000	4,100		119,000	78,000
1,200		65,000	41,000	4,150		119,000	78,000
1,250		65,000	41,000	4,200		119,000	78,000
1,300		65,000	41,000	4,250		119,000	78,000
1,350		70,000	45,000	4,300		126,000	82,000
1,500		70,000	45,000	4,400		126,000	82,000
1,600		76,000	50,000	4,500		126,000	82,000
1,780		80,000	53,000	4,600		126,000	82,000
1,800		80,000	53,000	4,700		126,000	82,000
1,850		80,000	53,000	4,800		132,000	87,000
1,900		80,000	53,000	4,900		132,000	87,000
1,950		85,000	56,000	5,000		132,000	87,000
2,000		85,000	56,000	5,100		132,000	87,000
2,050		85,000	56,000	5,200		132,000	87,000
2,100		85,000	56,000	5,250		132,000	87,000
2,150		90,000	59,000	5,300		132,000	87,000
2,200		90,000	59,000	5,400		139,000	91,000
2,300		90,000	59,000	5,500		139,000	91,000
2,500		95,000	62,000	5,600		139,000	91,000
2,550		95,000	62,000	5,700		139,000	91,000
2,700		100,000	66,000	5,800		139,000	91,000
2,800		100,000	66,000	6,000		139,000	91,000
2,850		100,000	66,000	6,100		148,000	97,000
2,900		100,000	66,000	6,200		148,000	97,000
2,950		100,000	66,000	6,300		148,000	97,000
3,000		100,000	66,000	6,400		148,000	97,000
3,050		106,000	69,000	6,500		148,000	97,000
3,100		106,000	69,000	6,600		148,000	97,000
3,200		106,000	69,000	6,700		148,000	97,000
3,250		106,000	69,000	6,750	17/64	156,000	102,000
3,300		106,000	69,000	6,800		156,000	102,000
3,350		106,000	69,000	6,900		156,000	102,000
3,400		112,000	73,000	7,000		156,000	102,000
3,450		112,000	73,000	7,100		156,000	102,000



Brocas espirales cil., largas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
7,200		156,000	102,000	9,700		184,000	121,000
7,300		156,000	102,000	9,750		184,000	121,000
7,400		156,000	102,000	9,800		184,000	121,000
7,500		156,000	102,000	10,000		184,000	121,000
7,600		165,000	109,000	10,200		184,000	121,000
7,700		165,000	109,000	10,300		184,000	121,000
7,750		165,000	109,000	11,000		195,000	128,000
7,800		165,000	109,000	11,300		195,000	128,000
7,900		165,000	109,000	11,500		195,000	128,000
8,000		165,000	109,000	12,000		205,000	134,000
8,100		165,000	109,000	13,500		214,000	140,000
8,200		165,000	109,000	14,000		214,000	140,000
8,300		165,000	109,000	14,250		220,000	144,000
8,400		165,000	109,000	14,500		220,000	144,000
8,500		165,000	109,000	15,500		227,000	149,000
8,600		175,000	115,000	17,000		235,000	154,000
8,700		175,000	115,000	20,000		254,000	166,000
8,800		175,000	115,000				
8,900		175,000	115,000				
9,000		175,000	115,000				
9,100		175,000	115,000				
9,200		175,000	115,000				
9,300		175,000	115,000				
9,500		175,000	115,000				



Brocas espirales cil., largas

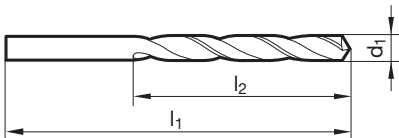
Artículo N° 81340



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • ranuras amplias • con desalajo de viruta difícil
fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,900		51,000	29,000	4,300		126,000	82,000
1,000		56,000	33,000	4,400		126,000	82,000
1,100		60,000	37,000	4,500		126,000	82,000
1,200		65,000	41,000	4,600		126,000	82,000
1,300		65,000	41,000	4,700		126,000	82,000
1,400		70,000	45,000	4,750		126,000	82,000
1,500		70,000	45,000	4,800		132,000	87,000
1,600		76,000	50,000	4,900		132,000	87,000
1,700		76,000	50,000	5,000		132,000	87,000
1,800		80,000	53,000	5,100		132,000	87,000
1,900		80,000	53,000	5,200		132,000	87,000
2,000		85,000	56,000	5,400		139,000	91,000
2,100		85,000	56,000	5,500		139,000	91,000
2,200		90,000	59,000	5,600		139,000	91,000
2,300		90,000	59,000	5,700		139,000	91,000
2,400		95,000	62,000	5,800		139,000	91,000
2,500		95,000	62,000	5,900		139,000	91,000
2,600		95,000	62,000	6,000		139,000	91,000
2,650		95,000	62,000	6,100		148,000	97,000
2,700		100,000	66,000	6,200		148,000	97,000
2,750		100,000	66,000	6,300		148,000	97,000
2,800		100,000	66,000	6,500		148,000	97,000
2,850		100,000	66,000	6,600		148,000	97,000
2,900		100,000	66,000	6,700		148,000	97,000
2,950		100,000	66,000	6,800		156,000	102,000
3,000		100,000	66,000	6,900		156,000	102,000
3,100		106,000	69,000	7,000		156,000	102,000
3,170	1/8	106,000	69,000	7,100		156,000	102,000
3,200		106,000	69,000	7,200		156,000	102,000
3,250		106,000	69,000	7,300		156,000	102,000
3,300		106,000	69,000	7,400		156,000	102,000
3,400		112,000	73,000	7,500		156,000	102,000
3,500		112,000	73,000	7,600		165,000	109,000
3,600		112,000	73,000	7,700		165,000	109,000
3,700		112,000	73,000	7,800		165,000	109,000
3,750		112,000	73,000	7,900		165,000	109,000
3,800		119,000	78,000	8,000		165,000	109,000
3,900		119,000	78,000	8,100		165,000	109,000
4,000		119,000	78,000	8,200		165,000	109,000
4,100		119,000	78,000	8,300		165,000	109,000
4,200		119,000	78,000	8,400		165,000	109,000
4,250		119,000	78,000	8,500		165,000	109,000



Brocas espirales cil., largas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
8,600		175,000	115,000	11,000		195,000	128,000
8,700		175,000	115,000	11,200		195,000	128,000
8,800		175,000	115,000	11,250		195,000	128,000
8,900		175,000	115,000	11,500		195,000	128,000
9,000		175,000	115,000	11,800		195,000	128,000
9,100		175,000	115,000	12,000		205,000	134,000
9,200		175,000	115,000	12,200		205,000	134,000
9,300		175,000	115,000	12,500		205,000	134,000
9,400		175,000	115,000	12,800		205,000	134,000
9,500		175,000	115,000	13,000		205,000	134,000
9,600		184,000	121,000	14,000		214,000	140,000
9,700		184,000	121,000				
9,800		184,000	121,000				
9,900		184,000	121,000				
10,000		184,000	121,000				
10,300		184,000	121,000				
10,500		184,000	121,000				
10,800		195,000	128,000				

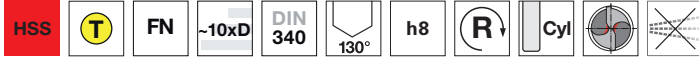


Brocas espirales cil., largas

Artículo N° 84423



P	M	K	N	S	H
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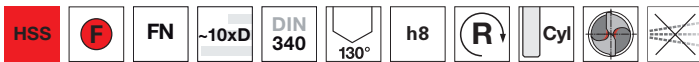


vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • ranuras amplias • con desalajo de viruta difícil
fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares

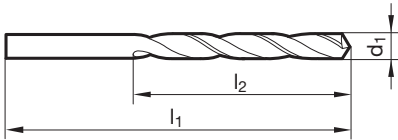
Artículo N° 84506



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • ranuras amplias • con desalajo de viruta difícil
fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
1,000	56,000	33,000	4,000	119,000	78,000
1,100	60,000	37,000	4,100	119,000	78,000
1,200	65,000	41,000	4,200	119,000	78,000
1,300	65,000	41,000	4,300	126,000	82,000
1,400	70,000	45,000	4,400	126,000	82,000
1,500	70,000	45,000	4,500	126,000	82,000
1,600	76,000	50,000	4,600	126,000	82,000
1,700	76,000	50,000	4,700	126,000	82,000
1,800	80,000	53,000	4,800	132,000	87,000
1,900	80,000	53,000	4,900	132,000	87,000
2,000	85,000	56,000	5,000	132,000	87,000
2,100	85,000	56,000	5,100	132,000	87,000
2,200	90,000	59,000	5,200	132,000	87,000
2,300	90,000	59,000	5,300	132,000	87,000
2,400	95,000	62,000	5,400	139,000	91,000
2,500	95,000	62,000	5,500	139,000	91,000
2,600	95,000	62,000	5,600	139,000	91,000
2,700	100,000	66,000	5,700	139,000	91,000
2,800	100,000	66,000	5,800	139,000	91,000
2,900	100,000	66,000	5,900	139,000	91,000
3,000	100,000	66,000	6,000	139,000	91,000
3,100	106,000	69,000	6,100	148,000	97,000
3,200	106,000	69,000	6,200	148,000	97,000
3,300	106,000	69,000	6,300	148,000	97,000
3,400	112,000	73,000	6,400	148,000	97,000
3,500	112,000	73,000	6,500	148,000	97,000
3,600	112,000	73,000	6,600	148,000	97,000
3,700	112,000	73,000	6,700	148,000	97,000
3,800	119,000	78,000	6,800	156,000	102,000
3,900	119,000	78,000	6,900	156,000	102,000



Brocas espirales cil., largas

d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
7,000	156,000	102,000	8,500	165,000	109,000
7,200	156,000	102,000	8,700	175,000	115,000
7,300	156,000	102,000	9,000	175,000	115,000
7,400	156,000	102,000	9,800	184,000	121,000
7,500	156,000	102,000	10,000	184,000	121,000
7,600	165,000	109,000	11,000	195,000	128,000
7,800	165,000	109,000	11,500	195,000	128,000
7,900	165,000	109,000	12,000	205,000	134,000
8,000	165,000	109,000	12,700	205,000	134,000
8,100	165,000	109,000	14,000	214,000	140,000
8,200	165,000	109,000			
8,300	165,000	109,000			

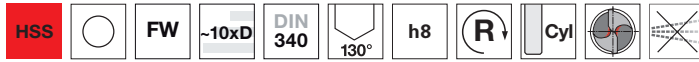


Brocas espirales cil., largas

Artículo N° 81350

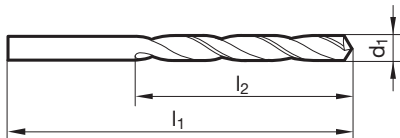


P	M	K	N	S	H
○			●		



vaciado de punta $\geq \varnothing 2,400$ • entrada cónica • ranura muy grande

mat. blandos y de viruta larga • hasta 500 N/mm² • aceros blandos para automáticos • aluminio, alea. de alum. (de vir. larga) • zink, cobre fino, siluminio, electrón • zamak, argalio plásticos (blandos) y madera



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		56,000	33,000	6,000		139,000	91,000
1,400		70,000	45,000	6,100		148,000	97,000
1,500		70,000	45,000	6,200		148,000	97,000
2,000		85,000	56,000	6,300		148,000	97,000
2,100		85,000	56,000	6,400		148,000	97,000
2,200		90,000	59,000	6,500		148,000	97,000
2,300		90,000	59,000	6,600		148,000	97,000
2,400		95,000	62,000	6,700		148,000	97,000
2,500		95,000	62,000	6,800		156,000	102,000
2,700		100,000	66,000	6,900		156,000	102,000
2,800		100,000	66,000	7,000		156,000	102,000
2,900		100,000	66,000	7,100		156,000	102,000
3,000		100,000	66,000	7,200		156,000	102,000
3,100		106,000	69,000	7,300		156,000	102,000
3,200		106,000	69,000	7,500		156,000	102,000
3,250		106,000	69,000	7,600		165,000	109,000
3,300		106,000	69,000	7,700		165,000	109,000
3,400		112,000	73,000	7,800		165,000	109,000
3,500		112,000	73,000	7,900		165,000	109,000
3,600		112,000	73,000	8,000		165,000	109,000
3,700		112,000	73,000	8,100		165,000	109,000
3,800		119,000	78,000	8,200		165,000	109,000
3,900		119,000	78,000	8,400		165,000	109,000
4,000		119,000	78,000	8,500		165,000	109,000
4,100		119,000	78,000	8,600		175,000	115,000
4,200		119,000	78,000	8,700		175,000	115,000
4,300		126,000	82,000	8,800		175,000	115,000
4,400		126,000	82,000	8,900		175,000	115,000
4,500		126,000	82,000	9,000		175,000	115,000
4,600		126,000	82,000	9,100		175,000	115,000
4,700		126,000	82,000	9,200		175,000	115,000
4,800		132,000	87,000	9,300		175,000	115,000
4,900		132,000	87,000	9,400		175,000	115,000
5,000		132,000	87,000	9,500		175,000	115,000
5,100		132,000	87,000	9,600		184,000	121,000
5,200		132,000	87,000	9,700		184,000	121,000
5,400		139,000	91,000	9,800		184,000	121,000
5,500		139,000	91,000	10,000		184,000	121,000
5,600		139,000	91,000	10,100		184,000	121,000
5,700		139,000	91,000	10,500		184,000	121,000
5,800		139,000	91,000	10,700		195,000	128,000
5,900		139,000	91,000	10,800		195,000	128,000



Brocas espirales cil., largas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
11,200		195,000	128,000	12,400		205,000	134,000
11,500		195,000	128,000	12,500		205,000	134,000
11,800		195,000	128,000	12,800		205,000	134,000
12,000		205,000	134,000	13,000		205,000	134,000
12,200		205,000	134,000	13,500		214,000	140,000
12,300	31/64	205,000	134,000	14,000		214,000	140,000



Brocas espirales cil., largas

Artículo N° 81311



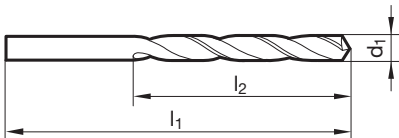
P	M	K	N	S	H
●	○	●	●	○	



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste

aceros aleados y no aleados y fundición de dureza sup. a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos

• aceros altamente aleados • aceros de cementación, de bonificación



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
0,500	32,000	12,000	6,500	148,000	97,000
0,600	35,000	15,000	6,600	148,000	97,000
0,700	42,000	21,000	6,700	148,000	97,000
0,800	46,000	25,000	6,800	156,000	102,000
0,900	51,000	29,000	6,900	156,000	102,000
1,000	56,000	33,000	7,000	156,000	102,000
1,100	60,000	37,000	7,200	156,000	102,000
1,200	65,000	41,000	7,300	156,000	102,000
1,400	70,000	45,000	7,400	156,000	102,000
1,500	70,000	45,000	7,600	165,000	109,000
1,900	80,000	53,000	7,700	165,000	109,000
2,000	85,000	56,000	7,800	165,000	109,000
2,200	90,000	59,000	7,900	165,000	109,000
2,500	95,000	62,000	8,000	165,000	109,000
3,000	100,000	66,000	8,300	165,000	109,000
3,100	106,000	69,000	8,400	165,000	109,000
3,200	106,000	69,000	8,600	175,000	115,000
3,300	106,000	69,000	8,700	175,000	115,000
3,400	112,000	73,000	8,800	175,000	115,000
3,500	112,000	73,000	8,900	175,000	115,000
3,900	119,000	78,000	9,000	175,000	115,000
4,000	119,000	78,000	9,100	175,000	115,000
4,100	119,000	78,000	9,200	175,000	115,000
4,200	119,000	78,000	9,300	175,000	115,000
4,300	126,000	82,000	9,400	175,000	115,000
4,400	126,000	82,000	9,500	175,000	115,000
4,500	126,000	82,000	9,600	184,000	121,000
4,600	126,000	82,000	9,700	184,000	121,000
4,700	126,000	82,000	9,900	184,000	121,000
4,800	132,000	87,000	10,000	184,000	121,000
4,900	132,000	87,000	10,500	184,000	121,000
5,000	132,000	87,000	10,800	195,000	128,000
5,100	132,000	87,000	11,000	195,000	128,000
5,300	132,000	87,000	11,200	195,000	128,000
5,500	139,000	91,000	12,000	205,000	134,000
5,600	139,000	91,000	12,500	205,000	134,000
5,700	139,000	91,000			
5,800	139,000	91,000			
5,900	139,000	91,000			
6,000	139,000	91,000			
6,300	148,000	97,000			
6,400	148,000	97,000			



Brocas espirales cil., largas

Artículo N° 81341

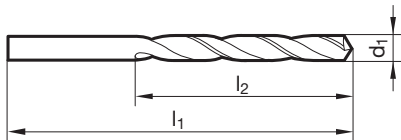


P	M	K	N	S	H
•	•	•	•		



vaciado de punta $\geq \varnothing 1,100$ • entrada cónica • acero rápido al cobalto • ranuras amplias • más resistencia al desgaste • con desalajo de viruta difícil

aceros aleados y no aleados y fundición de dureza sup. a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • aceros altamente aleados • aceros de cementación, de bonificación



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		56,000	33,000	4,760	3/16	132,000	87,000
1,100		60,000	37,000	4,800		132,000	87,000
1,200		65,000	41,000	4,900		132,000	87,000
1,250		65,000	41,000	5,000		132,000	87,000
1,300		65,000	41,000	5,100		132,000	87,000
1,400		70,000	45,000	5,200		132,000	87,000
1,500		70,000	45,000	5,300		132,000	87,000
1,600		76,000	50,000	5,400		139,000	91,000
1,700		76,000	50,000	5,500		139,000	91,000
1,800		80,000	53,000	5,600		139,000	91,000
1,900		80,000	53,000	5,700		139,000	91,000
2,000		85,000	56,000	5,800		139,000	91,000
2,100		85,000	56,000	5,900		139,000	91,000
2,200		90,000	59,000	6,000		139,000	91,000
2,300		90,000	59,000	6,100		148,000	97,000
2,400		95,000	62,000	6,150		148,000	97,000
2,440		95,000	62,000	6,200		148,000	97,000
2,500		95,000	62,000	6,250		148,000	97,000
2,600		95,000	62,000	6,300		148,000	97,000
2,700		100,000	66,000	6,350	1/4	148,000	97,000
2,800		100,000	66,000	6,400		148,000	97,000
2,900		100,000	66,000	6,500		148,000	97,000
3,000		100,000	66,000	6,600		148,000	97,000
3,050		106,000	69,000	6,700		148,000	97,000
3,100		106,000	69,000	6,800		156,000	102,000
3,200		106,000	69,000	6,900		156,000	102,000
3,300		106,000	69,000	7,000		156,000	102,000
3,400		112,000	73,000	7,100		156,000	102,000
3,500		112,000	73,000	7,200		156,000	102,000
3,600		112,000	73,000	7,300		156,000	102,000
3,700		112,000	73,000	7,400		156,000	102,000
3,800		119,000	78,000	7,500		156,000	102,000
3,900		119,000	78,000	7,600		165,000	109,000
4,000		119,000	78,000	7,700		165,000	109,000
4,050		119,000	78,000	7,800		165,000	109,000
4,100		119,000	78,000	7,900		165,000	109,000
4,200		119,000	78,000	8,000		165,000	109,000
4,300		126,000	82,000	8,100		165,000	109,000
4,400		126,000	82,000	8,200		165,000	109,000
4,500		126,000	82,000	8,300		165,000	109,000
4,600		126,000	82,000	8,400		165,000	109,000
4,700		126,000	82,000	8,500		165,000	109,000



Brocas espirales cil., largas

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
8,600		175,000	115,000	10,800		195,000	128,000
8,700		175,000	115,000	10,900		195,000	128,000
8,800		175,000	115,000	11,000		195,000	128,000
8,900		175,000	115,000	11,500		195,000	128,000
9,000		175,000	115,000	11,800		195,000	128,000
9,100		175,000	115,000	11,910	15/32	205,000	134,000
9,200		175,000	115,000	12,000		205,000	134,000
9,300		175,000	115,000	12,500		205,000	134,000
9,400		175,000	115,000	13,000		205,000	134,000
9,500		175,000	115,000	16,000		227,000	149,000
9,600		184,000	121,000				
9,700		184,000	121,000				
9,800		184,000	121,000				
9,900		184,000	121,000				
10,000		184,000	121,000				
10,200		184,000	121,000				
10,500		184,000	121,000				
10,700		195,000	128,000				

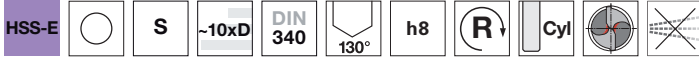


Brocas espirales cil., largas

Artículo N° 81361



P	M	K	N	S	H
○	●			●	



vaciado de punta $\geq \varnothing 1,400$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste

titanio y aleaciones de titanio • aceros austeníticos inoxidable y resistentes a los ácidos y al calor • aceros de gran resistencia a partir de 900 N/mm² y cifras más elevadas • aceros para rodamientos • Hastelloy, Inconel, Nimonic

Artículo N° 81362

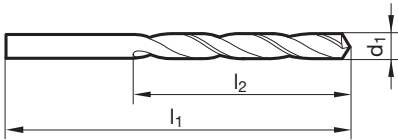


P	M	K	N	S	H
○	●			●	



vaciado de punta $\geq \varnothing 1,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste

titanio y aleaciones de titanio • aceros austeníticos inoxidable y resistentes a los ácidos y al calor • aceros de gran resistencia a partir de 900 N/mm² y cifras más elevadas • aceros para rodamientos • Hastelloy, Inconel, Nimonic



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
1,000	56,000	33,000	4,000	119,000	78,000
1,100	60,000	37,000	4,100	119,000	78,000
1,200	65,000	41,000	4,200	119,000	78,000
1,300	65,000	41,000	4,300	126,000	82,000
1,400	70,000	45,000	4,400	126,000	82,000
1,500	70,000	45,000	4,500	126,000	82,000
1,600	76,000	50,000	4,600	126,000	82,000
1,700	76,000	50,000	4,700	126,000	82,000
1,800	80,000	53,000	4,800	132,000	87,000
1,900	80,000	53,000	4,900	132,000	87,000
2,000	85,000	56,000	5,000	132,000	87,000
2,100	85,000	56,000	5,100	132,000	87,000
2,200	90,000	59,000	5,200	132,000	87,000
2,300	90,000	59,000	5,300	132,000	87,000
2,400	95,000	62,000	5,400	139,000	91,000
2,500	95,000	62,000	5,500	139,000	91,000
2,600	95,000	62,000	5,600	139,000	91,000
2,700	100,000	66,000	5,700	139,000	91,000
2,800	100,000	66,000	5,800	139,000	91,000
2,900	100,000	66,000	5,900	139,000	91,000
3,000	100,000	66,000	6,000	139,000	91,000
3,100	106,000	69,000	6,100	148,000	97,000
3,200	106,000	69,000	6,200	148,000	97,000
3,300	106,000	69,000	6,300	148,000	97,000
3,400	112,000	73,000	6,400	148,000	97,000
3,500	112,000	73,000	6,500	148,000	97,000
3,600	112,000	73,000	6,600	148,000	97,000
3,700	112,000	73,000	6,700	148,000	97,000
3,800	119,000	78,000	6,800	156,000	102,000
3,900	119,000	78,000	6,900	156,000	102,000



Brocas espirales cil., largas

d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
7,000	156,000	102,000	8,500	165,000	109,000
7,100	156,000	102,000	8,700	175,000	115,000
7,300	156,000	102,000	9,000	175,000	115,000
7,400	156,000	102,000	9,500	175,000	115,000
7,500	156,000	102,000	10,000	184,000	121,000
7,600	165,000	109,000	10,500	184,000	121,000
7,700	165,000	109,000	11,000	195,000	128,000
7,800	165,000	109,000	11,500	195,000	128,000
8,000	165,000	109,000	12,000	205,000	134,000
8,200	165,000	109,000	12,500	205,000	134,000
8,300	165,000	109,000	13,000	205,000	134,000
8,400	165,000	109,000			



Brocas espirales cil., largas

Artículo N° 84814



P	M	K	N	S	H
•	•	•	•		



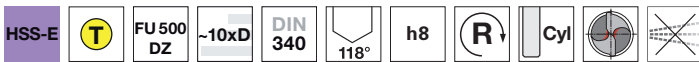
vaciado de punta $\geq \varnothing 1,000$ • afilado plano • acero rápido al cobalto • se requiere poca fuerza de avance • se requiere poco par • más resistencia al desgaste • aplicación universal

aceros aleados y no aleados fundición de dureza hasta a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • metales no ferríticos • fundición • aceros inoxidables • plásticos

Artículo N° 84812

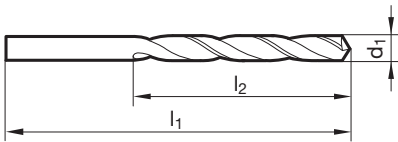


P	M	K	N	S	H
•	•	•	•		



vaciado de punta $\geq \varnothing 1,000$ • afilado plano • acero rápido al cobalto • se requiere poco par • se requiere poca fuerza de avance • más resistencia al desgaste • aplicación universal

aceros aleados y no aleados fundición de dureza hasta a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • metales no ferríticos • fundición • plásticos • aceros inoxidables



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
1,000	56,000	33,000	4,000	119,000	78,000
1,100	60,000	37,000	4,100	119,000	78,000
1,200	65,000	41,000	4,200	119,000	78,000
1,300	65,000	41,000	4,300	126,000	82,000
1,400	70,000	45,000	4,400	126,000	82,000
1,500	70,000	45,000	4,500	126,000	82,000
1,600	76,000	50,000	4,600	126,000	82,000
1,700	76,000	50,000	4,700	126,000	82,000
1,800	80,000	53,000	4,800	132,000	87,000
1,900	80,000	53,000	4,900	132,000	87,000
2,000	85,000	56,000	5,000	132,000	87,000
2,100	85,000	56,000	5,100	132,000	87,000
2,200	90,000	59,000	5,200	132,000	87,000
2,300	90,000	59,000	5,300	132,000	87,000
2,400	95,000	62,000	5,400	139,000	91,000
2,500	95,000	62,000	5,500	139,000	91,000
2,600	95,000	62,000	5,600	139,000	91,000
2,700	100,000	66,000	5,700	139,000	91,000
2,800	100,000	66,000	5,800	139,000	91,000
2,900	100,000	66,000	5,900	139,000	91,000
3,000	100,000	66,000	6,000	139,000	91,000
3,100	106,000	69,000	6,100	148,000	97,000
3,200	106,000	69,000	6,200	148,000	97,000
3,300	106,000	69,000	6,300	148,000	97,000
3,400	112,000	73,000	6,400	148,000	97,000
3,500	112,000	73,000	6,500	148,000	97,000
3,600	112,000	73,000	6,600	148,000	97,000
3,700	112,000	73,000	6,700	148,000	97,000
3,800	119,000	78,000	6,800	156,000	102,000
3,900	119,000	78,000	6,900	156,000	102,000



Brocas espirales cil., largas

d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
7,000	156,000	102,000	9,500	175,000	115,000
7,100	156,000	102,000	9,600	184,000	121,000
7,200	156,000	102,000	9,700	184,000	121,000
7,300	156,000	102,000	9,800	184,000	121,000
7,400	156,000	102,000	9,900	184,000	121,000
7,500	156,000	102,000	10,000	184,000	121,000
7,600	165,000	109,000	10,100	184,000	121,000
7,700	165,000	109,000	10,200	184,000	121,000
7,800	165,000	109,000	10,300	184,000	121,000
7,900	165,000	109,000	10,400	184,000	121,000
8,000	165,000	109,000	10,500	184,000	121,000
8,100	165,000	109,000	11,000	195,000	128,000
8,200	165,000	109,000	11,500	195,000	128,000
8,300	165,000	109,000	12,000	205,000	134,000
8,400	165,000	109,000	12,500	205,000	134,000
8,500	165,000	109,000	13,000	205,000	134,000
8,600	175,000	115,000	13,500	214,000	140,000
8,700	175,000	115,000	14,000	214,000	140,000
8,800	175,000	115,000			
9,000	175,000	115,000			
9,100	175,000	115,000			
9,200	175,000	115,000			
9,300	175,000	115,000			
9,400	175,000	115,000			



Brocas espirales cil., largas

Artículo N° 89286

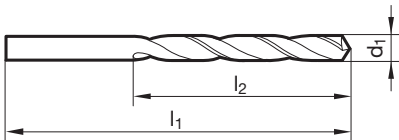


P	M	K	N	S	H
○		○			○



afilado plano • forma recta del corte principal

plásticos reforzados con fibra de vidrio • placas de circ. impresos que pueden ocasionar un rápido desgaste en las superficies y bordes de corte de la broca



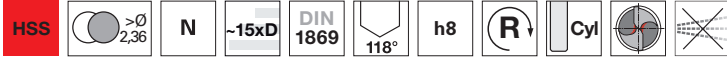
d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
0,500	38,000	8,500	1,300	38,000	17,000
0,600	38,000	9,500	1,400	38,000	17,000
0,650	38,000	10,500	1,450	38,000	17,000
0,700	38,000	10,500	1,500	38,000	17,000
0,750	38,000	12,500			
0,800	38,000	12,500			
0,850	38,000	14,500			
0,900	38,000	14,500			
1,000	38,000	17,000			
1,050	38,000	17,000			
1,100	38,000	17,000			
1,200	38,000	17,000			



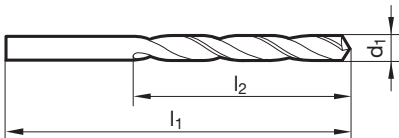
Brocas espirales, extra largas, serie 1

Artículo N° 81410

P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 2,400$ • entrada cónica • para taladros muy profundos
 aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argénton y grafito



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
1,600	115,000	75,000	6,400	215,000	150,000
1,800	120,000	80,000	6,500	215,000	150,000
1,900	120,000	80,000	6,600	215,000	150,000
2,000	125,000	85,000	6,700	215,000	150,000
2,200	135,000	90,000	6,800	225,000	155,000
2,300	135,000	90,000	7,000	225,000	155,000
2,400	140,000	95,000	7,100	225,000	155,000
2,500	140,000	95,000	7,500	225,000	155,000
2,700	150,000	100,000	7,600	240,000	165,000
2,800	150,000	100,000	7,700	240,000	165,000
2,900	150,000	100,000	7,800	240,000	165,000
3,000	150,000	100,000	7,900	240,000	165,000
3,100	155,000	105,000	8,000	240,000	165,000
3,200	155,000	105,000	8,100	240,000	165,000
3,250	155,000	105,000	8,200	240,000	165,000
3,300	155,000	105,000	8,500	240,000	165,000
3,400	165,000	115,000	8,600	250,000	175,000
3,500	165,000	115,000	8,800	250,000	175,000
3,700	165,000	115,000	9,000	250,000	175,000
3,800	175,000	120,000	9,400	250,000	175,000
3,900	175,000	120,000	9,500	250,000	175,000
4,000	175,000	120,000	9,700	265,000	185,000
4,100	175,000	120,000	10,000	265,000	185,000
4,200	175,000	120,000	10,200	265,000	185,000
4,300	185,000	125,000	10,500	265,000	185,000
4,500	185,000	125,000	11,000	280,000	195,000
4,600	185,000	125,000	11,500	280,000	195,000
4,700	185,000	125,000	11,800	280,000	195,000
4,800	195,000	135,000	12,000	295,000	205,000
4,900	195,000	135,000	12,500	295,000	205,000
5,000	195,000	135,000	13,000	295,000	205,000
5,100	195,000	135,000			
5,200	195,000	135,000			
5,300	195,000	135,000			
5,400	205,000	140,000			
5,500	205,000	140,000			
5,700	205,000	140,000			
5,800	205,000	140,000			
5,900	205,000	140,000			
6,000	205,000	140,000			
6,200	215,000	150,000			
6,300	215,000	150,000			

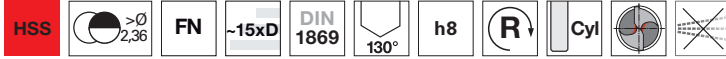


Brocas espirales, extra largas, serie 1

Artículo N° 81440

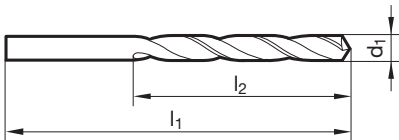


P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • ranuras amplias • para taladros muy profundos
 • con desalajo de viruta difícil

fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
2,000		125,000	85,000	6,500		215,000	150,000
2,200		135,000	90,000	6,600		215,000	150,000
2,300		135,000	90,000	6,800		225,000	155,000
2,400		140,000	95,000	7,000		225,000	155,000
2,500		140,000	95,000	7,100		225,000	155,000
2,600		140,000	95,000	7,300		225,000	155,000
2,700		150,000	100,000	7,500		225,000	155,000
2,850		150,000	100,000	7,800		240,000	165,000
2,900		150,000	100,000	7,900		240,000	165,000
2,950		150,000	100,000	8,000		240,000	165,000
3,000		150,000	100,000	8,100		240,000	165,000
3,100		155,000	105,000	8,200		240,000	165,000
3,170	1/8	155,000	105,000	8,400		240,000	165,000
3,200		155,000	105,000	8,500		240,000	165,000
3,300		155,000	105,000	8,800		250,000	175,000
3,400		165,000	115,000	9,000		250,000	175,000
3,500		165,000	115,000	9,200		250,000	175,000
3,600		165,000	115,000	9,300		250,000	175,000
3,700		165,000	115,000	9,400		250,000	175,000
3,750		165,000	115,000	9,500		250,000	175,000
3,800		175,000	120,000	9,600		265,000	185,000
3,900		175,000	120,000	9,700		265,000	185,000
4,000		175,000	120,000	9,800		265,000	185,000
4,200		175,000	120,000	9,900		265,000	185,000
4,500		185,000	125,000	10,000		265,000	185,000
4,600		185,000	125,000	10,200		265,000	185,000
4,700		185,000	125,000	10,500		265,000	185,000
4,800		195,000	135,000	11,000		280,000	195,000
5,000		195,000	135,000	11,500		280,000	195,000
5,100		195,000	135,000	11,750		280,000	195,000
5,200		195,000	135,000	11,800		280,000	195,000
5,300		195,000	135,000	12,000		295,000	205,000
5,400		205,000	140,000	12,500		295,000	205,000
5,500		205,000	140,000	12,700	1/2	295,000	205,000
5,600		205,000	140,000	13,000		295,000	205,000
5,700		205,000	140,000				
5,800		205,000	140,000				
5,900		205,000	140,000				
6,000		205,000	140,000				
6,200		215,000	150,000				
6,300		215,000	150,000				
6,400		215,000	150,000				

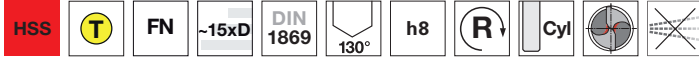


Brocas espirales, extra largas, serie 1

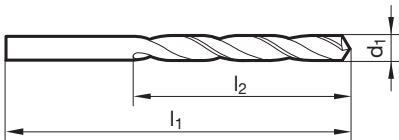
Artículo N° 84425



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
2,000	125,000	85,000	5,500	205,000	140,000
2,100	125,000	85,000	5,800	205,000	140,000
2,500	140,000	95,000	6,000	205,000	140,000
3,000	150,000	100,000	6,500	215,000	150,000
3,200	155,000	105,000	6,600	215,000	150,000
3,500	165,000	115,000	7,000	225,000	155,000
4,000	175,000	120,000	7,500	225,000	155,000
4,200	175,000	120,000	8,000	240,000	165,000
4,500	185,000	125,000	9,000	250,000	175,000
4,600	185,000	125,000	10,000	265,000	185,000
5,000	195,000	135,000	11,000	280,000	195,000
5,100	195,000	135,000	12,000	295,000	205,000



Brocas espirales, extra largas, serie 1

Artículo N° 81450



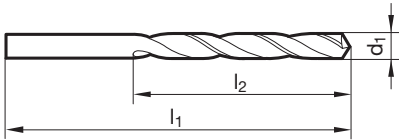
P	M	K	N	S	H
○			●		



vaciado de punta $\geq \varnothing 2,500$ • entrada cónica • para taladros muy profundos

mat. blandos y de viruta larga de hasta a 500 N/mm² • aceros blandos para automáticos • aluminio, alea. de alum. (de vir. larga)

• zink, cobre fino, siluminio, electrón • zamak, argalio plásticos (blandos) y madera



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
2,000	125,000	85,000	7,000	225,000	155,000
2,500	140,000	95,000	9,500	250,000	175,000
2,600	140,000	95,000			
3,000	150,000	100,000			
3,200	155,000	105,000			
3,500	165,000	115,000			
4,000	175,000	120,000			
5,000	195,000	135,000			
5,500	205,000	140,000			
5,600	205,000	140,000			
6,000	205,000	140,000			
6,500	215,000	150,000			

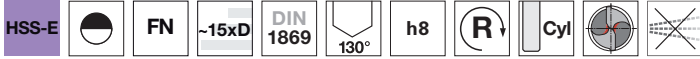


Brocas espirales, extra largas, serie 1

Artículo N° 81441

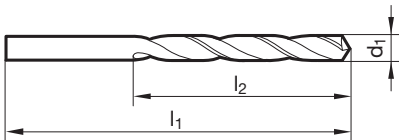


P	M	K	N	S	H
•	•	•	•		○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • acero rápido al cobalto • ranuras amplias • más resistencia al desgaste • para taladros muy profundos • con desalajo de viruta difícil

aceros aleados y no aleados fundición de dureza sup. a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • aceros altamente aleados • aceros de cementación, de bonificación



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
3,000		150,000	100,000	8,000		240,000	165,000
3,500		165,000	115,000	8,200		240,000	165,000
4,000		175,000	120,000	8,500		240,000	165,000
4,300		185,000	125,000	9,000		250,000	175,000
4,500		185,000	125,000	9,500		250,000	175,000
4,760	3/16	195,000	135,000	10,000		265,000	185,000
5,000		195,000	135,000				
5,400		205,000	140,000				
5,500		205,000	140,000				
6,000		205,000	140,000				
6,500		215,000	150,000				
7,000		225,000	155,000				



Brocas espirales, extra largas, serie 2

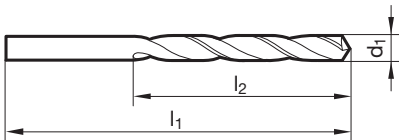
Artículo N° 81510



P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • para taladros muy profundos
 aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argénton y grafito



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
3,000		190,000	130,000	9,000		320,000	220,000
3,170	1/8	200,000	135,000	9,500		320,000	220,000
3,300		200,000	135,000	10,000		340,000	235,000
3,500		210,000	145,000	10,500		340,000	235,000
4,000		220,000	150,000	11,000		365,000	250,000
4,200		220,000	150,000	11,500		365,000	250,000
4,500		235,000	160,000	12,000		375,000	260,000
4,800		245,000	170,000				
5,000		245,000	170,000				
5,200		245,000	170,000				
5,500		260,000	180,000				
5,800		260,000	180,000				
6,000		260,000	180,000				
6,500		275,000	190,000				
6,800		290,000	200,000				
7,000		290,000	200,000				
8,000		305,000	210,000				
8,500		305,000	210,000				



Brocas espirales, extra largas, serie 2

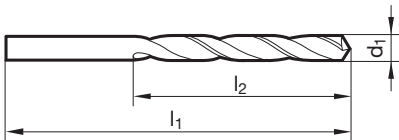
Artículo N° 81540



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
2,000		160,000	110,000	8,200		305,000	210,000
2,500		180,000	120,000	8,500		305,000	210,000
2,800		190,000	130,000	9,000		320,000	220,000
3,000		190,000	130,000	9,500		320,000	220,000
3,200		200,000	135,000	9,800		340,000	235,000
3,300		200,000	135,000	10,000		340,000	235,000
3,500		210,000	145,000	10,200		340,000	235,000
4,000		220,000	150,000	10,500		340,000	235,000
4,100		220,000	150,000	10,720	27/64	365,000	250,000
4,200		220,000	150,000	11,000		365,000	250,000
4,500		235,000	160,000	11,500		365,000	250,000
5,000		245,000	170,000	12,000		375,000	260,000
5,500		260,000	180,000	12,500		375,000	260,000
6,000		260,000	180,000	12,700	1/2	375,000	260,000
6,500		275,000	190,000	13,000		375,000	260,000
7,000		290,000	200,000				
7,500		290,000	200,000				
8,000		305,000	210,000				

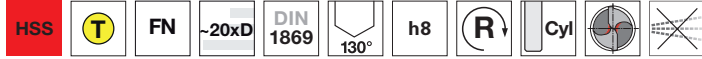


Brocas espirales, extra largas, serie 2

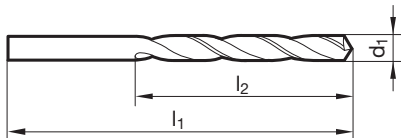
Artículo N° 84426



P	M	K	N	S	H
•		•	•	○	



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
 fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
3,000	190,000	130,000	6,800	290,000	200,000
4,000	220,000	150,000	7,000	290,000	200,000
4,200	220,000	150,000	8,000	305,000	210,000
4,500	235,000	160,000	8,500	305,000	210,000
5,000	245,000	170,000			
6,000	260,000	180,000			

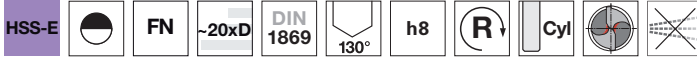


Brocas espirales, extra largas, serie 2

Artículo N° 81541

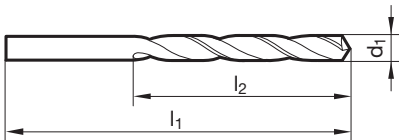


P	M	K	N	S	H
•	•	•	•		○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil

aceros aleados y no aleados y fundición de dureza sup. a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos • aceros altamente aleados • aceros de cementación, de bonificación



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
3,000		190,000	130,000	7,500		290,000	200,000
3,170	1/8	200,000	135,000	8,000		305,000	210,000
3,200		200,000	135,000	8,500		305,000	210,000
3,500		210,000	145,000	9,000		320,000	220,000
4,000		220,000	150,000	10,000		340,000	235,000
4,200		220,000	150,000				
5,000		245,000	170,000				
6,000		260,000	180,000				
6,200		275,000	190,000				
6,350	1/4	275,000	190,000				
6,500		275,000	190,000				
7,000		290,000	200,000				



Brocas espirales, extra largas, serie 3

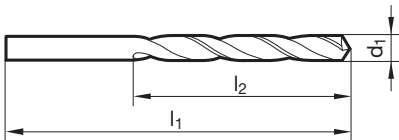
Artículo N° 81610



P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 4,000$ • entrada cónica • para taladros muy profundos
 aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
4,000	280,000	190,000	10,000	430,000	295,000
5,000	315,000	210,000	10,500	430,000	295,000
5,500	330,000	225,000	11,000	455,000	310,000
5,800	330,000	225,000	12,000	480,000	330,000
5,900	330,000	225,000			
6,000	330,000	225,000			
7,000	370,000	250,000			
7,500	370,000	250,000			
7,800	390,000	265,000			
8,000	390,000	265,000			
9,000	410,000	280,000			
9,500	410,000	280,000			

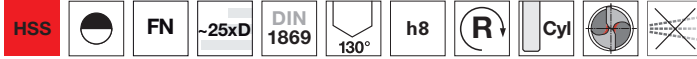


Brocas espirales, extra largas, serie 3

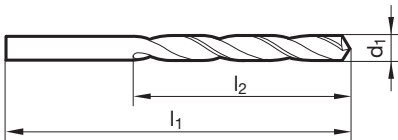
Artículo N° 81640



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
 fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
3,000		240,000	160,000	8,200		390,000	265,000
3,170	1/8	250,000	170,000	8,500		390,000	265,000
3,300		250,000	170,000	9,000		410,000	280,000
3,500		265,000	180,000	9,500		410,000	280,000
3,700		265,000	180,000	9,520	3/8	430,000	295,000
4,000		280,000	190,000	10,000		430,000	295,000
4,200		280,000	190,000	10,500		430,000	295,000
4,500		295,000	200,000	11,000		455,000	310,000
5,000		315,000	210,000	11,500		455,000	310,000
5,100		315,000	210,000	12,000		480,000	330,000
5,500		330,000	225,000	12,500		480,000	330,000
6,000		330,000	225,000	13,000		480,000	330,000
6,350	1/4	350,000	235,000				
6,500		350,000	235,000				
6,800		370,000	250,000				
7,000		370,000	250,000				
7,500		370,000	250,000				
8,000		390,000	265,000				

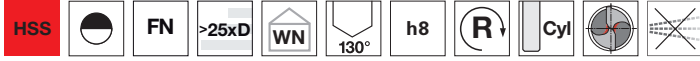


Brocas espirales, largo especial

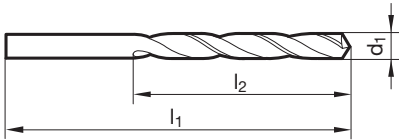
Artículo N° 81740



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 6,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
 fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
6,000	500,000	400,000			
8,000	500,000	400,000			
10,000	600,000	500,000			
11,000	600,000	500,000			
12,000	600,000	500,000			



Brocas espirales, largo especial

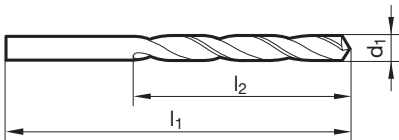
Artículo N° 81750



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 8,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
 fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
8,000	750,000	650,000			
10,000	750,000	650,000			
11,000	750,000	650,000			
12,000	750,000	650,000			

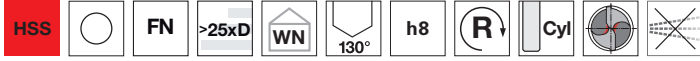


Brocas espirales, largo especial

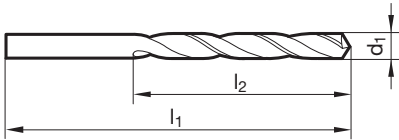
Artículo N° 81760



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 10,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
 fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
10,000	1000,000	850,000			
12,000	1000,000	850,000			





HARTNER

Brocas para pasadores cónicos

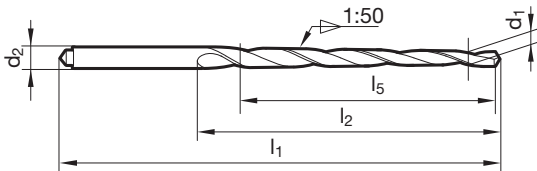
Artículo N° 81810



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • para taladros cónicos • con arrastre según DIN 1809



d1 mm	d2 mm	l1 mm	l2 mm	l5 mm	d1 mm	d2 mm	l1 mm	l2 mm	l5 mm
2,000	3,150	86,000	52,000	48,000	8,000	10,000	207,000	157,000	145,000
2,500	3,150	86,000	52,000	48,000	10,000	12,500	245,000	190,000	175,000
3,000	4,000	100,000	63,000	58,000	12,000	16,000	290,000	228,000	228,500
4,000	5,000	112,000	74,000	68,000					
5,000	6,300	122,000	81,000	73,000					
6,000	8,000	160,000	114,000	105,000					



Brocas espirales, placa MD soldada

Artículo N° 89303

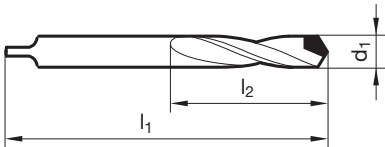


P	M	K	N	S	H
○		○			○



vaciado de punta $\geq \varnothing 3,100$ • afilado plano • placa MD soldada • con arrastre según DIN 1809

plásticos reforzados con fibra de vidrio • placas de circ. impresos que pueden ocasionar un rápido desgaste en las superficies y bordes de corte de la broca



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
3,100	56,000	25,000	8,000	80,000	40,000
3,200	56,000	25,000			
4,200	63,000	28,000			
5,000	63,000	28,000			
5,500	71,000	32,000			
6,000	71,000	32,000			

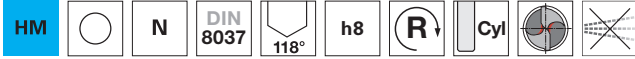


Brocas espirales, placa MD soldada

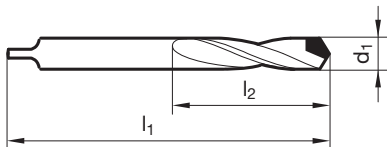
Artículo N° 89301



P	M	K	N	S	H
○		○			○



vaciado de punta $\geq \varnothing 2,600$ • afilado plano • placa MD soldada • con arrastre según DIN 1809
 acero de muelles • fundición dura con más de 300 HB • molibdeno puro • bronce duro y tenaz



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
2,600	50,000	20,000	7,700	80,000	40,000
3,000	50,000	20,000	7,800	80,000	40,000
3,100	56,000	25,000	8,000	80,000	40,000
3,200	56,000	25,000	8,200	90,000	50,000
3,300	56,000	25,000	8,400	90,000	50,000
3,500	56,000	25,000	8,500	90,000	50,000
3,700	56,000	25,000	8,600	90,000	50,000
3,800	56,000	25,000	8,800	90,000	50,000
3,900	56,000	25,000	9,000	90,000	50,000
4,000	56,000	25,000	9,500	90,000	50,000
4,100	63,000	28,000	9,600	100,000	56,000
4,200	63,000	28,000	9,700	100,000	56,000
4,300	63,000	28,000	9,800	100,000	56,000
4,400	63,000	28,000	10,000	100,000	56,000
4,500	63,000	28,000	10,200	100,000	56,000
4,800	63,000	28,000	10,500	100,000	56,000
4,900	63,000	28,000	11,000	100,000	56,000
5,000	63,000	28,000	11,500	112,000	63,000
5,100	71,000	32,000	12,000	112,000	63,000
5,200	71,000	32,000	12,500	112,000	63,000
5,300	71,000	32,000	13,000	112,000	63,000
5,400	71,000	32,000	13,500	125,000	71,000
5,500	71,000	32,000	14,000	125,000	71,000
5,800	71,000	32,000	14,500	125,000	71,000
6,000	71,000	32,000	15,000	125,000	71,000
6,200	71,000	32,000	15,500	140,000	80,000
6,300	71,000	32,000	16,000	140,000	80,000
6,400	71,000	32,000	16,500	140,000	80,000
6,500	71,000	32,000	17,000	140,000	80,000
6,700	80,000	40,000	17,500	160,000	90,000
6,800	80,000	40,000	18,000	160,000	90,000
7,000	80,000	40,000	18,500	160,000	90,000
7,100	80,000	40,000	19,000	160,000	90,000
7,200	80,000	40,000	19,500	160,000	90,000
7,400	80,000	40,000	20,000	160,000	90,000
7,500	80,000	40,000			



Brocas escariadoras, cil.

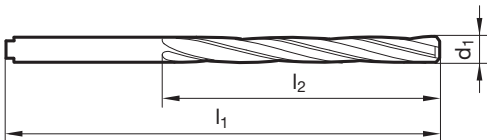
Artículo N° 86010



P	M	K	N	S	H
●	○	●	○		



entrada cónica • estabilidad muy buena • con arrastre según DIN 1809 • para pretal. de fund./estampados/broca • desvío corregido • excéntrica corregida • mejora calidad superficial del taladro • ten. en cuenta día. más pequ. d. pretal. • ten. en cuenta día. más pequ. d. pretal.



d1 mm	inch	d0 mm	l1 mm	l2 mm	d1 mm	inch	d0 mm	l1 mm	l2 mm
3,800		2,8	96,000	64,000	10,200		7,0	162,000	116,000
4,000		2,8	96,000	64,000	10,500		7,0	162,000	116,000
4,750		3,2	102,000	69,000	10,600		7,0	162,000	116,000
4,800		3,5	108,000	74,000	11,000		7,7	173,000	125,000
4,900		3,5	108,000	74,000	11,300		7,7	173,000	125,000
5,000		3,5	108,000	74,000	11,750		8,4	184,000	134,000
5,800		4,2	116,000	80,000	12,000		8,4	184,000	134,000
6,000		4,2	116,000	80,000	12,700		9,1	184,000	134,000
6,200		4,2	124,000	86,000	12,750		9,1	184,000	134,000
6,400		4,2	124,000	86,000	13,000		9,1	184,000	134,000
6,800		4,9	133,000	93,000	13,500		9,8	194,000	142,000
7,500		4,9	133,000	93,000	13,750		9,8	194,000	142,000
7,700		5,6	142,000	100,000	14,000		9,8	194,000	142,000
7,800		5,6	142,000	100,000	14,750		10,5	202,000	147,000
7,850		5,6	142,000	100,000	15,000		10,5	202,000	147,000
8,000		5,6	142,000	100,000					
8,050		5,6	142,000	100,000					
8,200		5,6	142,000	100,000					
8,300		5,6	142,000	100,000					
8,600		6,3	151,000	107,000					
9,400		6,3	151,000	107,000					
9,600		7,0	162,000	116,000					
9,800		7,0	162,000	116,000					
10,000		7,0	162,000	116,000					





HARTNER

Precision Cutting Tools

Brocas de mango cónico


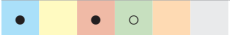


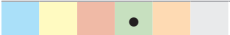


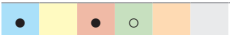


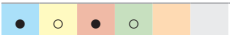


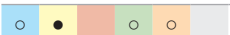


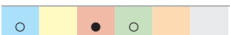


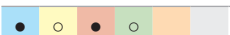

BROCAS DE MANGO CÓNICO

fabricada en HSS, HSS-E, placa MD soldada
brillante y recubierta


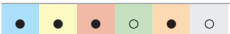


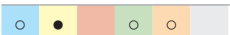



P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas espirales

		DIN 345	N	HSS		derecha	MK	~5xD	3,000 - 70,000	82010	158
		DIN 345	W	HSS		derecha	MK	~5xD	6,800 - 30,500	82030	157
		DIN 345	N	HSS		derecha	MK	~5xD	5,500 - 30,000	84460	160
		DIN 345	N	HSS-E		derecha	MK	~5xD	5,000 - 50,000	82011	161
		DIN 345	IS	HSS-E		derecha	MK	~5xD	11,500 - 32,000	82012	162
		DIN 345	FN	HSS-E		derecha	MK	~5xD	14,200 - 28,000	84660	163
		DIN 345	N	HSS-E		derecha	MK	~5xD	8,000 - 31,000	84859	164

Brocas espirales cil., cortas


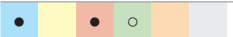




		Norma de fab.	V	HSS-E		derecha	MK	~3xD	10,000 - 38,000	82971	166
		Norma de fab.	IS	HSS-E		derecha	MK	~3xD	10,000 - 29,000	82972	165

Brocas de puntear NC


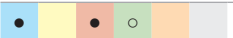







		Norma de fab.	N	HSS		derecha	MK		12,000 - 25,000	82191	167
		Norma de fab.	N	HSS		derecha	MK		12,000 - 25,000	82192	167

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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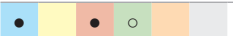




Brocas espirales cil., largas

		DIN 341	N	HSS		derecha	MK	~10xD	4,000 - 50,000	82210	168
		DIN 341	N	HSS-E		derecha	MK	~10xD	5,000 - 30,000	82211	169











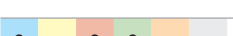

Brocas espirales, extra largas, serie 1

		DIN 1870	N	HSS		derecha	MK	~15xD	8,500 - 33,000	82310	170
		DIN 1870	FN	HSS		derecha	MK	~15xD	8,000 - 30,000	82340	171
		DIN 1870	FN	HSS-E		derecha	MK	~15xD	10,000 - 17,000	82341	172

Brocas espirales, extra largas, serie 2




		DIN 1870	N	HSS		derecha	MK	~20xD	8,500 - 49,000	82410	173
		DIN 1870	FN	HSS		derecha	MK	~20xD	8,000 - 30,000	82440	174

Brocas espirales, largo especial

		Norma de fab.	FN	HSS		derecha	MK	>20xD	8,000 - 20,000	82466	175
		Norma de fab.	FN	HSS		derecha	MK	>20xD	14,000 - 38,000	82467	176
		Norma de fab.	FN	HSS		derecha	MK	>20xD	14,000 - 18,000	82468	177
		Norma de fab.	FN	HSS		derecha	MK	>20xD	15,000 - 18,000	82469	178

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas de refrigeración, serie larga

	•	○	•	○	○	Norma de fab.	N	HSS	●	derecha	MK	~10xD	10,000 - 40,000	82521	180
	•	○	•	○	○	Norma de fab.	FN	HSS	●	derecha	MK	~10xD	10,000 - 20,000	82535	179
	•	•	•	•	○	Norma de fab.	FN	HSS-E	●	derecha	MK	~10xD	15,000 - 32,500	82525	181



Brocas de refrigeración, serie extra larga

	•	•	•	•	○	Norma de fab.	FN	HSS-E	●	derecha	MK	~15xD	14,000 - 29,000	82515	182
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Brocas espirales, placa MD soldada

	○	○	○	○	○	DIN 8041	N	Carbide	○	derecha	MK		8,500 - 40,000	89302	183
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Brocas escariadoras, CM

	•	○	•	○	○	DIN 343	N	HSS	●	derecha	MK		8,600 - 40,000	86110	184
	•	○	•	○	○	DIN 343	N	HSS-E	●	derecha	MK		12,000 - 22,000	86111	185

Brocas para pasadores cónicos

	•	○	•	○	○	DIN 1898	N	HSS	●	derecha	MK		5,000 - 20,000	82810	186
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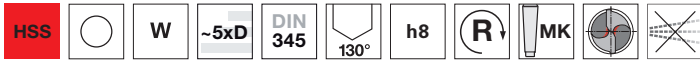


Brocas espirales

Artículo N° 82030

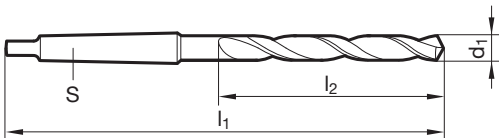


P	M	K	N	S	H
			•		



vaciado de punta $\geq \varnothing 15,000$ • entrada cónica

mat. blandos y de viruta larga • aluminio, alea. de alum. (de vir. larga) • zink, cobre fino, siluminio, electrón



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
6,800	MK-1	150,000	69,000	15,000	MK-2	212,000	114,000
9,000	MK-1	162,000	81,000	19,000	MK-2	233,000	135,000
9,500	MK-1	162,000	81,000	24,300	MK-3	281,000	160,000
10,000	MK-1	168,000	87,000	30,500	MK-3	301,000	180,000
10,200	MK-1	168,000	87,000				
12,000	MK-1	182,000	101,000				



Brocas espirales

Artículo N° 82010

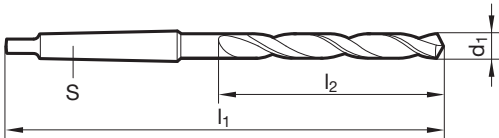


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 14,100$ • entrada cónica

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argénton y grafito



d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
3,000		MK-1	114,000	33,000	10,200		MK-1	168,000	87,000
3,300		MK-1	117,000	36,000	10,250		MK-1	168,000	87,000
3,600		MK-1	120,000	39,000	10,300		MK-1	168,000	87,000
3,750		MK-1	120,000	39,000	10,500		MK-1	168,000	87,000
4,000		MK-1	124,000	43,000	10,600		MK-1	168,000	87,000
4,100		MK-1	124,000	43,000	10,700		MK-1	175,000	94,000
4,200		MK-1	124,000	43,000	10,750		MK-1	175,000	94,000
4,250		MK-1	124,000	43,000	10,800		MK-1	175,000	94,000
4,500		MK-1	128,000	47,000	11,000		MK-1	175,000	94,000
4,900		MK-1	133,000	52,000	11,100		MK-1	175,000	94,000
5,000		MK-1	133,000	52,000	11,200		MK-1	175,000	94,000
5,200		MK-1	133,000	52,000	11,250		MK-1	175,000	94,000
5,500		MK-1	138,000	57,000	11,500		MK-1	175,000	94,000
5,700		MK-1	138,000	57,000	11,750		MK-1	175,000	94,000
6,000		MK-1	138,000	57,000	11,800		MK-1	175,000	94,000
6,200		MK-1	144,000	63,000	12,000		MK-1	182,000	101,000
6,500		MK-1	144,000	63,000	12,100		MK-1	182,000	101,000
6,600		MK-1	144,000	63,000	12,200		MK-1	182,000	101,000
6,700		MK-1	144,000	63,000	12,250		MK-1	182,000	101,000
6,750	17/64	MK-1	150,000	69,000	12,500		MK-1	182,000	101,000
6,800		MK-1	150,000	69,000	12,750		MK-1	182,000	101,000
7,000		MK-1	150,000	69,000	12,800		MK-1	182,000	101,000
7,250		MK-1	150,000	69,000	13,000		MK-1	182,000	101,000
7,500		MK-1	150,000	69,000	13,200		MK-1	182,000	101,000
7,800		MK-1	156,000	75,000	13,250		MK-1	189,000	108,000
7,900		MK-1	156,000	75,000	13,490	17/32	MK-1	189,000	108,000
8,000		MK-1	156,000	75,000	13,500		MK-1	189,000	108,000
8,100		MK-1	156,000	75,000	13,750		MK-1	189,000	108,000
8,200		MK-1	156,000	75,000	13,800		MK-1	189,000	108,000
8,400		MK-1	156,000	75,000	14,000		MK-1	189,000	108,000
8,500		MK-1	156,000	75,000	14,100		MK-2	212,000	114,000
8,700		MK-1	162,000	81,000	14,200		MK-2	212,000	114,000
8,750		MK-1	162,000	81,000	14,250		MK-2	212,000	114,000
8,800		MK-1	162,000	81,000	14,300		MK-2	212,000	114,000
9,000		MK-1	162,000	81,000	14,500		MK-2	212,000	114,000
9,200		MK-1	162,000	81,000	14,600		MK-2	212,000	114,000
9,500		MK-1	162,000	81,000	14,750		MK-2	212,000	114,000
9,700		MK-1	168,000	87,000	15,000		MK-2	212,000	114,000
9,750		MK-1	168,000	87,000	15,200		MK-2	218,000	120,000
9,800		MK-1	168,000	87,000	15,250		MK-2	218,000	120,000
10,000		MK-1	168,000	87,000	15,500		MK-2	218,000	120,000
10,100		MK-1	168,000	87,000	15,750		MK-2	218,000	120,000



Brocas espirales

d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
15,800		MK-2	218,000	120,000	29,500		MK-3	296,000	175,000
16,000		MK-2	218,000	120,000	29,750		MK-3	296,000	175,000
16,100		MK-2	223,000	125,000	30,000		MK-3	296,000	175,000
16,200		MK-2	223,000	125,000	30,250		MK-3	301,000	180,000
16,250		MK-2	223,000	125,000	30,500		MK-3	301,000	180,000
16,500		MK-2	223,000	125,000	30,600		MK-3	301,000	180,000
16,750		MK-2	223,000	125,000	30,750		MK-3	301,000	180,000
17,000		MK-2	223,000	125,000	31,000		MK-3	301,000	180,000
17,250		MK-2	228,000	130,000	31,250		MK-3	301,000	180,000
17,500		MK-2	228,000	130,000	31,500		MK-3	301,000	180,000
17,750		MK-2	228,000	130,000	31,750	1 1/4	MK-3	306,000	185,000
18,000		MK-2	228,000	130,000	32,000		MK-4	334,000	185,000
18,200		MK-2	233,000	135,000	32,500		MK-4	334,000	185,000
18,250		MK-2	233,000	135,000	33,000		MK-4	334,000	185,000
18,500		MK-2	233,000	135,000	33,500		MK-4	334,000	185,000
18,750		MK-2	233,000	135,000	34,000		MK-4	339,000	190,000
19,000		MK-2	233,000	135,000	34,500		MK-4	339,000	190,000
19,250		MK-2	238,000	140,000	35,000		MK-4	339,000	190,000
19,500		MK-2	238,000	140,000	35,500		MK-4	339,000	190,000
19,700		MK-2	238,000	140,000	36,000		MK-4	344,000	195,000
19,750		MK-2	238,000	140,000	36,500		MK-4	344,000	195,000
20,000		MK-2	238,000	140,000	37,000		MK-4	344,000	195,000
20,100		MK-2	243,000	145,000	37,500		MK-4	344,000	195,000
20,200		MK-2	243,000	145,000	38,000		MK-4	349,000	200,000
20,250		MK-2	243,000	145,000	38,500	1 33/64	MK-4	349,000	200,000
20,400		MK-2	243,000	145,000	39,000		MK-4	349,000	200,000
20,500		MK-2	243,000	145,000	39,500		MK-4	349,000	200,000
20,750		MK-2	243,000	145,000	40,000		MK-4	349,000	200,000
21,000		MK-2	243,000	145,000	40,500		MK-4	354,000	205,000
21,250		MK-2	248,000	150,000	41,000		MK-4	354,000	205,000
21,500		MK-2	248,000	150,000	41,500		MK-4	354,000	205,000
21,750		MK-2	248,000	150,000	42,000		MK-4	354,000	205,000
22,000		MK-2	248,000	150,000	42,500		MK-4	354,000	205,000
22,100		MK-2	248,000	150,000	43,000		MK-4	359,000	210,000
22,200		MK-2	248,000	150,000	43,500		MK-4	359,000	210,000
22,250		MK-2	248,000	150,000	44,000		MK-4	359,000	210,000
22,500		MK-2	253,000	155,000	44,500		MK-4	359,000	210,000
22,750		MK-2	253,000	155,000	45,000		MK-4	359,000	210,000
23,000		MK-2	253,000	155,000	45,500		MK-4	364,000	215,000
23,250		MK-3	276,000	155,000	46,000		MK-4	364,000	215,000
23,500		MK-3	276,000	155,000	46,500		MK-4	364,000	215,000
23,750		MK-3	281,000	160,000	47,000		MK-4	364,000	215,000
24,000		MK-3	281,000	160,000	47,500		MK-4	364,000	215,000
24,250		MK-3	281,000	160,000	48,000		MK-4	369,000	220,000
24,500		MK-3	281,000	160,000	48,500		MK-4	369,000	220,000
24,750		MK-3	281,000	160,000	49,000		MK-4	369,000	220,000
25,000	63/64	MK-3	281,000	160,000	49,500		MK-4	369,000	220,000
25,200		MK-3	286,000	165,000	50,000		MK-4	369,000	220,000
25,250		MK-3	286,000	165,000	50,500		MK-4	374,000	225,000
25,400	1	MK-3	286,000	165,000	50,800	2	MK-4	374,000	225,000
25,500		MK-3	286,000	165,000	51,000		MK-5	412,000	225,000
25,750		MK-3	286,000	165,000	52,000		MK-5	412,000	225,000
25,800	1 1/64	MK-3	286,000	165,000	53,000		MK-5	412,000	225,000
26,000		MK-3	286,000	165,000	54,000		MK-5	417,000	230,000
26,250		MK-3	286,000	165,000	55,000		MK-5	417,000	230,000
26,500		MK-3	286,000	165,000	56,000		MK-5	417,000	230,000
27,000		MK-3	291,000	170,000	56,500		MK-5	422,000	235,000
27,250		MK-3	291,000	170,000	57,000		MK-5	422,000	235,000
27,500		MK-3	291,000	170,000	58,000		MK-5	422,000	235,000
27,750		MK-3	291,000	170,000	59,000		MK-5	422,000	235,000
28,000		MK-3	291,000	170,000	60,000		MK-5	422,000	235,000
28,250		MK-3	296,000	175,000	63,000		MK-5	427,000	240,000
28,500		MK-3	296,000	175,000	65,000		MK-5	432,000	245,000
28,750		MK-3	296,000	175,000	70,000		MK-5	437,000	250,000
29,000		MK-3	296,000	175,000					
29,250		MK-3	296,000	175,000					



Brocas espirales

Artículo N° 84460

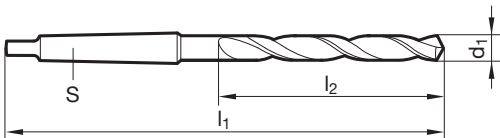


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 5,500$ • entrada cónica

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
5,500		MK-1	138,000	57,000	15,500		MK-2	218,000	120,000
6,000		MK-1	138,000	57,000	16,000		MK-2	218,000	120,000
6,800		MK-1	150,000	69,000	16,250		MK-2	223,000	125,000
8,000		MK-1	156,000	75,000	16,500		MK-2	223,000	125,000
8,200		MK-1	156,000	75,000	16,750		MK-2	223,000	125,000
8,500		MK-1	156,000	75,000	17,000		MK-2	223,000	125,000
8,800		MK-1	162,000	81,000	17,250		MK-2	228,000	130,000
9,000		MK-1	162,000	81,000	17,500		MK-2	228,000	130,000
9,200		MK-1	162,000	81,000	18,000		MK-2	228,000	130,000
9,500		MK-1	162,000	81,000	18,500		MK-2	233,000	135,000
9,800		MK-1	168,000	87,000	19,000		MK-2	233,000	135,000
10,000		MK-1	168,000	87,000	19,500		MK-2	238,000	140,000
10,200		MK-1	168,000	87,000	20,000		MK-2	238,000	140,000
10,250		MK-1	168,000	87,000	20,400		MK-2	243,000	145,000
10,500		MK-1	168,000	87,000	20,500		MK-2	243,000	145,000
10,750		MK-1	175,000	94,000	20,750		MK-2	243,000	145,000
11,000		MK-1	175,000	94,000	21,000		MK-2	243,000	145,000
11,250		MK-1	175,000	94,000	21,250		MK-2	248,000	150,000
11,500		MK-1	175,000	94,000	21,750		MK-2	248,000	150,000
11,750		MK-1	175,000	94,000	22,000		MK-2	248,000	150,000
12,000		MK-1	182,000	101,000	22,500		MK-2	253,000	155,000
12,250		MK-1	182,000	101,000	23,000		MK-2	253,000	155,000
12,500		MK-1	182,000	101,000	24,000		MK-3	281,000	160,000
12,750		MK-1	182,000	101,000	24,500		MK-3	281,000	160,000
12,800		MK-1	182,000	101,000	25,000	63/64	MK-3	281,000	160,000
13,000		MK-1	182,000	101,000	25,500		MK-3	286,000	165,000
13,250		MK-1	189,000	108,000	26,000		MK-3	286,000	165,000
13,500		MK-1	189,000	108,000	26,500		MK-3	286,000	165,000
13,750		MK-1	189,000	108,000	27,000		MK-3	291,000	170,000
14,000		MK-1	189,000	108,000	28,000		MK-3	291,000	170,000
14,200		MK-2	212,000	114,000	28,500		MK-3	296,000	175,000
14,250		MK-2	212,000	114,000	29,000		MK-3	296,000	175,000
14,500		MK-2	212,000	114,000	29,500		MK-3	296,000	175,000
14,750		MK-2	212,000	114,000	30,000		MK-3	296,000	175,000
15,000		MK-2	212,000	114,000					
15,250		MK-2	218,000	120,000					



Brocas espirales

Artículo N° 82011

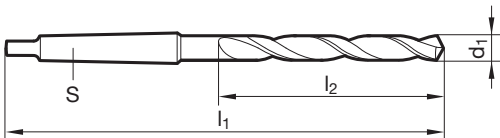


P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 5,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste

aceros aleados y no aleados y fundición de dureza sup. a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos
• aceros altamente aleados • aceros de cementación, de bonificación



d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
5,000		MK-1	133,000	52,000	18,500		MK-2	233,000	135,000
6,000		MK-1	138,000	57,000	19,000		MK-2	233,000	135,000
7,000		MK-1	150,000	69,000	19,050	3/4	MK-2	238,000	140,000
7,500		MK-1	150,000	69,000	19,500		MK-2	238,000	140,000
8,000		MK-1	156,000	75,000	20,000		MK-2	238,000	140,000
8,500		MK-1	156,000	75,000	20,250		MK-2	243,000	145,000
9,000		MK-1	162,000	81,000	20,500		MK-2	243,000	145,000
9,500		MK-1	162,000	81,000	20,750		MK-2	243,000	145,000
10,000		MK-1	168,000	87,000	21,000		MK-2	243,000	145,000
10,250		MK-1	168,000	87,000	21,500		MK-2	248,000	150,000
10,500		MK-1	168,000	87,000	22,000		MK-2	248,000	150,000
11,000		MK-1	175,000	94,000	22,500		MK-2	253,000	155,000
11,200		MK-1	175,000	94,000	23,000		MK-2	253,000	155,000
11,500		MK-1	175,000	94,000	23,500		MK-3	276,000	155,000
12,000		MK-1	182,000	101,000	24,000		MK-3	281,000	160,000
12,200		MK-1	182,000	101,000	24,500		MK-3	281,000	160,000
12,250		MK-1	182,000	101,000	25,000	63/64	MK-3	281,000	160,000
12,500		MK-1	182,000	101,000	25,250		MK-3	286,000	165,000
12,750		MK-1	182,000	101,000	25,500		MK-3	286,000	165,000
13,000		MK-1	182,000	101,000	26,000		MK-3	286,000	165,000
13,500		MK-1	189,000	108,000	26,500		MK-3	286,000	165,000
13,800		MK-1	189,000	108,000	27,000		MK-3	291,000	170,000
14,000		MK-1	189,000	108,000	27,500		MK-3	291,000	170,000
14,200		MK-2	212,000	114,000	28,000		MK-3	291,000	170,000
14,290	9/16	MK-2	212,000	114,000	28,500		MK-3	296,000	175,000
14,500		MK-2	212,000	114,000	28,570	1 1/8	MK-3	296,000	175,000
14,750		MK-2	212,000	114,000	29,000		MK-3	296,000	175,000
15,000		MK-2	212,000	114,000	29,500		MK-3	296,000	175,000
15,250		MK-2	218,000	120,000	30,000		MK-3	296,000	175,000
15,500		MK-2	218,000	120,000	31,000		MK-3	301,000	180,000
15,750		MK-2	218,000	120,000	31,500		MK-3	301,000	180,000
16,000		MK-2	218,000	120,000	32,000		MK-4	334,000	185,000
16,250		MK-2	223,000	125,000	33,000		MK-4	334,000	185,000
16,500		MK-2	223,000	125,000	34,000		MK-4	339,000	190,000
16,750		MK-2	223,000	125,000	35,000		MK-4	339,000	190,000
17,000		MK-2	223,000	125,000	36,000		MK-4	344,000	195,000
17,250		MK-2	228,000	130,000	38,000		MK-4	349,000	200,000
17,460	11/16	MK-2	228,000	130,000	40,000		MK-4	349,000	200,000
17,500		MK-2	228,000	130,000	50,000		MK-4	369,000	220,000
17,750		MK-2	228,000	130,000					
18,000		MK-2	228,000	130,000					
18,200		MK-2	233,000	135,000					



HARTNER

Brocas espirales

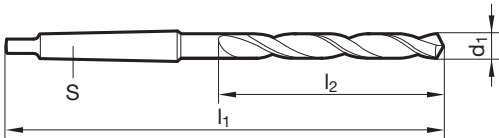
Artículo N° 82012



P	M	K	N	S	H
○	●	○	○	○	○



Broca INOX • entrada cónica • acero rápido al cobalto • más resistencia al desgaste
aceros austeníticos inoxidables y resistentes a los ácidos y al calor (V2A y V4A)



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
11,500	MK-1	175,000	94,000	23,000	MK-2	253,000	155,000
12,000	MK-1	182,000	101,000	26,000	MK-3	286,000	165,000
14,000	MK-1	189,000	108,000	27,500	MK-3	291,000	170,000
15,000	MK-2	212,000	114,000	28,000	MK-3	291,000	170,000
15,500	MK-2	218,000	120,000	29,000	MK-3	296,000	175,000
16,000	MK-2	218,000	120,000	29,500	MK-3	296,000	175,000
16,500	MK-2	223,000	125,000	31,500	MK-3	301,000	180,000
17,000	MK-2	223,000	125,000	32,000	MK-4	334,000	185,000
17,250	MK-2	228,000	130,000				
17,500	MK-2	228,000	130,000				
18,000	MK-2	228,000	130,000				
18,500	MK-2	233,000	135,000				
19,500	MK-2	238,000	140,000				
20,000	MK-2	238,000	140,000				
20,500	MK-2	243,000	145,000				
21,000	MK-2	243,000	145,000				
22,000	MK-2	248,000	150,000				
22,500	MK-2	253,000	155,000				

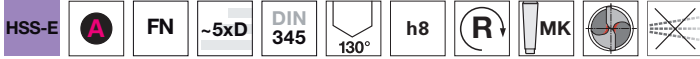


Brocas espirales

Artículo N° 84660

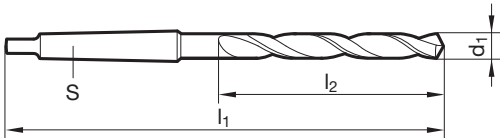


P	M	K	N	S	H
○		●	○		



vaciado de punta $\geq \varnothing 14,200$ • entrada cónica • ranuras amplias • acero rápido al cobalto • resistencia más alta al desgaste
 • ideal para prof. de taladro sup. a 3xD

aceros aleados y no aleados fundición de dureza sup. a 1000 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos
 • aceros altamente aleados • aceros de cementación, de bonificación



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
14,200	MK-2	212,000	114,000				
14,500	MK-2	212,000	114,000				
19,000	MK-2	233,000	135,000				
19,500	MK-2	238,000	140,000				
24,500	MK-3	281,000	160,000				
28,000	MK-3	291,000	170,000				



Brocas espirales

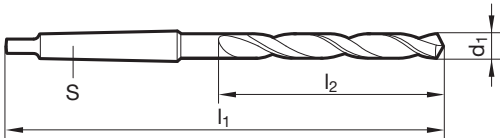
Artículo N° 84859



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 8,000$ • entrada cónica • acero rápido al cobalto • resistencia más alta al desgaste
 aceros aleados y no aleados y fundición de dureza sup. a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos
 • aceros altamente aleados • aceros de cementación, de bonificación



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
8,000	MK-1	156,000	75,000				
14,000	MK-1	189,000	108,000				
23,000	MK-2	253,000	155,000				
24,500	MK-3	281,000	160,000				
31,000	MK-3	301,000	180,000				



Brocas espirales cil., cortas

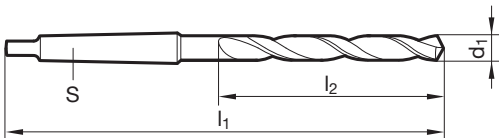
Artículo N° 82972



P	M	K	N	S	H
○	●	○	○	○	○



Broca INOX • entrada cónica • acero rápido al cobalto • más resistencia al desgaste
aceros austeníticos inoxidables y resistentes a los ácidos y al calor (V2A y V4A)



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
10,000	MK-1	138,000	57,000	21,500	MK-3	219,000	98,000
10,500	MK-1	138,000	57,000	29,000	MK-4	263,000	114,000
10,800	MK-1	142,000	61,000				
11,200	MK-1	142,000	61,000				
12,500	MK-1	147,000	66,000				
13,200	MK-1	147,000	66,000				

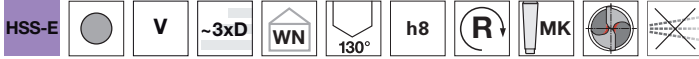


Brocas espirales cil., cortas

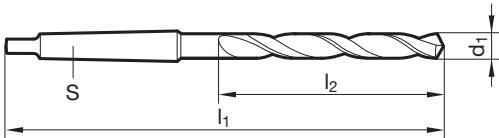
Artículo N° 82971



P	M	K	N	S	H
•	•	•	○	•	○



vaciado de punta $\geq \varnothing 10,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste materiales difíciles • aceros inoxidable y resistentes al ácido • aceros de muelles, aceros austeníticos



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
10,000	MK-1	138,000	57,000	18,500	MK-2	186,000	88,000
10,200	MK-1	138,000	57,000	19,000	MK-2	186,000	88,000
10,500	MK-1	138,000	57,000	20,000	MK-3	212,000	91,000
11,000	MK-1	142,000	61,000	21,000	MK-3	216,000	95,000
11,500	MK-1	142,000	61,000	21,500	MK-3	219,000	98,000
11,800	MK-1	142,000	61,000	22,000	MK-3	219,000	98,000
12,000	MK-1	147,000	66,000	23,000	MK-3	222,000	101,000
12,500	MK-1	147,000	66,000	24,000	MK-3	225,000	104,000
13,000	MK-1	147,000	66,000	25,000	MK-3	225,000	104,000
13,500	MK-2	168,000	70,000	26,000	MK-4	256,000	107,000
14,000	MK-2	168,000	70,000	26,500	MK-4	256,000	107,000
14,500	MK-2	172,000	74,000	27,000	MK-4	259,000	110,000
15,000	MK-2	172,000	74,000	28,000	MK-4	259,000	110,000
15,500	MK-2	176,000	78,000	29,000	MK-4	263,000	114,000
16,000	MK-2	176,000	78,000	38,000	MK-5	317,000	130,000
17,000	MK-2	179,000	81,000				
17,500	MK-2	183,000	85,000				
18,000	MK-2	183,000	85,000				

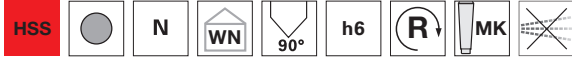


Brocas de puntear NC

Artículo N° 82192



P	M	K	N	S	H
•	○	•	•	○	



entrada cónica • solo para puntear • estabilidad muy buena

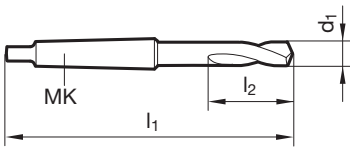
Artículo N° 82191



P	M	K	N	S	H
•	○	•	•	○	



entrada cónica • solo para puntear • estabilidad muy buena



d1 mm	inch	S	l1 mm	l2 mm
12,000		MK-1	122,000	30,000
16,000		MK-2	148,000	37,500
20,000		MK-2	148,000	45,000
25,000		MK-3	171,000	53,000

d1 mm	inch	S	l1 mm	l2 mm



Brocas espirales cil., largas

Artículo N° 82210

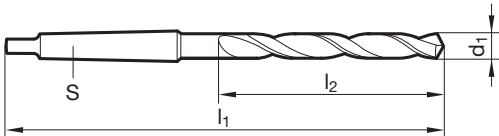


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 14,500$ • entrada cónica • para taladrar casquillos

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado, argénton y grafito



d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
4,000		MK-1	145,000	64,000	21,000		MK-2	282,000	184,000
4,200		MK-1	145,000	64,000	21,400		MK-2	289,000	191,000
5,000		MK-1	155,000	74,000	21,500		MK-2	289,000	191,000
5,200		MK-1	155,000	74,000	22,000		MK-2	289,000	191,000
5,500		MK-1	161,000	80,000	22,500		MK-2	296,000	198,000
5,800		MK-1	161,000	80,000	23,000		MK-2	296,000	198,000
6,000		MK-1	161,000	80,000	23,250		MK-3	319,000	198,000
6,800		MK-1	174,000	93,000	24,000		MK-3	327,000	206,000
7,000		MK-1	174,000	93,000	24,500		MK-3	327,000	206,000
7,800		MK-1	181,000	100,000	25,000	63/64	MK-3	327,000	206,000
8,000		MK-1	181,000	100,000	25,500		MK-3	335,000	214,000
8,200		MK-1	181,000	100,000	26,000		MK-3	335,000	214,000
8,500		MK-1	181,000	100,000	26,500		MK-3	335,000	214,000
9,000		MK-1	188,000	107,000	27,000		MK-3	343,000	222,000
9,900		MK-1	197,000	116,000	27,500		MK-3	343,000	222,000
10,000		MK-1	197,000	116,000	28,000		MK-3	343,000	222,000
10,200		MK-1	197,000	116,000	29,000		MK-3	351,000	230,000
10,500		MK-1	197,000	116,000	29,500		MK-3	351,000	230,000
11,000		MK-1	206,000	125,000	30,000		MK-3	351,000	230,000
11,500		MK-1	206,000	125,000	31,000		MK-3	360,000	239,000
11,800		MK-1	206,000	125,000	32,000		MK-4	397,000	248,000
12,000		MK-1	215,000	134,000	33,000		MK-4	397,000	248,000
12,500		MK-1	215,000	134,000	34,000		MK-4	406,000	257,000
13,000		MK-1	215,000	134,000	35,000		MK-4	406,000	257,000
13,500		MK-1	223,000	142,000	36,000		MK-4	416,000	267,000
13,750		MK-1	223,000	142,000	38,000		MK-4	426,000	277,000
14,000		MK-1	223,000	142,000	39,000		MK-4	426,000	277,000
14,500		MK-2	245,000	147,000	39,500		MK-4	426,000	277,000
15,000		MK-2	245,000	147,000	40,000		MK-4	426,000	277,000
15,500		MK-2	251,000	153,000	41,000		MK-4	436,000	287,000
15,750		MK-2	251,000	153,000	42,000		MK-4	436,000	287,000
16,000		MK-2	251,000	153,000	44,000		MK-4	447,000	298,000
16,400		MK-2	257,000	159,000	45,000		MK-4	447,000	298,000
16,500		MK-2	257,000	159,000	48,000		MK-4	470,000	321,000
17,000		MK-2	257,000	159,000	49,000		MK-4	470,000	321,000
17,500		MK-2	263,000	165,000	50,000		MK-4	470,000	321,000
18,000		MK-2	263,000	165,000					
18,750		MK-2	269,000	171,000					
19,000		MK-2	269,000	171,000					
19,500		MK-2	275,000	177,000					
20,000		MK-2	275,000	177,000					
20,500		MK-2	282,000	184,000					



Brocas espirales cil., largas

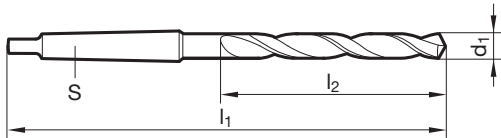
Artículo N° 82211



P	M	K	N	S	H
●	○	●	●	○	



vaciado de punta $\geq \varnothing 5,000$ • entrada cónica • acero rápido al cobalto • más resistencia al desgaste • para taladrar casquillos
 aceros aleados y no aleados fundición de dureza sup. a 800 N/mm² • aceros para trab. en frío y en caliente • aceros para rodamientos
 • aceros altamente aleados • aceros de cementación, de bonificación



d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
5,000		MK-1	155,000	74,000	18,000		MK-2	263,000	165,000
6,800		MK-1	174,000	93,000	20,000		MK-2	275,000	177,000
8,500		MK-1	181,000	100,000	22,500		MK-2	296,000	198,000
10,000		MK-1	197,000	116,000	23,000		MK-2	296,000	198,000
10,200		MK-1	197,000	116,000	25,000	63/64	MK-3	327,000	206,000
11,500		MK-1	206,000	125,000	30,000		MK-3	351,000	230,000
12,000		MK-1	215,000	134,000					
13,000		MK-1	215,000	134,000					
14,000		MK-1	223,000	142,000					
14,500		MK-2	245,000	147,000					
16,000		MK-2	251,000	153,000					
17,500		MK-2	263,000	165,000					



Brocas espirales, extra largas, serie 1

Artículo N° 82310

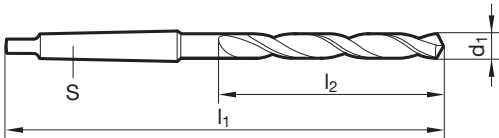


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 8,500$ • entrada cónica • para taladros muy profundos

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
8,500	MK-1	265,000	165,000	18,500	MK-2	370,000	245,000
9,000	MK-1	275,000	175,000	20,000	MK-2	385,000	260,000
9,500	MK-1	275,000	175,000	21,000	MK-2	385,000	260,000
10,000	MK-1	285,000	185,000	22,500	MK-2	405,000	270,000
10,200	MK-1	285,000	185,000	23,500	MK-3	425,000	270,000
11,000	MK-1	300,000	195,000	24,000	MK-3	440,000	290,000
11,800	MK-1	300,000	195,000	24,500	MK-3	440,000	290,000
12,500	MK-1	310,000	205,000	25,000	MK-3	440,000	290,000
13,000	MK-1	310,000	205,000	26,000	MK-3	440,000	290,000
14,000	MK-1	325,000	220,000	26,500	MK-3	440,000	290,000
14,500	MK-2	340,000	220,000	30,000	MK-3	460,000	305,000
15,000	MK-2	340,000	220,000	30,500	MK-3	480,000	320,000
15,750	MK-2	355,000	230,000	33,000	MK-4	505,000	320,000
15,800	MK-2	355,000	230,000				
16,000	MK-2	355,000	230,000				
16,250	MK-2	355,000	230,000				
17,750	MK-2	370,000	245,000				
18,000	MK-2	370,000	245,000				



Brocas espirales, extra largas, serie 1

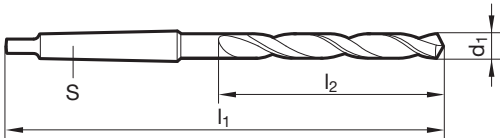
Artículo N° 82340



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 8,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
 fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
8,000		MK-1	265,000	165,000	17,000		MK-2	355,000	230,000
8,500		MK-1	265,000	165,000	17,500		MK-2	370,000	245,000
8,700		MK-1	275,000	175,000	18,000		MK-2	370,000	245,000
9,000		MK-1	275,000	175,000	19,000		MK-2	370,000	245,000
10,000		MK-1	285,000	185,000	19,500		MK-2	385,000	260,000
10,500		MK-1	285,000	185,000	20,000		MK-2	385,000	260,000
11,000		MK-1	300,000	195,000	20,500		MK-2	385,000	260,000
11,500		MK-1	300,000	195,000	21,000		MK-2	385,000	260,000
12,000		MK-1	310,000	205,000	22,000		MK-2	405,000	270,000
12,500		MK-1	310,000	205,000	23,000		MK-2	405,000	270,000
13,000		MK-1	310,000	205,000	24,000		MK-3	440,000	290,000
13,500		MK-1	325,000	220,000	25,000	63/64	MK-3	440,000	290,000
14,000		MK-1	325,000	220,000	26,000		MK-3	440,000	290,000
14,500		MK-2	340,000	220,000	28,000		MK-3	460,000	305,000
15,000		MK-2	340,000	220,000	29,000		MK-3	460,000	305,000
15,500		MK-2	355,000	230,000	30,000		MK-3	460,000	305,000
16,000		MK-2	355,000	230,000					
16,500		MK-2	355,000	230,000					

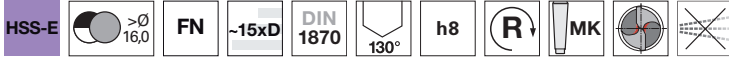


Brocas espirales, extra largas, serie 1

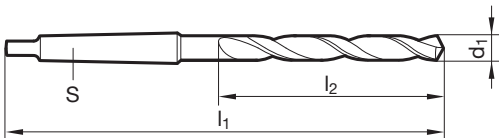
Artículo N° 82341



P	M	K	N	S	H
•	•	•	•	•	○



vaciado de punta $\geq \varnothing 10,000$ • entrada cónica • ranuras amplias • más resistencia al desgaste • acero rápido al cobalto
 • para taladros muy profundos • con desalajo de viruta difícil
 aceros y fundición de acero de gran dureza • fundición gris, fundición maleable, fundición esferica



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
10,000	MK-1	285,000	185,000				
14,000	MK-1	325,000	220,000				
15,000	MK-2	340,000	220,000				
16,500	MK-2	355,000	230,000				
17,000	MK-2	355,000	230,000				



Brocas espirales, extra largas, serie 2

Artículo N° 82410

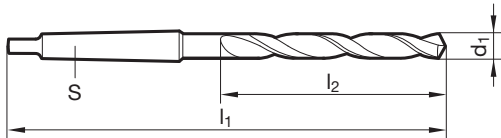


P	M	K	N	S	H
•		•	○		



vaciado de punta $\geq \varnothing 8,500$ • entrada cónica • para taladros muy profundos

aceros y fundición de aceros (aleados y sin alea) • fundición gris, fundición maleable, fundición esferica • hierro sinterizado y grafito



d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
8,500		MK-1	330,000	210,000	16,000		MK-2	445,000	295,000
9,000		MK-1	345,000	220,000	18,000		MK-2	465,000	310,000
9,500		MK-1	345,000	220,000	19,000		MK-2	465,000	310,000
10,000		MK-1	360,000	235,000	20,000		MK-2	490,000	325,000
10,500		MK-1	360,000	235,000	21,000		MK-2	490,000	325,000
11,000		MK-1	375,000	250,000	21,500		MK-2	515,000	345,000
13,000		MK-1	395,000	260,000	22,000		MK-2	515,000	345,000
13,500		MK-1	410,000	275,000	23,000		MK-2	515,000	345,000
14,000		MK-1	410,000	275,000	24,000		MK-3	555,000	365,000
14,500		MK-2	425,000	275,000	25,000	63/64	MK-3	555,000	365,000
15,000		MK-2	425,000	275,000	30,000		MK-3	580,000	385,000
15,500		MK-2	445,000	295,000	49,000		MK-4	765,000	510,000



Brocas espirales, extra largas, serie 2

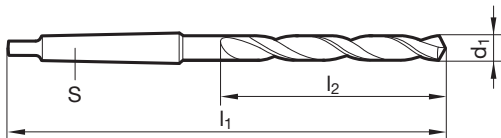
Artículo N° 82440



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 8,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
 fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
8,000		MK-1	330,000	210,000	17,000		MK-2	445,000	295,000
8,500		MK-1	330,000	210,000	17,500		MK-2	465,000	310,000
9,000		MK-1	345,000	220,000	18,000		MK-2	465,000	310,000
9,500		MK-1	345,000	220,000	18,500		MK-2	465,000	310,000
9,800		MK-1	360,000	235,000	19,000		MK-2	465,000	310,000
10,000		MK-1	360,000	235,000	19,500		MK-2	490,000	325,000
10,500		MK-1	360,000	235,000	20,000		MK-2	490,000	325,000
11,000		MK-1	375,000	250,000	20,500		MK-2	490,000	325,000
12,000		MK-1	395,000	260,000	21,000		MK-2	490,000	325,000
12,500		MK-1	395,000	260,000	22,000		MK-2	515,000	345,000
13,000		MK-1	395,000	260,000	23,000		MK-2	515,000	345,000
13,500		MK-1	410,000	275,000	24,000		MK-3	555,000	365,000
14,000		MK-1	410,000	275,000	25,000	63/64	MK-3	555,000	365,000
14,500		MK-2	425,000	275,000	26,000		MK-3	555,000	365,000
15,000		MK-2	425,000	275,000	28,000		MK-3	580,000	385,000
15,500		MK-2	445,000	295,000	29,000		MK-3	580,000	385,000
16,000		MK-2	445,000	295,000	30,000		MK-3	580,000	385,000
16,500		MK-2	445,000	295,000					



Brocas espirales, largo especial

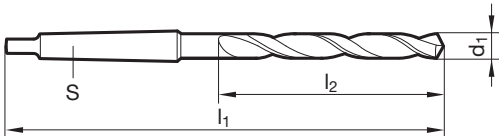
Artículo N° 82466



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 8,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
8,000	MK-1	500,000	420,000	20,000	MK-2	500,000	400,000
8,500	MK-1	500,000	420,000				
9,000	MK-1	500,000	420,000				
10,000	MK-1	500,000	420,000				
12,000	MK-1	500,000	420,000				
13,000	MK-1	500,000	420,000				
14,000	MK-1	500,000	420,000				
15,000	MK-2	500,000	400,000				
16,000	MK-2	500,000	400,000				
17,000	MK-2	500,000	400,000				
18,000	MK-2	500,000	400,000				
19,000	MK-2	500,000	400,000				



Brocas espirales, largo especial

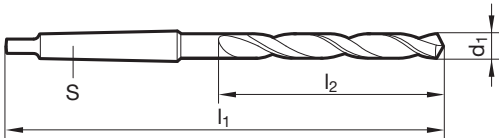
Artículo N° 82467



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 14,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
14,000	MK-1	600,000	500,000	32,000	MK-4	600,000	450,000
15,000	MK-2	600,000	500,000	38,000	MK-4	600,000	450,000
16,000	MK-2	600,000	500,000				
18,000	MK-2	600,000	500,000				
19,000	MK-2	600,000	500,000				
20,000	MK-2	600,000	500,000				
21,000	MK-2	600,000	500,000				
22,000	MK-2	600,000	500,000				
23,000	MK-2	600,000	500,000				
24,000	MK-3	600,000	475,000				
25,000	MK-3	600,000	475,000				
30,000	MK-3	600,000	475,000				

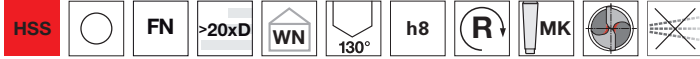


Brocas espirales, largo especial

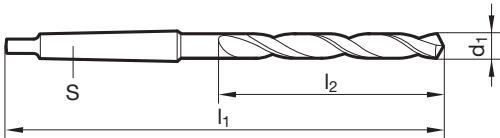
Artículo N° 82468



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 14,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
 fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
14,000	MK-1	750,000	650,000				
15,000	MK-2	750,000	650,000				
16,000	MK-2	750,000	650,000				
18,000	MK-2	750,000	650,000				



Brocas espirales, largo especial

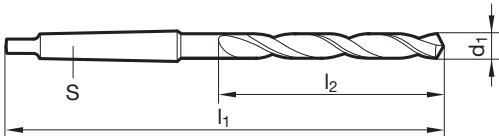
Artículo N° 82469



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \emptyset 15,000$ • entrada cónica • ranuras amplias • para taladros muy profundos • con desalajo de viruta difícil
 fundición gris y aceros hasta máx. 1000 N/mm² • Excepción: aceros CrNi, aceros VA y materiales similares



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
15,000	MK-2	1000,000	850,000				
18,000	MK-2	1000,000	850,000				



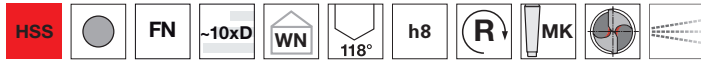


Brocas de refrigeración, serie larga

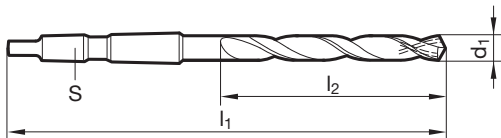
Artículo N° 82535



P	M	K	N	S	H
•		•	•		



vaciado de punta $\geq \varnothing 10,000$ • entrada cónica • transmisión de refrigerante axial por el cono morse • para taladrar casquillos
paquetes de chapas • aceros y fundición de aceros, fundición gris • aceros austeníticos hasta aprox. 800 N/mm²



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
10,000	MK-2	224,000	116,000	18,500	MK-3	303,000	171,000
10,500	MK-2	224,000	116,000	19,000	MK-3	303,000	171,000
11,000	MK-2	233,000	125,000	19,500	MK-3	309,000	177,000
11,500	MK-2	233,000	125,000	20,000	MK-3	309,000	177,000
12,000	MK-2	242,000	134,000				
12,500	MK-2	242,000	134,000				
15,000	MK-2	255,000	147,000				
16,000	MK-2	261,000	153,000				
16,500	MK-2	267,000	159,000				
17,000	MK-2	267,000	159,000				
17,500	MK-2	273,000	165,000				
18,000	MK-2	273,000	165,000				



Brocas de refrigeración, serie larga

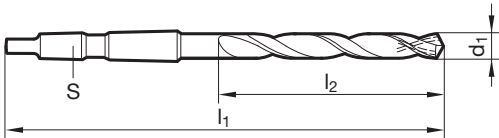
Artículo N° 82521



P	M	K	N	S	H
•	○	•	•	○	



vaciado de punta $\geq \varnothing 10,000$ • entrada cónica • transmisión de refrigerante axial por el cono morse • para taladrar casquillos
paquetes de chapas • aceros y fundición de aceros, fundición gris • aceros austeníticos hasta aprox. 800 N/mm²



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
10,000	MK-2	233,000	116,000	21,000	MK-3	320,000	184,000
11,000	MK-2	242,000	125,000	22,000	MK-3	327,000	191,000
12,000	MK-2	251,000	134,000	23,000	MK-3	334,000	198,000
13,000	MK-2	251,000	134,000	24,000	MK-3	342,000	206,000
13,200	MK-2	251,000	134,000	25,000	MK-3	342,000	206,000
13,500	MK-2	259,000	142,000	26,000	MK-3	350,000	214,000
13,800	MK-2	259,000	142,000	26,500	MK-3	350,000	214,000
14,000	MK-2	259,000	142,000	27,000	MK-4	385,000	222,000
15,000	MK-2	264,000	147,000	28,000	MK-4	385,000	222,000
16,000	MK-2	270,000	153,000	29,000	MK-4	393,000	230,000
16,250	MK-2	276,000	159,000	30,000	MK-4	393,000	230,000
17,000	MK-2	276,000	159,000	32,000	MK-4	421,000	248,000
18,000	MK-2	282,000	165,000	33,000	MK-4	421,000	248,000
18,500	MK-3	307,000	171,000	35,000	MK-4	430,000	257,000
18,750	MK-3	307,000	171,000	40,000	MK-4	450,000	277,000
19,000	MK-3	307,000	171,000				
19,500	MK-3	313,000	177,000				
20,000	MK-3	313,000	177,000				

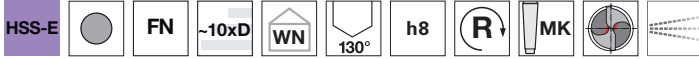


Brocas de refrigeración, serie larga

Artículo N° 82525

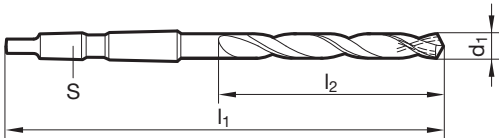


P	M	K	N	S	H
•	•	•	•	•	○



vaciado de punta $\geq \varnothing 15,000$ • entrada cónica • transmisión de refrigerante axial por el cono morse • acero rápido al cobalto
 • más resistencia al desgaste • para taladrar casquillos

aceros templados • aceros aleados, fundición gris • aceros inoxidables y resistentes al ácido y al calor • dureza con una resistencia de hasta 1400 N/mm²



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
15,000	MK-2	264,000	147,000				
17,000	MK-2	276,000	159,000				
18,000	MK-2	282,000	165,000				
21,000	MK-3	320,000	184,000				
22,000	MK-3	327,000	191,000				
32,500	MK-4	421,000	248,000				

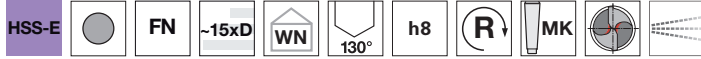


Brocas de refrigeración, serie extra larga

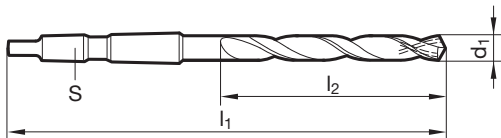
Artículo N° 82515



P	M	K	N	S	H
•	•	•	•	•	○



vaciado de punta $\geq \varnothing 14,000$ • entrada cónica • transmisión de refrigerante axial por el cono morse • acero rápido al cobalto
 • más resistencia al desgaste • para taladrar casquillos
 aceros templados • aceros aleados, fundición gris • aceros inoxidables y resistentes al ácido y al calor • dureza con una resistencia de hasta 1400 N/mm²



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
14,000	MK-2	337,000	220,000	29,000	MK-4	468,000	305,000
15,000	MK-2	337,000	220,000				
16,000	MK-2	347,000	230,000				
17,500	MK-2	362,000	245,000				
18,000	MK-2	362,000	245,000				
20,000	MK-3	396,000	260,000				



Brocas espirales, placa MD soldada

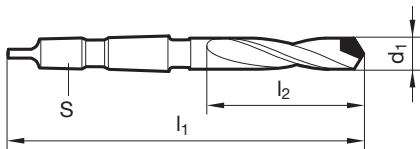
Artículo N° 89302



P	M	K	N	S	H
○		○			○



vaciado de punta $\geq \varnothing 8,500$ • afilado plano • placa MD soldada
 acero de muelles • fundición dura con más de 300 HB • molibdeno puro • bronce duro y tenaz



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
8,500	MK-1	135,000	45,000	18,000	MK-2	185,000	80,000
10,000	MK-1	140,000	50,000	19,000	MK-2	185,000	80,000
10,200	MK-1	140,000	50,000	20,000	MK-3	215,000	90,000
10,500	MK-1	140,000	50,000	21,500	MK-3	215,000	90,000
11,000	MK-1	140,000	50,000	22,000	MK-3	215,000	90,000
11,500	MK-1	146,000	56,000	25,000	MK-3	225,000	100,000
12,000	MK-1	146,000	56,000	26,500	MK-4	260,000	110,000
12,500	MK-1	146,000	56,000	27,000	MK-4	260,000	110,000
13,000	MK-1	146,000	56,000	30,000	MK-4	275,000	125,000
13,500	MK-2	168,000	63,000	32,000	MK-4	275,000	125,000
14,000	MK-2	168,000	63,000	33,000	MK-4	290,000	140,000
14,500	MK-2	168,000	63,000	40,000	MK-4	310,000	160,000
15,000	MK-2	168,000	63,000				
15,500	MK-2	175,000	70,000				
16,000	MK-2	175,000	70,000				
16,500	MK-2	175,000	70,000				
17,000	MK-2	175,000	70,000				
17,500	MK-2	185,000	80,000				



Brocas escariadoras, CM

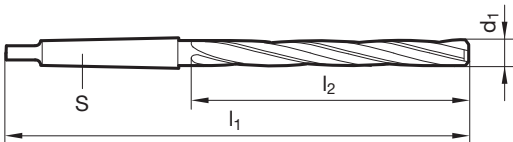
Artículo N° 86110



P	M	K	N	S	H
●	○	●	○		



entrada cónica • 3 cortes • estabilidad muy buena • para pretal. de fund./estampados/broca • desvío corregido • excéntrica corregida • mejora calidad superficial del taladro • ten. en cuenta dia. más pequ. d. pretal. • ten. en cuenta dia. más pequ. d. pretal. • escariar perfect. después del desbaste



d1 mm	d0 mm	S	l1 mm	l2 mm	d1 mm	d0 mm	S	l1 mm	l2 mm
8,600	6,3	MK-1	162,000	81,000	22,000	15,3	MK-2	248,000	150,000
9,000	6,3	MK-1	162,000	81,000	22,700	16,0	MK-2	253,000	155,000
9,800	7,0	MK-1	168,000	87,000	23,000	16,0	MK-2	253,000	155,000
10,000	7,0	MK-1	168,000	87,000	24,000	16,6	MK-3	281,000	160,000
10,100	7,0	MK-1	168,000	87,000	25,000	17,3	MK-3	281,000	160,000
11,000	7,7	MK-1	175,000	94,000	25,700	18,0	MK-3	286,000	165,000
11,500	7,7	MK-1	175,000	94,000	26,000	18,0	MK-3	286,000	165,000
11,600	7,7	MK-1	175,000	94,000	26,700	18,6	MK-3	291,000	170,000
11,750	8,4	MK-1	182,000	101,000	27,000	18,6	MK-3	291,000	170,000
13,000	9,1	MK-1	182,000	101,000	27,700	19,3	MK-3	291,000	170,000
13,750	9,8	MK-1	189,000	108,000	28,000	19,3	MK-3	291,000	170,000
14,000	9,8	MK-1	189,000	108,000	29,000	20,0	MK-3	296,000	175,000
14,100	10,5	MK-2	212,000	114,000	29,700	20,5	MK-3	296,000	175,000
14,750	10,5	MK-2	212,000	114,000	30,000	20,5	MK-3	296,000	175,000
15,000	10,5	MK-2	212,000	114,000	31,000	21,0	MK-3	301,000	180,000
15,750	11,2	MK-2	218,000	120,000	31,600	22,0	MK-4	334,000	185,000
16,000	11,2	MK-2	218,000	120,000	32,000	22,0	MK-4	334,000	185,000
16,250	11,9	MK-2	223,000	125,000	32,600	23,0	MK-4	334,000	185,000
16,750	11,9	MK-2	223,000	125,000	33,000	23,0	MK-4	334,000	185,000
17,000	11,9	MK-2	223,000	125,000	34,000	24,0	MK-4	339,000	190,000
17,750	12,6	MK-2	228,000	130,000	35,000	25,0	MK-4	339,000	190,000
18,000	12,6	MK-2	228,000	130,000	35,600	25,5	MK-4	344,000	195,000
18,700	13,3	MK-2	233,000	135,000	36,000	25,5	MK-4	344,000	195,000
19,000	13,3	MK-2	233,000	135,000	36,600	26,0	MK-4	344,000	195,000
19,700	14,0	MK-2	238,000	140,000	37,600	26,5	MK-4	349,000	200,000
19,750	14,0	MK-2	238,000	140,000	38,000	26,5	MK-4	349,000	200,000
20,000	14,0	MK-2	238,000	140,000	39,000	27,0	MK-4	349,000	200,000
20,700	14,6	MK-2	243,000	145,000	40,000	28,0	MK-4	349,000	200,000
21,000	14,6	MK-2	243,000	145,000					
21,700	15,3	MK-2	248,000	150,000					



Brocas escariadoras, CM

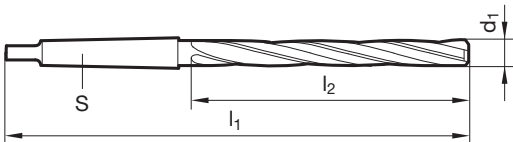
Artículo N° 86111



P	M	K	N	S	H
•	○	•	•	○	



entrada cónica • 3 cortes • estabilidad muy buena • para pretal. de fund./estampados/broca • desvío corregido • excéntrica corregida • mejora calidad superficial del taladro • ten. en cuenta dia. más pequ. d. pretal. • ten. en cuenta dia. más pequ. d. pretal. • escariar perfect. después del desbaste



d1 mm	d0 mm	S	l1 mm	l2 mm
12,000	8,400	MK-1	182,000	101,000
14,000	9,800	MK-1	189,000	108,000
22,000	15,300	MK-2	248,000	150,000

d1 mm	d0 mm	S	l1 mm	l2 mm
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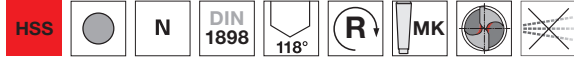


Brocas para pasadores cónicos

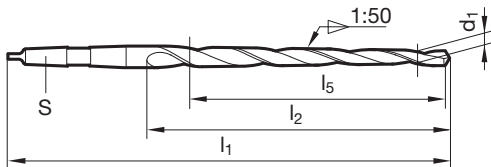
Artículo N° 82810



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 13,000$ • entrada cónica • para taleros cónicos para pasadores según DIN 1 (nuevo: DIN EN 22339), DIN EN 28736), DIN 7977 (nuevo: DIN EN 28737) y DIN 258



d1 mm	S	l1 mm	l2 mm	l5 mm	d1 mm	S	l1 mm	l2 mm	l5 mm
5,000	MK-1	155,000	81,000	75,000	20,000	MK-3	377,000	263,000	250,000
6,000	MK-1	187,000	108,000	105,000					
8,000	MK-1	227,000	149,000	145,000					
10,000	MK-1	257,000	180,000	175,000					
13,000	MK-2	325,000	229,000	220,000					
14,000	MK-2	325,000	229,000	220,000					



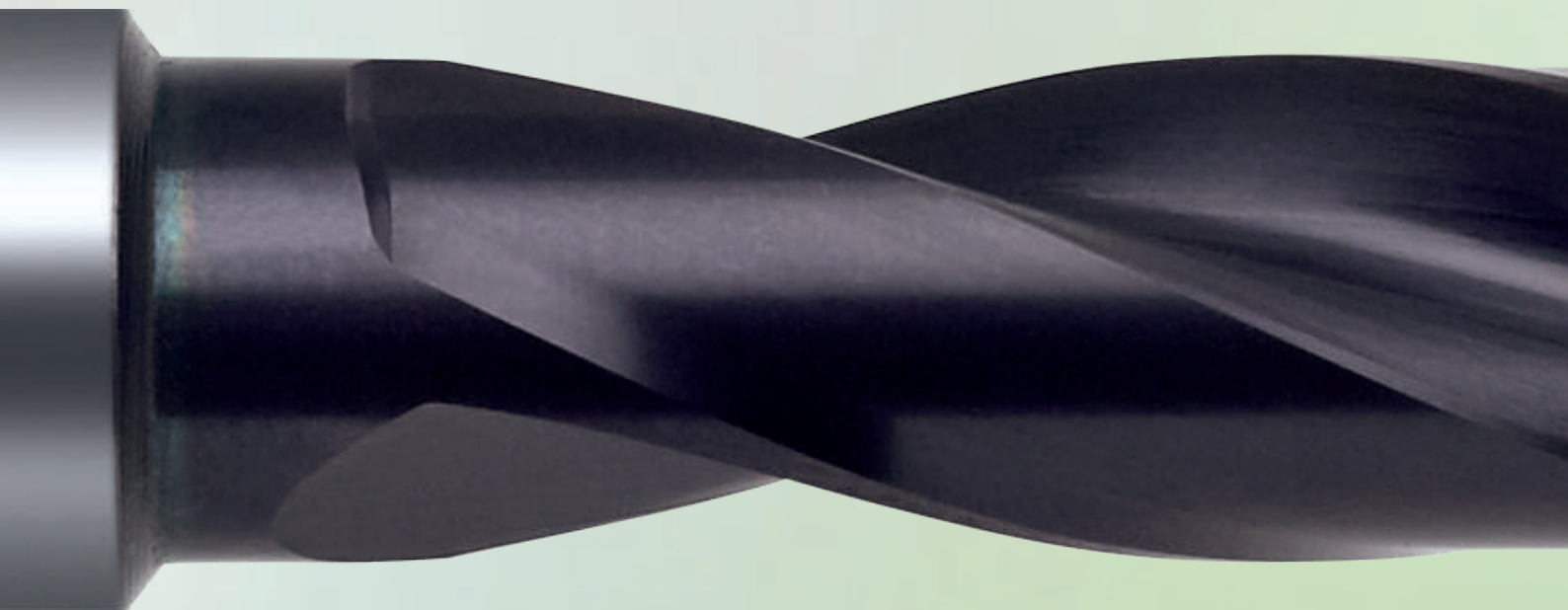
HARTNER

Precision Cutting Tools

15/20/25/30/40xØ



TS-DRILLS





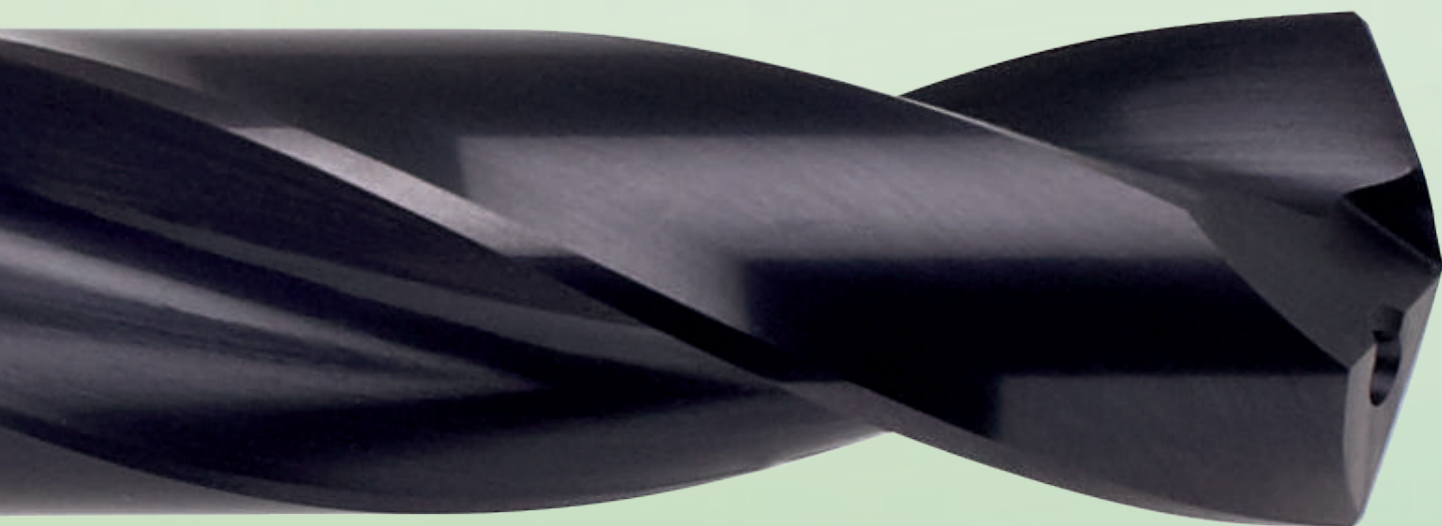
HARTNER

Precision Cutting Tools

Brocas de metal
duro tipo TS



BROCAS DE METAL DURO TIPO TS

Herramientas de alta tecnología
fabricadas en metal duro
brillante y recubierta







P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas-TS sin refrigeración interior














	•	○	•	○	○	DIN 6537K	TS 100 U	Metal duro	T	derecha	HE	3xD	3,000 - 20,000	89264	196
	•	○	•	○	○	DIN 6537K	TS 100 U	Metal duro	F	derecha	HE	3xD	3,000 - 20,000	89402	194
	•	○	•	○	○	DIN 6537K	TS 100 U	Metal duro	F	derecha	HA	3xD	3,000 - 20,000	89413	194
	•	○	•	○	○	DIN 6537K	TS 100 H	Metal duro	Y	derecha	HA	3xD	3,000 - 20,000	89422	198
	•	○	•	○	○	DIN 6539	TS 100 U	Metal duro	T	derecha	cil.	3xD	3,000 - 16,000	89237	200
	•	○	•	○	○	DIN 6539	TS 100 U	Metal duro	F	derecha	cil.	3xD	3,000 - 16,000	89401	200
	•	○	•	○	○	DIN 6537L	TS 100 U	Metal duro	F	derecha	HA	5xD	3,000 - 20,000	89414	202
	•	○	•	○	○	DIN 6537L	TS 100 U	Metal duro	F	derecha	HE	5xD	3,000 - 20,000	89417	202
	•	○	•	○	○	Norma de fab.	TS 100 U	Metal duro	T	derecha	cil.	5xD	5,000 - 16,000	89275	204

Brocas-TS con refrigeración interior

	•	○	○	○	○	DIN 6538K	TS 80 U	Carbide	T	derecha	HE	3xD	10,000 - 25,000	89306	208
	•	○	•	○	○	DIN 6537K	TS 100 U	Metal duro	T	derecha	HE	3xD	4,000 - 20,000	89266	207
	•	○	•	○	○	DIN 6537K	TS 100 U	Metal duro	F	derecha	HA	3xD	3,000 - 20,000	89410	205
	•	○	•	○	○	DIN 6537K	TS 100 U	Metal duro	F	derecha	HE	3xD	3,000 - 20,000	89415	205







P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas-TS con refrigeración interior

	•				○	DIN 6537K	TS 100 H	Metal duro	Y	derecha	HA	3xD	3,000 - 20,000	89423	211
	•				○	DIN 6537K	TS 100 H	Metal duro	Y	derecha	HE	3xD	3,000 - 20,000	89424	211
	•					DIN 6537K	TS 100 INOX	Metal duro	a	derecha	HA	3xD	3,000 - 20,000	89450	209
	•					DIN 6537K	TS 100 INOX	Metal duro	a	derecha	HE	3xD	3,000 - 20,000	89550	209
						Norma de fab.	TS 150 GG	Metal duro	○	derecha	HA	4xD	3,000 - 20,000	89292	213
	•	○	○	○		DIN 6538M	TS 80 U	Carbide	T	derecha	HE	5xD	9,800 - 25,500	89307	217
	•	○	○	○	○	DIN 6537L	TS 100 U	Metal duro	T	derecha	HE	5xD	3,700 - 19,500	89272	214
	•	○	○	○	○	DIN 6537L	TS 100 U	Metal duro	F	derecha	HE	5xD	3,000 - 20,000	89408	215
	•	○	○	○	○	DIN 6537L	TS 100 U	Metal duro	F	derecha	HA	5xD	3,000 - 20,000	89411	215
						DIN 6537L	TS 100 R	Metal duro	F	derecha	HA	5xD	3,000 - 20,000	89420	222
	•				○	DIN 6537L	TS 100 H	Metal duro	Y	derecha	HA	5xD	3,000 - 20,000	89425	220
	•				○	DIN 6537L	TS 100 H	Metal duro	Y	derecha	HE	5xD	3,000 - 20,000	89426	220
	•					DIN 6537L	TS 100 INOX	Metal duro	a	derecha	HA	5xD	3,000 - 20,000	89451	218
	•					DIN 6537L	TS 100 INOX	Metal duro	a	derecha	HE	5xD	3,000 - 20,000	89551	218

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas-TS con refrigeración interior

	•	○	○	○	○	DIN 6538L	TS 80 U	Carbide		derecha	HE	7xD	10,000 - 22,000	89308	226
	○	○	○	○	○	Norma de fab.	TS 150 GG	Metal duro		derecha	HA	7xD	3,000 - 20,000	89294	230
	•	○	○	○	○	Norma de fab.	TS 100 U	Metal duro		derecha	HA	7xD	3,000 - 20,000	89412	224
	•	○	○	○	○	Norma de fab.	TS 100 U	Metal duro		derecha	HE	7xD	3,000 - 20,000	89416	224
	○	○	○	○	○	Norma de fab.	TS 100 R	Metal duro		derecha	HA	7xD	4,000 - 20,000	89421	228
	•	○	○	○	○	Norma de fab.	TS 100 H	Metal duro		derecha	HA	7xD	3,000 - 16,000	89427	227
	○	○	○	○	○	Norma de fab.	TS 150 GG	Metal duro		derecha	HA	10xD	3,000 - 20,000	89293	231
	○	○	○	○	○	Norma de fab.	TS 150 GG	Metal duro		derecha	HA	10xD	3,000 - 20,000	89295	231
	•	○	○	○	○	Norma de fab.	TS 100 U	Metal duro		derecha	HA	12xD	3,000 - 20,000	89418	233
	•	•	○	○	○	Norma de fab.	TS 100 T	Metal duro		derecha	HA	15xD	3,000 - 14,000	86509	235
	•	•	○	○	○	Norma de fab.	TS 100 T	Metal duro		derecha	HA	20xD	3,000 - 14,000	86511	236
	•	•	○	○	○	Norma de fab.	TS 100 T	Metal duro		derecha	HA	25xD	3,000 - 12,000	86512	237
	•	•	○	○	○	Norma de fab.	TS 100 T	Metal duro		derecha	HA	30xD	3,000 - 10,000	86513	238
	•	•	○	○	○	Norma de fab.	TS 100 T	Metal duro		derecha	HA	40xD	3,000 - 8,000	86514	239

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas-TS, 3 cortes



		•	•			DIN 6537L	TS 3 G	Metal duro	○	derecha	HA	5xD	3,000 - 20,000	89247	240
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		•	•			DIN 6539	TS 3 G	Metal duro	○	derecha	cil.	5xD	3,000 - 20,000	89239	241
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Desbarbador



•	•	•	○	•	○	Norma de fab.	TS 100 EG	Metal duro	○	derecha	cil.			84100	243
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•	•	•	○	•	○	Norma de fab.	TS 100 EG	Metal duro	○	derecha	HA			84101	244
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Rebarbadores 90°



•	•	•	○	•	○	Norma de fab.	TS 100 VR	Metal duro	ⓐ	derecha	HA		3,000 - 12,000	80495	245
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Brocas-TS sin refrigeración interior

Artículo N° 89413



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados) hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AlSi altamente aleables

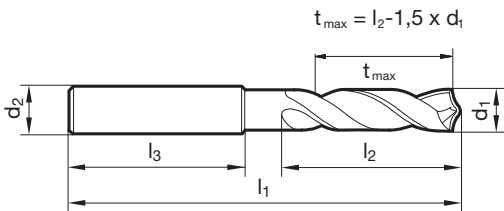
Artículo N° 89402



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados) hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AlSi altamente aleables



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	62,000	20,000	36,000	5,200		6,000	66,000	28,000	36,000
3,100		6,000	62,000	20,000	36,000	5,300		6,000	66,000	28,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000	5,400		6,000	66,000	28,000	36,000
3,200		6,000	62,000	20,000	36,000	5,500		6,000	66,000	28,000	36,000
3,250		6,000	62,000	20,000	36,000	5,550		6,000	66,000	28,000	36,000
3,300		6,000	62,000	20,000	36,000	5,560	7/32	6,000	66,000	28,000	36,000
3,400		6,000	62,000	20,000	36,000	5,600		6,000	66,000	28,000	36,000
3,500		6,000	62,000	20,000	36,000	5,700		6,000	66,000	28,000	36,000
3,570	9/64	6,000	62,000	20,000	36,000	5,800		6,000	66,000	28,000	36,000
3,600		6,000	62,000	20,000	36,000	5,900		6,000	66,000	28,000	36,000
3,700		6,000	62,000	20,000	36,000	5,950	15/64	6,000	66,000	28,000	36,000
3,800		6,000	66,000	24,000	36,000	6,000		6,000	66,000	28,000	36,000
3,900		6,000	66,000	24,000	36,000	6,100		8,000	79,000	34,000	36,000
3,970	5/32	6,000	66,000	24,000	36,000	6,200		8,000	79,000	34,000	36,000
4,000		6,000	66,000	24,000	36,000	6,300		8,000	79,000	34,000	36,000
4,100		6,000	66,000	24,000	36,000	6,350	1/4	8,000	79,000	34,000	36,000
4,200		6,000	66,000	24,000	36,000	6,400		8,000	79,000	34,000	36,000
4,300		6,000	66,000	24,000	36,000	6,500		8,000	79,000	34,000	36,000
4,370	11/64	6,000	66,000	24,000	36,000	6,600		8,000	79,000	34,000	36,000
4,400		6,000	66,000	24,000	36,000	6,700		8,000	79,000	34,000	36,000
4,500		6,000	66,000	24,000	36,000	6,750	17/64	8,000	79,000	34,000	36,000
4,600		6,000	66,000	24,000	36,000	6,800		8,000	79,000	34,000	36,000
4,650		6,000	66,000	24,000	36,000	6,900		8,000	79,000	34,000	36,000
4,700		6,000	66,000	24,000	36,000	7,000		8,000	79,000	34,000	36,000
4,760	3/16	6,000	66,000	28,000	36,000	7,100		8,000	79,000	41,000	36,000
4,800		6,000	66,000	28,000	36,000	7,140	9/32	8,000	79,000	41,000	36,000
4,900		6,000	66,000	28,000	36,000	7,200		8,000	79,000	41,000	36,000
5,000		6,000	66,000	28,000	36,000	7,300		8,000	79,000	41,000	36,000
5,100		6,000	66,000	28,000	36,000	7,400		8,000	79,000	41,000	36,000
5,160	13/64	6,000	66,000	28,000	36,000	7,500		8,000	79,000	41,000	36,000



Brocas-TS sin refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,540	19/64	8,000	79,000	41,000	36,000	11,400		12,000	102,000	55,000	45,000
7,600		8,000	79,000	41,000	36,000	11,500		12,000	102,000	55,000	45,000
7,700		8,000	79,000	41,000	36,000	11,600		12,000	102,000	55,000	45,000
7,800		8,000	79,000	41,000	36,000	11,700		12,000	102,000	55,000	45,000
7,900		8,000	79,000	41,000	36,000	11,800		12,000	102,000	55,000	45,000
7,940	5/16	8,000	79,000	41,000	36,000	11,900		12,000	102,000	55,000	45,000
8,000		8,000	79,000	41,000	36,000	11,910	15/32	12,000	102,000	55,000	45,000
8,100		10,000	89,000	47,000	40,000	12,000		12,000	102,000	55,000	45,000
8,200		10,000	89,000	47,000	40,000	12,100		14,000	107,000	60,000	45,000
8,300		10,000	89,000	47,000	40,000	12,200		14,000	107,000	60,000	45,000
8,330	21/64	10,000	89,000	47,000	40,000	12,300	31/64	14,000	107,000	60,000	45,000
8,400		10,000	89,000	47,000	40,000	12,400		14,000	107,000	60,000	45,000
8,500		10,000	89,000	47,000	40,000	12,500		14,000	107,000	60,000	45,000
8,600		10,000	89,000	47,000	40,000	12,600		14,000	107,000	60,000	45,000
8,700		10,000	89,000	47,000	40,000	12,700	1/2	14,000	107,000	60,000	45,000
8,730	11/32	10,000	89,000	47,000	40,000	12,800		14,000	107,000	60,000	45,000
8,800		10,000	89,000	47,000	40,000	13,000		14,000	107,000	60,000	45,000
8,900		10,000	89,000	47,000	40,000	13,100	33/64	14,000	107,000	60,000	45,000
9,000		10,000	89,000	47,000	40,000	13,200		14,000	107,000	60,000	45,000
9,100		10,000	89,000	47,000	40,000	13,300		14,000	107,000	60,000	45,000
9,130	23/64	10,000	89,000	47,000	40,000	13,500		14,000	107,000	60,000	45,000
9,200		10,000	89,000	47,000	40,000	13,700		14,000	107,000	60,000	45,000
9,250		10,000	89,000	47,000	40,000	13,800		14,000	107,000	60,000	45,000
9,300		10,000	89,000	47,000	40,000	14,000		14,000	107,000	60,000	45,000
9,400		10,000	89,000	47,000	40,000	14,100		16,000	115,000	65,000	48,000
9,500		10,000	89,000	47,000	40,000	14,200		16,000	115,000	65,000	48,000
9,520	3/8	10,000	89,000	47,000	40,000	14,290	9/16	16,000	115,000	65,000	48,000
9,600		10,000	89,000	47,000	40,000	14,500		16,000	115,000	65,000	48,000
9,700		10,000	89,000	47,000	40,000	14,700		16,000	115,000	65,000	48,000
9,800		10,000	89,000	47,000	40,000	15,000		16,000	115,000	65,000	48,000
9,900		10,000	89,000	47,000	40,000	15,100		16,000	115,000	65,000	48,000
9,920	25/64	10,000	89,000	47,000	40,000	15,200		16,000	115,000	65,000	48,000
10,000		10,000	89,000	47,000	40,000	15,500		16,000	115,000	65,000	48,000
10,100		12,000	102,000	55,000	45,000	15,700		16,000	115,000	65,000	48,000
10,200		12,000	102,000	55,000	45,000	15,800		16,000	115,000	65,000	48,000
10,300		12,000	102,000	55,000	45,000	16,000		16,000	115,000	65,000	48,000
10,320	13/32	12,000	102,000	55,000	45,000	16,200		18,000	123,000	73,000	48,000
10,400		12,000	102,000	55,000	45,000	16,500		18,000	123,000	73,000	48,000
10,500		12,000	102,000	55,000	45,000	17,000		18,000	123,000	73,000	48,000
10,600		12,000	102,000	55,000	45,000	17,500		18,000	123,000	73,000	48,000
10,700		12,000	102,000	55,000	45,000	18,000		18,000	123,000	73,000	48,000
10,800		12,000	102,000	55,000	45,000	18,500		20,000	131,000	79,000	50,000
10,900		12,000	102,000	55,000	45,000	19,000		20,000	131,000	79,000	50,000
11,000		12,000	102,000	55,000	45,000	19,500		20,000	131,000	79,000	50,000
11,100		12,000	102,000	55,000	45,000	20,000		20,000	131,000	79,000	50,000
11,110	7/16	12,000	102,000	55,000	45,000						
11,200		12,000	102,000	55,000	45,000						
11,300		12,000	102,000	55,000	45,000						



Brocas-TS sin refrigeración interior

Artículo N° 89264

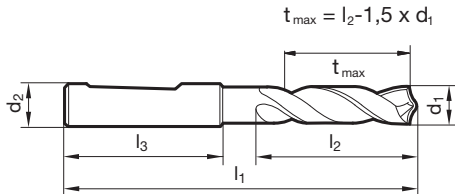


P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada

aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados) hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AlSi altamente aleables



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	62,000	20,000	36,000	7,140	9/32	8,000	79,000	41,000	36,000
3,100		6,000	62,000	20,000	36,000	7,400		8,000	79,000	41,000	36,000
3,200		6,000	62,000	20,000	36,000	7,500		8,000	79,000	41,000	36,000
3,300		6,000	62,000	20,000	36,000	7,600		8,000	79,000	41,000	36,000
3,400		6,000	62,000	20,000	36,000	7,700		8,000	79,000	41,000	36,000
3,500		6,000	62,000	20,000	36,000	7,800		8,000	79,000	41,000	36,000
3,600		6,000	62,000	20,000	36,000	7,900		8,000	79,000	41,000	36,000
3,700		6,000	62,000	20,000	36,000	8,000		8,000	79,000	41,000	36,000
3,800		6,000	66,000	24,000	36,000	8,100		10,000	89,000	47,000	40,000
3,900		6,000	66,000	24,000	36,000	8,200		10,000	89,000	47,000	40,000
4,000		6,000	66,000	24,000	36,000	8,300		10,000	89,000	47,000	40,000
4,100		6,000	66,000	24,000	36,000	8,330	21/64	10,000	89,000	47,000	40,000
4,200		6,000	66,000	24,000	36,000	8,400		10,000	89,000	47,000	40,000
4,300		6,000	66,000	24,000	36,000	8,500		10,000	89,000	47,000	40,000
4,500		6,000	66,000	24,000	36,000	8,700		10,000	89,000	47,000	40,000
4,600		6,000	66,000	24,000	36,000	8,730	11/32	10,000	89,000	47,000	40,000
4,700		6,000	66,000	24,000	36,000	8,800		10,000	89,000	47,000	40,000
4,760	3/16	6,000	66,000	28,000	36,000	8,900		10,000	89,000	47,000	40,000
4,800		6,000	66,000	28,000	36,000	9,000		10,000	89,000	47,000	40,000
4,900		6,000	66,000	28,000	36,000	9,100		10,000	89,000	47,000	40,000
5,000		6,000	66,000	28,000	36,000	9,300		10,000	89,000	47,000	40,000
5,100		6,000	66,000	28,000	36,000	9,400		10,000	89,000	47,000	40,000
5,200		6,000	66,000	28,000	36,000	9,500		10,000	89,000	47,000	40,000
5,300		6,000	66,000	28,000	36,000	9,600		10,000	89,000	47,000	40,000
5,400		6,000	66,000	28,000	36,000	9,700		10,000	89,000	47,000	40,000
5,500		6,000	66,000	28,000	36,000	9,800		10,000	89,000	47,000	40,000
5,560	7/32	6,000	66,000	28,000	36,000	9,900		10,000	89,000	47,000	40,000
5,600		6,000	66,000	28,000	36,000	9,920	25/64	10,000	89,000	47,000	40,000
5,700		6,000	66,000	28,000	36,000	10,000		10,000	89,000	47,000	40,000
5,800		6,000	66,000	28,000	36,000	10,100		12,000	102,000	55,000	45,000
5,900		6,000	66,000	28,000	36,000	10,200		12,000	102,000	55,000	45,000
6,000		6,000	66,000	28,000	36,000	10,300		12,000	102,000	55,000	45,000
6,100		8,000	79,000	34,000	36,000	10,500		12,000	102,000	55,000	45,000
6,200		8,000	79,000	34,000	36,000	10,600		12,000	102,000	55,000	45,000
6,300		8,000	79,000	34,000	36,000	10,800		12,000	102,000	55,000	45,000
6,400		8,000	79,000	34,000	36,000	11,000		12,000	102,000	55,000	45,000
6,500		8,000	79,000	34,000	36,000	11,100		12,000	102,000	55,000	45,000
6,600		8,000	79,000	34,000	36,000	11,200		12,000	102,000	55,000	45,000
6,700		8,000	79,000	34,000	36,000	11,400		12,000	102,000	55,000	45,000
6,750	17/64	8,000	79,000	34,000	36,000	11,500		12,000	102,000	55,000	45,000
6,800		8,000	79,000	34,000	36,000	11,600		12,000	102,000	55,000	45,000
7,000		8,000	79,000	34,000	36,000	11,700		12,000	102,000	55,000	45,000



Brocas-TS sin refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
11,800		12,000	102,000	55,000	45,000	14,400		16,000	115,000	65,000	48,000
11,900		12,000	102,000	55,000	45,000	15,000		16,000	115,000	65,000	48,000
12,000		12,000	102,000	55,000	45,000	15,200		16,000	115,000	65,000	48,000
12,100		14,000	107,000	60,000	45,000	15,800		16,000	115,000	65,000	48,000
12,200		14,000	107,000	60,000	45,000	15,870	5/8	16,000	115,000	65,000	48,000
12,300	31/64	14,000	107,000	60,000	45,000	16,000		16,000	115,000	65,000	48,000
12,400		14,000	107,000	60,000	45,000	16,100		18,000	123,000	73,000	48,000
12,500		14,000	107,000	60,000	45,000	16,300		18,000	123,000	73,000	48,000
13,000		14,000	107,000	60,000	45,000	16,500		18,000	123,000	73,000	48,000
13,200		14,000	107,000	60,000	45,000	17,000		18,000	123,000	73,000	48,000
13,300		14,000	107,000	60,000	45,000	17,500		18,000	123,000	73,000	48,000
13,500		14,000	107,000	60,000	45,000	18,000		18,000	123,000	73,000	48,000
13,800		14,000	107,000	60,000	45,000	18,300		20,000	131,000	79,000	50,000
13,890	35/64	14,000	107,000	60,000	45,000	19,000		20,000	131,000	79,000	50,000
14,000		14,000	107,000	60,000	45,000	19,200		20,000	131,000	79,000	50,000
14,200		16,000	115,000	65,000	48,000	19,500		20,000	131,000	79,000	50,000
14,290	9/16	16,000	115,000	65,000	48,000	20,000		20,000	131,000	79,000	50,000
14,300		16,000	115,000	65,000	48,000						



Brocas-TS sin refrigeración interior

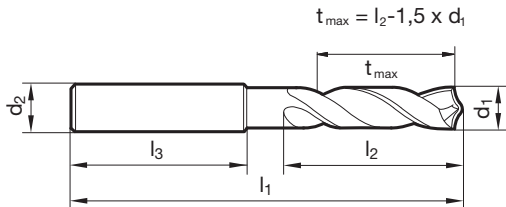
Artículo N° 89422



P	M	K	N	S	H
•				•	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • forma del corte principal ligeramente cóncava • geometría de corte optimizada
 aceros aleados y templados hasta a 1400 N/mm² • Inconel, Hastelloy, Monel • titanio y aleaciones de titanio



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	62,000	20,000	36,000	6,100		8,000	79,000	34,000	36,000
3,100		6,000	62,000	20,000	36,000	6,200		8,000	79,000	34,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000	6,300		8,000	79,000	34,000	36,000
3,200		6,000	62,000	20,000	36,000	6,350	1/4	8,000	79,000	34,000	36,000
3,250		6,000	62,000	20,000	36,000	6,400		8,000	79,000	34,000	36,000
3,300		6,000	62,000	20,000	36,000	6,500		8,000	79,000	34,000	36,000
3,400		6,000	62,000	20,000	36,000	6,600		8,000	79,000	34,000	36,000
3,500		6,000	62,000	20,000	36,000	6,700		8,000	79,000	34,000	36,000
3,570	9/64	6,000	62,000	20,000	36,000	6,750	17/64	8,000	79,000	34,000	36,000
3,600		6,000	62,000	20,000	36,000	6,800		8,000	79,000	34,000	36,000
3,700		6,000	62,000	20,000	36,000	6,900		8,000	79,000	34,000	36,000
3,800		6,000	66,000	24,000	36,000	7,000		8,000	79,000	34,000	36,000
3,900		6,000	66,000	24,000	36,000	7,100		8,000	79,000	41,000	36,000
3,970	5/32	6,000	66,000	24,000	36,000	7,140	9/32	8,000	79,000	41,000	36,000
4,000		6,000	66,000	24,000	36,000	7,200		8,000	79,000	41,000	36,000
4,100		6,000	66,000	24,000	36,000	7,300		8,000	79,000	41,000	36,000
4,200		6,000	66,000	24,000	36,000	7,400		8,000	79,000	41,000	36,000
4,300		6,000	66,000	24,000	36,000	7,500		8,000	79,000	41,000	36,000
4,370	11/64	6,000	66,000	24,000	36,000	7,540	19/64	8,000	79,000	41,000	36,000
4,400		6,000	66,000	24,000	36,000	7,600		8,000	79,000	41,000	36,000
4,500		6,000	66,000	24,000	36,000	7,700		8,000	79,000	41,000	36,000
4,600		6,000	66,000	24,000	36,000	7,800		8,000	79,000	41,000	36,000
4,650		6,000	66,000	24,000	36,000	7,900		8,000	79,000	41,000	36,000
4,700		6,000	66,000	24,000	36,000	7,940	5/16	8,000	79,000	41,000	36,000
4,760	3/16	6,000	66,000	28,000	36,000	8,000		8,000	79,000	41,000	36,000
4,800		6,000	66,000	28,000	36,000	8,100		10,000	89,000	47,000	40,000
4,900		6,000	66,000	28,000	36,000	8,200		10,000	89,000	47,000	40,000
5,000		6,000	66,000	28,000	36,000	8,300		10,000	89,000	47,000	40,000
5,100		6,000	66,000	28,000	36,000	8,330	21/64	10,000	89,000	47,000	40,000
5,160	13/64	6,000	66,000	28,000	36,000	8,400		10,000	89,000	47,000	40,000
5,200		6,000	66,000	28,000	36,000	8,500		10,000	89,000	47,000	40,000
5,300		6,000	66,000	28,000	36,000	8,600		10,000	89,000	47,000	40,000
5,400		6,000	66,000	28,000	36,000	8,700		10,000	89,000	47,000	40,000
5,500		6,000	66,000	28,000	36,000	8,730	11/32	10,000	89,000	47,000	40,000
5,550		6,000	66,000	28,000	36,000	8,800		10,000	89,000	47,000	40,000
5,560	7/32	6,000	66,000	28,000	36,000	8,900		10,000	89,000	47,000	40,000
5,600		6,000	66,000	28,000	36,000	9,000		10,000	89,000	47,000	40,000
5,700		6,000	66,000	28,000	36,000	9,100		10,000	89,000	47,000	40,000
5,800		6,000	66,000	28,000	36,000	9,130	23/64	10,000	89,000	47,000	40,000
5,900		6,000	66,000	28,000	36,000	9,200		10,000	89,000	47,000	40,000
5,950	15/64	6,000	66,000	28,000	36,000	9,250		10,000	89,000	47,000	40,000
6,000		6,000	66,000	28,000	36,000	9,300		10,000	89,000	47,000	40,000



Brocas-TS sin refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,400		10,000	89,000	47,000	40,000	13,000		14,000	107,000	60,000	45,000
9,500		10,000	89,000	47,000	40,000	13,300		14,000	107,000	60,000	45,000
9,520	3/8	10,000	89,000	47,000	40,000	13,500		14,000	107,000	60,000	45,000
9,600		10,000	89,000	47,000	40,000	13,700		14,000	107,000	60,000	45,000
9,700		10,000	89,000	47,000	40,000	14,000		14,000	107,000	60,000	45,000
9,800		10,000	89,000	47,000	40,000	14,200		16,000	115,000	65,000	48,000
9,900		10,000	89,000	47,000	40,000	14,290	9/16	16,000	115,000	65,000	48,000
9,920	25/64	10,000	89,000	47,000	40,000	14,300		16,000	115,000	65,000	48,000
10,000		10,000	89,000	47,000	40,000	14,500		16,000	115,000	65,000	48,000
10,100		12,000	102,000	55,000	45,000	14,700		16,000	115,000	65,000	48,000
10,200		12,000	102,000	55,000	45,000	15,000		16,000	115,000	65,000	48,000
10,300		12,000	102,000	55,000	45,000	15,200		16,000	115,000	65,000	48,000
10,320	13/32	12,000	102,000	55,000	45,000	15,300		16,000	115,000	65,000	48,000
10,400		12,000	102,000	55,000	45,000	15,500		16,000	115,000	65,000	48,000
10,500		12,000	102,000	55,000	45,000	15,700		16,000	115,000	65,000	48,000
10,600		12,000	102,000	55,000	45,000	16,000		16,000	115,000	65,000	48,000
10,700		12,000	102,000	55,000	45,000	16,300		18,000	123,000	73,000	48,000
10,800		12,000	102,000	55,000	45,000	16,500		18,000	123,000	73,000	48,000
10,900		12,000	102,000	55,000	45,000	16,900		18,000	123,000	73,000	48,000
11,000		12,000	102,000	55,000	45,000	17,000		18,000	123,000	73,000	48,000
11,100		12,000	102,000	55,000	45,000	17,300		18,000	123,000	73,000	48,000
11,110	7/16	12,000	102,000	55,000	45,000	17,500		18,000	123,000	73,000	48,000
11,200		12,000	102,000	55,000	45,000	18,000		18,000	123,000	73,000	48,000
11,300		12,000	102,000	55,000	45,000	18,500		20,000	131,000	79,000	50,000
11,400		12,000	102,000	55,000	45,000	18,900		20,000	131,000	79,000	50,000
11,500		12,000	102,000	55,000	45,000	19,000		20,000	131,000	79,000	50,000
11,600		12,000	102,000	55,000	45,000	19,050	3/4	20,000	131,000	79,000	50,000
11,700		12,000	102,000	55,000	45,000	19,300		20,000	131,000	79,000	50,000
11,800		12,000	102,000	55,000	45,000	19,500		20,000	131,000	79,000	50,000
11,900		12,000	102,000	55,000	45,000	20,000		20,000	131,000	79,000	50,000
11,910	15/32	12,000	102,000	55,000	45,000						
12,000		12,000	102,000	55,000	45,000						
12,200		14,000	107,000	60,000	45,000						
12,500		14,000	107,000	60,000	45,000						
12,700	1/2	14,000	107,000	60,000	45,000						
12,800		14,000	107,000	60,000	45,000						



Brocas-TS sin refrigeración interior

Artículo N° 89237



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada

aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados) hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AlSi altamente aleables

Artículo N° 89401



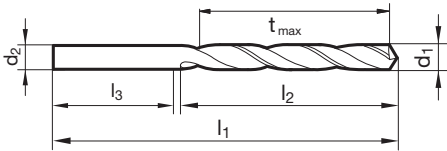
P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada

aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados) hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AlSi altamente aleables

$$t_{\max} = l_2 - 1,5 \times d_1$$



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		3,000	46,000	16,000	30,000	7,000		7,000	74,000	34,000	40,000
3,100		3,100	49,000	18,000	31,000	7,100		7,100	74,000	34,000	40,000
3,200		3,200	49,000	18,000	31,000	7,140	9/32	7,140	74,000	34,000	40,000
3,300		3,300	49,000	18,000	31,000	7,200		7,200	74,000	34,000	40,000
3,400		3,400	52,000	20,000	32,000	7,400		7,400	74,000	34,000	40,000
3,500		3,500	52,000	20,000	32,000	7,500		7,500	74,000	34,000	40,000
3,600		3,600	52,000	20,000	32,000	7,800		7,800	79,000	37,000	42,000
3,700		3,700	52,000	20,000	32,000	8,000		8,000	79,000	37,000	42,000
3,800		3,800	55,000	22,000	33,000	8,200		8,200	79,000	37,000	42,000
3,900		3,900	55,000	22,000	33,000	8,400		8,400	79,000	37,000	42,000
4,000		4,000	55,000	22,000	33,000	8,500		8,500	79,000	37,000	42,000
4,100		4,100	55,000	22,000	33,000	8,600		8,600	84,000	40,000	44,000
4,200		4,200	55,000	22,000	33,000	8,700		8,700	84,000	40,000	44,000
4,500		4,500	58,000	24,000	34,000	8,800		8,800	84,000	40,000	44,000
4,800		4,800	62,000	26,000	36,000	9,000		9,000	84,000	40,000	44,000
5,000		5,000	62,000	26,000	36,000	9,500		9,500	84,000	40,000	44,000
5,100		5,100	62,000	26,000	36,000	9,800		9,800	89,000	43,000	46,000
5,200		5,200	62,000	26,000	36,000	10,000		10,000	89,000	43,000	46,000
5,300		5,300	62,000	26,000	36,000	10,100		10,100	89,000	43,000	46,000
5,500		5,500	66,000	28,000	38,000	10,200		10,200	89,000	43,000	46,000
5,600		5,600	66,000	28,000	38,000	10,300		10,300	89,000	43,000	46,000
5,700		5,700	66,000	28,000	38,000	10,500		10,500	89,000	43,000	46,000
5,800		5,800	66,000	28,000	38,000	10,600		10,600	89,000	43,000	46,000
6,000		6,000	66,000	28,000	38,000	10,800		10,800	95,000	47,000	48,000
6,100		6,100	70,000	31,000	39,000	11,000		11,000	95,000	47,000	48,000
6,200		6,200	70,000	31,000	39,000	11,110	7/16	11,110	95,000	47,000	48,000
6,400		6,400	70,000	31,000	39,000	11,500		11,500	95,000	47,000	48,000
6,500		6,500	70,000	31,000	39,000	11,800		11,800	95,000	47,000	48,000
6,700		6,700	70,000	31,000	39,000	12,000		12,000	102,000	51,000	51,000
6,800		6,800	74,000	34,000	40,000	12,500		12,500	102,000	51,000	51,000



Brocas-TS sin refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
12,700	1/2	12,700	102,000	51,000	51,000	15,500		15,500	115,000	58,000	57,000
13,000		13,000	102,000	51,000	51,000	16,000		16,000	115,000	58,000	57,000
13,500		13,500	107,000	54,000	53,000						
14,000		14,000	107,000	54,000	53,000						
14,500		14,500	111,000	56,000	55,000						
15,000		15,000	111,000	56,000	55,000						



Brocas-TS sin refrigeración interior

Artículo N° 89414



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados) hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AlSi altamente aleables

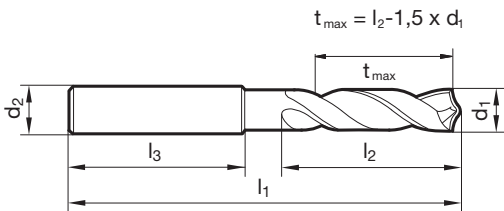
Artículo N° 89417



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados) hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AlSi altamente aleables



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	66,000	28,000	36,000	5,200		6,000	82,000	44,000	36,000
3,100		6,000	66,000	28,000	36,000	5,300		6,000	82,000	44,000	36,000
3,170	1/8	6,000	66,000	28,000	36,000	5,400		6,000	82,000	44,000	36,000
3,200		6,000	66,000	28,000	36,000	5,500		6,000	82,000	44,000	36,000
3,250		6,000	66,000	28,000	36,000	5,550		6,000	82,000	44,000	36,000
3,300		6,000	66,000	28,000	36,000	5,560	7/32	6,000	82,000	44,000	36,000
3,400		6,000	66,000	28,000	36,000	5,600		6,000	82,000	44,000	36,000
3,500		6,000	66,000	28,000	36,000	5,700		6,000	82,000	44,000	36,000
3,570	9/64	6,000	66,000	28,000	36,000	5,800		6,000	82,000	44,000	36,000
3,600		6,000	66,000	28,000	36,000	5,900		6,000	82,000	44,000	36,000
3,700		6,000	66,000	28,000	36,000	5,950	15/64	6,000	82,000	44,000	36,000
3,800		6,000	74,000	36,000	36,000	6,000		6,000	82,000	44,000	36,000
3,900		6,000	74,000	36,000	36,000	6,100		8,000	91,000	53,000	36,000
3,970	5/32	6,000	74,000	36,000	36,000	6,200		8,000	91,000	53,000	36,000
4,000		6,000	74,000	36,000	36,000	6,300		8,000	91,000	53,000	36,000
4,100		6,000	74,000	36,000	36,000	6,350	1/4	8,000	91,000	53,000	36,000
4,200		6,000	74,000	36,000	36,000	6,400		8,000	91,000	53,000	36,000
4,300		6,000	74,000	36,000	36,000	6,500		8,000	91,000	53,000	36,000
4,370	11/64	6,000	74,000	36,000	36,000	6,600		8,000	91,000	53,000	36,000
4,400		6,000	74,000	36,000	36,000	6,700		8,000	91,000	53,000	36,000
4,500		6,000	74,000	36,000	36,000	6,750	17/64	8,000	91,000	53,000	36,000
4,600		6,000	74,000	36,000	36,000	6,800		8,000	91,000	53,000	36,000
4,650		6,000	74,000	36,000	36,000	6,900		8,000	91,000	53,000	36,000
4,700		6,000	74,000	36,000	36,000	7,000		8,000	91,000	53,000	36,000
4,760	3/16	6,000	82,000	44,000	36,000	7,100		8,000	91,000	53,000	36,000
4,800		6,000	82,000	44,000	36,000	7,140	9/32	8,000	91,000	53,000	36,000
4,900		6,000	82,000	44,000	36,000	7,200		8,000	91,000	53,000	36,000
5,000		6,000	82,000	44,000	36,000	7,300		8,000	91,000	53,000	36,000
5,100		6,000	82,000	44,000	36,000	7,400		8,000	91,000	53,000	36,000
5,160	13/64	6,000	82,000	44,000	36,000	7,500		8,000	91,000	53,000	36,000



Brocas-TS sin refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,540	19/64	8,000	91,000	53,000	36,000	11,400		12,000	118,000	71,000	45,000
7,600		8,000	91,000	53,000	36,000	11,500		12,000	118,000	71,000	45,000
7,700		8,000	91,000	53,000	36,000	11,600		12,000	118,000	71,000	45,000
7,800		8,000	91,000	53,000	36,000	11,700		12,000	118,000	71,000	45,000
7,900		8,000	91,000	53,000	36,000	11,800		12,000	118,000	71,000	45,000
7,940	5/16	8,000	91,000	53,000	36,000	11,900		12,000	118,000	71,000	45,000
8,000		8,000	91,000	53,000	36,000	11,910	15/32	12,000	118,000	71,000	45,000
8,100		10,000	103,000	61,000	40,000	12,000		12,000	118,000	71,000	45,000
8,200		10,000	103,000	61,000	40,000	12,100		14,000	124,000	77,000	45,000
8,300		10,000	103,000	61,000	40,000	12,200		14,000	124,000	77,000	45,000
8,330	21/64	10,000	103,000	61,000	40,000	12,500		14,000	124,000	77,000	45,000
8,400		10,000	103,000	61,000	40,000	12,700	1/2	14,000	124,000	77,000	45,000
8,500		10,000	103,000	61,000	40,000	13,000		14,000	124,000	77,000	45,000
8,600		10,000	103,000	61,000	40,000	13,100	33/64	14,000	124,000	77,000	45,000
8,700		10,000	103,000	61,000	40,000	13,500		14,000	124,000	77,000	45,000
8,730	11/32	10,000	103,000	61,000	40,000	13,700		14,000	124,000	77,000	45,000
8,800		10,000	103,000	61,000	40,000	13,800		14,000	124,000	77,000	45,000
8,900		10,000	103,000	61,000	40,000	14,000		14,000	124,000	77,000	45,000
9,000		10,000	103,000	61,000	40,000	14,100		16,000	133,000	83,000	48,000
9,100		10,000	103,000	61,000	40,000	14,200		16,000	133,000	83,000	48,000
9,130	23/64	10,000	103,000	61,000	40,000	14,290	9/16	16,000	133,000	83,000	48,000
9,200		10,000	103,000	61,000	40,000	14,500		16,000	133,000	83,000	48,000
9,250		10,000	103,000	61,000	40,000	14,700		16,000	133,000	83,000	48,000
9,300		10,000	103,000	61,000	40,000	15,000		16,000	133,000	83,000	48,000
9,400		10,000	103,000	61,000	40,000	15,100		16,000	133,000	83,000	48,000
9,500		10,000	103,000	61,000	40,000	15,200		16,000	133,000	83,000	48,000
9,520	3/8	10,000	103,000	61,000	40,000	15,500		16,000	133,000	83,000	48,000
9,600		10,000	103,000	61,000	40,000	15,700		16,000	133,000	83,000	48,000
9,700		10,000	103,000	61,000	40,000	16,000		16,000	133,000	83,000	48,000
9,800		10,000	103,000	61,000	40,000	16,500		18,000	143,000	93,000	48,000
9,900		10,000	103,000	61,000	40,000	17,000		18,000	143,000	93,000	48,000
9,920	25/64	10,000	103,000	61,000	40,000	17,500		18,000	143,000	93,000	48,000
10,000		10,000	103,000	61,000	40,000	18,000		18,000	143,000	93,000	48,000
10,100		12,000	118,000	71,000	45,000	18,500		20,000	153,000	101,000	50,000
10,200		12,000	118,000	71,000	45,000	19,000		20,000	153,000	101,000	50,000
10,300		12,000	118,000	71,000	45,000	19,500		20,000	153,000	101,000	50,000
10,320	13/32	12,000	118,000	71,000	45,000	20,000		20,000	153,000	101,000	50,000
10,400		12,000	118,000	71,000	45,000						
10,500		12,000	118,000	71,000	45,000						
10,600		12,000	118,000	71,000	45,000						
10,700		12,000	118,000	71,000	45,000						
10,800		12,000	118,000	71,000	45,000						
10,900		12,000	118,000	71,000	45,000						
11,000		12,000	118,000	71,000	45,000						
11,100		12,000	118,000	71,000	45,000						
11,110	7/16	12,000	118,000	71,000	45,000						
11,200		12,000	118,000	71,000	45,000						
11,300		12,000	118,000	71,000	45,000						



Brocas-TS sin refrigeración interior

Artículo N° 89275

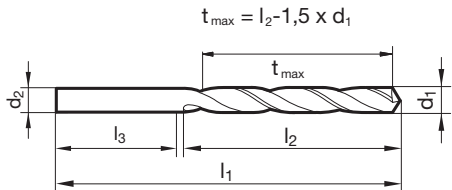


P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 5,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada

aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados) hasta 1200 N/mm2 • fundición • bronce, latón • aleaciones de AlSi altamente aleables



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
5,000		5,000	73,000	34,000	39,000	10,000		10,000	105,000	60,000	45,000
5,160	13/64	5,160	76,000	38,000	38,000	10,200		10,200	112,000	66,000	46,000
5,200		5,200	76,000	38,000	38,000	10,300		10,300	112,000	66,000	46,000
5,500		5,500	76,000	38,000	38,000	10,320	13/32	10,320	112,000	66,000	46,000
5,560	7/32	5,560	81,000	41,000	40,000	10,500		10,500	112,000	66,000	46,000
5,700		5,700	81,000	41,000	40,000	10,720	27/64	10,720	114,000	68,000	46,000
5,800		5,800	81,000	41,000	40,000	10,800		10,800	114,000	68,000	46,000
6,000		6,000	81,000	41,000	40,000	11,000		11,000	114,000	68,000	46,000
6,350	1/4	6,350	81,000	41,000	40,000	11,110	7/16	11,110	118,000	71,000	47,000
6,400		6,400	81,000	41,000	40,000	11,500		11,500	118,000	71,000	47,000
6,500		6,500	81,000	41,000	40,000	11,800		11,800	121,000	73,000	48,000
6,750	17/64	6,750	83,000	43,000	40,000	11,910	15/32	11,910	121,000	73,000	48,000
6,800		6,800	83,000	43,000	40,000	12,000		12,000	121,000	73,000	48,000
7,000		7,000	83,000	43,000	40,000	12,500		12,500	135,000	76,000	59,000
7,500		7,500	87,000	45,000	42,000	12,700	1/2	12,700	137,000	78,000	59,000
7,800		7,800	90,000	48,000	42,000	13,000		13,000	137,000	78,000	59,000
7,940	5/16	7,940	90,000	48,000	42,000	13,500		13,500	144,000	84,000	60,000
8,000		8,000	90,000	48,000	42,000	14,000		14,000	147,000	86,000	61,000
8,100		8,100	96,000	53,000	43,000	14,500		14,500	151,000	89,000	62,000
8,330	21/64	8,330	96,000	53,000	43,000	15,000		15,000	153,000	91,000	62,000
8,400		8,400	96,000	53,000	43,000	15,500		15,500	157,000	94,000	63,000
8,500		8,500	96,000	53,000	43,000	16,000		16,000	160,000	96,000	64,000
8,600		8,600	98,000	55,000	43,000						
8,730	11/32	8,730	98,000	55,000	43,000						
8,800		8,800	98,000	55,000	43,000						
9,000		9,000	98,000	55,000	43,000						
9,130	23/64	9,130	102,000	58,000	44,000						
9,500		9,500	102,000	58,000	44,000						
9,520	3/8	9,520	105,000	60,000	45,000						
9,800		9,800	105,000	60,000	45,000						



Brocas-TS con refrigeración interior

Artículo N° 89410



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados)
 hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AISi altamente aleables

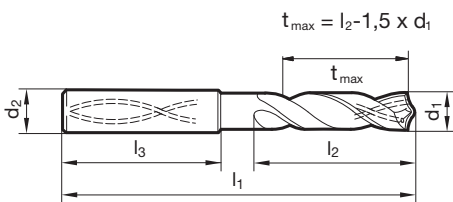
Artículo N° 89415



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados)
 hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AISi altamente aleables



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	62,000	20,000	36,000	5,200		6,000	66,000	28,000	36,000
3,100		6,000	62,000	20,000	36,000	5,300		6,000	66,000	28,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000	5,400		6,000	66,000	28,000	36,000
3,200		6,000	62,000	20,000	36,000	5,500		6,000	66,000	28,000	36,000
3,250		6,000	62,000	20,000	36,000	5,550		6,000	66,000	28,000	36,000
3,300		6,000	62,000	20,000	36,000	5,560	7/32	6,000	66,000	28,000	36,000
3,400		6,000	62,000	20,000	36,000	5,600		6,000	66,000	28,000	36,000
3,500		6,000	62,000	20,000	36,000	5,700		6,000	66,000	28,000	36,000
3,570	9/64	6,000	62,000	20,000	36,000	5,800		6,000	66,000	28,000	36,000
3,600		6,000	62,000	20,000	36,000	5,900		6,000	66,000	28,000	36,000
3,700		6,000	62,000	20,000	36,000	5,950	15/64	6,000	66,000	28,000	36,000
3,800		6,000	66,000	24,000	36,000	6,000		6,000	66,000	28,000	36,000
3,900		6,000	66,000	24,000	36,000	6,100		8,000	79,000	34,000	36,000
3,970	5/32	6,000	66,000	24,000	36,000	6,200		8,000	79,000	34,000	36,000
4,000		6,000	66,000	24,000	36,000	6,300		8,000	79,000	34,000	36,000
4,100		6,000	66,000	24,000	36,000	6,350	1/4	8,000	79,000	34,000	36,000
4,200		6,000	66,000	24,000	36,000	6,400		8,000	79,000	34,000	36,000
4,300		6,000	66,000	24,000	36,000	6,500		8,000	79,000	34,000	36,000
4,370	11/64	6,000	66,000	24,000	36,000	6,600		8,000	79,000	34,000	36,000
4,400		6,000	66,000	24,000	36,000	6,700		8,000	79,000	34,000	36,000
4,500		6,000	66,000	24,000	36,000	6,750	17/64	8,000	79,000	34,000	36,000
4,600		6,000	66,000	24,000	36,000	6,800		8,000	79,000	34,000	36,000
4,650		6,000	66,000	24,000	36,000	6,900		8,000	79,000	34,000	36,000
4,700		6,000	66,000	24,000	36,000	7,000		8,000	79,000	34,000	36,000
4,760	3/16	6,000	66,000	28,000	36,000	7,100		8,000	79,000	41,000	36,000
4,800		6,000	66,000	28,000	36,000	7,140	9/32	8,000	79,000	41,000	36,000
4,900		6,000	66,000	28,000	36,000	7,200		8,000	79,000	41,000	36,000
5,000		6,000	66,000	28,000	36,000	7,300		8,000	79,000	41,000	36,000
5,100		6,000	66,000	28,000	36,000	7,400		8,000	79,000	41,000	36,000
5,160	13/64	6,000	66,000	28,000	36,000	7,500		8,000	79,000	41,000	36,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,540	19/64	8,000	79,000	41,000	36,000	11,400		12,000	102,000	55,000	45,000
7,600		8,000	79,000	41,000	36,000	11,500		12,000	102,000	55,000	45,000
7,700		8,000	79,000	41,000	36,000	11,600		12,000	102,000	55,000	45,000
7,800		8,000	79,000	41,000	36,000	11,700		12,000	102,000	55,000	45,000
7,900		8,000	79,000	41,000	36,000	11,800		12,000	102,000	55,000	45,000
7,940	5/16	8,000	79,000	41,000	36,000	11,900		12,000	102,000	55,000	45,000
8,000		8,000	79,000	41,000	36,000	11,910	15/32	12,000	102,000	55,000	45,000
8,100		10,000	89,000	47,000	40,000	12,000		12,000	102,000	55,000	45,000
8,200		10,000	89,000	47,000	40,000	12,100		14,000	107,000	60,000	45,000
8,300		10,000	89,000	47,000	40,000	12,200		14,000	107,000	60,000	45,000
8,330	21/64	10,000	89,000	47,000	40,000	12,300	31/64	14,000	107,000	60,000	45,000
8,400		10,000	89,000	47,000	40,000	12,500		14,000	107,000	60,000	45,000
8,500		10,000	89,000	47,000	40,000	12,700	1/2	14,000	107,000	60,000	45,000
8,600		10,000	89,000	47,000	40,000	13,000		14,000	107,000	60,000	45,000
8,700		10,000	89,000	47,000	40,000	13,200		14,000	107,000	60,000	45,000
8,730	11/32	10,000	89,000	47,000	40,000	13,300		14,000	107,000	60,000	45,000
8,800		10,000	89,000	47,000	40,000	13,500		14,000	107,000	60,000	45,000
8,900		10,000	89,000	47,000	40,000	13,700		14,000	107,000	60,000	45,000
9,000		10,000	89,000	47,000	40,000	14,000		14,000	107,000	60,000	45,000
9,100		10,000	89,000	47,000	40,000	14,200		16,000	115,000	65,000	48,000
9,130	23/64	10,000	89,000	47,000	40,000	14,290	9/16	16,000	115,000	65,000	48,000
9,200		10,000	89,000	47,000	40,000	14,400		16,000	115,000	65,000	48,000
9,250		10,000	89,000	47,000	40,000	14,500		16,000	115,000	65,000	48,000
9,300		10,000	89,000	47,000	40,000	14,600		16,000	115,000	65,000	48,000
9,400		10,000	89,000	47,000	40,000	14,700		16,000	115,000	65,000	48,000
9,500		10,000	89,000	47,000	40,000	15,000		16,000	115,000	65,000	48,000
9,520	3/8	10,000	89,000	47,000	40,000	15,200		16,000	115,000	65,000	48,000
9,600		10,000	89,000	47,000	40,000	15,500		16,000	115,000	65,000	48,000
9,700		10,000	89,000	47,000	40,000	15,700		16,000	115,000	65,000	48,000
9,800		10,000	89,000	47,000	40,000	16,000		16,000	115,000	65,000	48,000
9,900		10,000	89,000	47,000	40,000	16,100		18,000	123,000	73,000	48,000
9,920	25/64	10,000	89,000	47,000	40,000	16,500		18,000	123,000	73,000	48,000
10,000		10,000	89,000	47,000	40,000	16,900		18,000	123,000	73,000	48,000
10,100		12,000	102,000	55,000	45,000	17,000		18,000	123,000	73,000	48,000
10,200		12,000	102,000	55,000	45,000	17,300		18,000	123,000	73,000	48,000
10,300		12,000	102,000	55,000	45,000	17,500		18,000	123,000	73,000	48,000
10,320	13/32	12,000	102,000	55,000	45,000	18,000		18,000	123,000	73,000	48,000
10,400		12,000	102,000	55,000	45,000	18,500		20,000	131,000	79,000	50,000
10,500		12,000	102,000	55,000	45,000	18,900		20,000	131,000	79,000	50,000
10,600		12,000	102,000	55,000	45,000	19,000		20,000	131,000	79,000	50,000
10,700		12,000	102,000	55,000	45,000	19,500		20,000	131,000	79,000	50,000
10,800		12,000	102,000	55,000	45,000	20,000		20,000	131,000	79,000	50,000
10,900		12,000	102,000	55,000	45,000						
11,000		12,000	102,000	55,000	45,000						
11,100		12,000	102,000	55,000	45,000						
11,110	7/16	12,000	102,000	55,000	45,000						
11,200		12,000	102,000	55,000	45,000						
11,300		12,000	102,000	55,000	45,000						



Brocas-TS con refrigeración interior

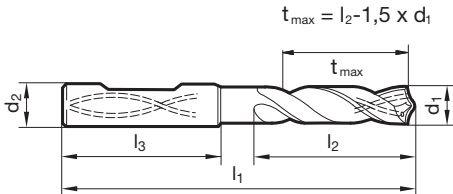
Artículo N° 89266



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 4,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados)
 hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AISi altamente aleables



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
4,000		6,000	66,000	24,000	36,000	10,720	27/64	12,000	102,000	55,000	45,000
5,000		6,000	66,000	28,000	36,000	10,800		12,000	102,000	55,000	45,000
5,500		6,000	66,000	28,000	36,000	11,000		12,000	102,000	55,000	45,000
5,800		6,000	66,000	28,000	36,000	11,500		12,000	102,000	55,000	45,000
6,000		6,000	66,000	28,000	36,000	11,800		12,000	102,000	55,000	45,000
6,400		8,000	79,000	34,000	36,000	12,000		12,000	102,000	55,000	45,000
6,800		8,000	79,000	34,000	36,000	12,500		14,000	107,000	60,000	45,000
7,000		8,000	79,000	34,000	36,000	12,700	1/2	14,000	107,000	60,000	45,000
7,400		8,000	79,000	41,000	36,000	13,000		14,000	107,000	60,000	45,000
7,500		8,000	79,000	41,000	36,000	13,500		14,000	107,000	60,000	45,000
7,800		8,000	79,000	41,000	36,000	14,000		14,000	107,000	60,000	45,000
7,940	5/16	8,000	79,000	41,000	36,000	14,500		16,000	115,000	65,000	48,000
8,000		8,000	79,000	41,000	36,000	15,000		16,000	115,000	65,000	48,000
8,100		10,000	89,000	47,000	40,000	15,200		16,000	115,000	65,000	48,000
8,400		10,000	89,000	47,000	40,000	15,500		16,000	115,000	65,000	48,000
8,500		10,000	89,000	47,000	40,000	16,200		18,000	123,000	73,000	48,000
8,700		10,000	89,000	47,000	40,000	16,500		18,000	123,000	73,000	48,000
8,800		10,000	89,000	47,000	40,000	18,000		18,000	123,000	73,000	48,000
9,000		10,000	89,000	47,000	40,000	18,500		20,000	131,000	79,000	50,000
9,500		10,000	89,000	47,000	40,000	19,000		20,000	131,000	79,000	50,000
9,800		10,000	89,000	47,000	40,000	20,000		20,000	131,000	79,000	50,000
10,000		10,000	89,000	47,000	40,000						
10,200		12,000	102,000	55,000	45,000						
10,500		12,000	102,000	55,000	45,000						



Brocas-TS con refrigeración interior

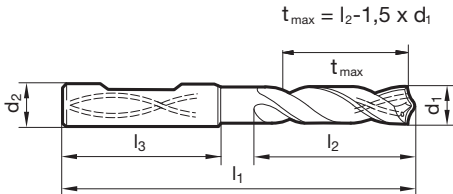
Artículo N° 89306



P	M	K	N	S	H
●	○	○	○		



vaciado de punta $\geq \varnothing 10,000$ • entrada cónica • amortigua oscilaciones y golpes • portaherr. HSS con plaquita HM soldada
 aceros no aleados y de baja aleación • fundición gris, fundición de grafito • latón, bronce, plásticos y grafitos



d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
10,000	16,000	103,000	51,000	48,000	17,000	20,000	130,000	76,000	50,000
10,500	16,000	103,000	51,000	48,000	17,500	20,000	130,000	76,000	50,000
10,600	16,000	103,000	51,000	48,000	17,700	20,000	130,000	76,000	50,000
11,000	16,000	103,000	51,000	48,000	18,000	20,000	130,000	76,000	50,000
12,000	16,000	103,000	51,000	48,000	18,500	25,000	144,000	84,000	56,000
12,200	16,000	111,000	59,000	48,000	19,000	25,000	144,000	84,000	56,000
12,500	16,000	111,000	59,000	48,000	19,700	25,000	144,000	84,000	56,000
13,000	16,000	111,000	59,000	48,000	20,000	25,000	144,000	84,000	56,000
13,700	16,000	111,000	59,000	48,000	20,500	25,000	153,000	93,000	56,000
14,000	16,000	111,000	59,000	48,000	21,000	25,000	153,000	93,000	56,000
14,200	20,000	122,000	68,000	50,000	21,500	25,000	153,000	93,000	56,000
14,400	20,000	122,000	68,000	50,000	22,000	25,000	153,000	93,000	56,000
14,600	20,000	122,000	68,000	50,000	22,500	25,000	161,000	101,000	56,000
15,000	20,000	122,000	68,000	50,000	23,500	25,000	161,000	101,000	56,000
15,300	20,000	122,000	68,000	50,000	25,000	32,000	174,000	110,000	60,000
15,800	20,000	122,000	68,000	50,000					
16,000	20,000	122,000	68,000	50,000					
16,500	20,000	130,000	76,000	50,000					



Brocas-TS con refrigeración interior

Artículo N° 89450



P	M	K	N	S	H
	•			•	



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros inoxidables y resistentes al ácido y al calor • titanio y aleaciones de titanio • Inconel, Hastelloy, Monel

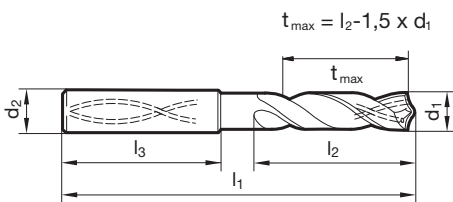
Artículo N° 89550



P	M	K	N	S	H
	•			•	



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros inoxidables y resistentes al ácido y al calor • titanio y aleaciones de titanio
 • Inconel, Hastelloy, Monel



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	62,000	20,000	36,000	5,200		6,000	66,000	28,000	36,000
3,100		6,000	62,000	20,000	36,000	5,300		6,000	66,000	28,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000	5,400		6,000	66,000	28,000	36,000
3,200		6,000	62,000	20,000	36,000	5,500		6,000	66,000	28,000	36,000
3,250		6,000	62,000	20,000	36,000	5,550		6,000	66,000	28,000	36,000
3,300		6,000	62,000	20,000	36,000	5,560	7/32	6,000	66,000	28,000	36,000
3,400		6,000	62,000	20,000	36,000	5,600		6,000	66,000	28,000	36,000
3,500		6,000	62,000	20,000	36,000	5,700		6,000	66,000	28,000	36,000
3,570	9/64	6,000	62,000	20,000	36,000	5,800		6,000	66,000	28,000	36,000
3,600		6,000	62,000	20,000	36,000	5,900		6,000	66,000	28,000	36,000
3,700		6,000	62,000	20,000	36,000	5,950	15/64	6,000	66,000	28,000	36,000
3,800		6,000	66,000	24,000	36,000	6,000		6,000	66,000	28,000	36,000
3,900		6,000	66,000	24,000	36,000	6,100		8,000	79,000	34,000	36,000
3,970	5/32	6,000	66,000	24,000	36,000	6,200		8,000	79,000	34,000	36,000
4,000		6,000	66,000	24,000	36,000	6,300		8,000	79,000	34,000	36,000
4,100		6,000	66,000	24,000	36,000	6,350	1/4	8,000	79,000	34,000	36,000
4,200		6,000	66,000	24,000	36,000	6,400		8,000	79,000	34,000	36,000
4,300		6,000	66,000	24,000	36,000	6,500		8,000	79,000	34,000	36,000
4,370	11/64	6,000	66,000	24,000	36,000	6,600		8,000	79,000	34,000	36,000
4,400		6,000	66,000	24,000	36,000	6,700		8,000	79,000	34,000	36,000
4,500		6,000	66,000	24,000	36,000	6,750	17/64	8,000	79,000	34,000	36,000
4,600		6,000	66,000	24,000	36,000	6,800		8,000	79,000	34,000	36,000
4,650		6,000	66,000	24,000	36,000	6,900		8,000	79,000	34,000	36,000
4,700		6,000	66,000	24,000	36,000	7,000		8,000	79,000	34,000	36,000
4,760	3/16	6,000	66,000	28,000	36,000	7,100		8,000	79,000	41,000	36,000
4,800		6,000	66,000	28,000	36,000	7,140	9/32	8,000	79,000	41,000	36,000
4,900		6,000	66,000	28,000	36,000	7,200		8,000	79,000	41,000	36,000
5,000		6,000	66,000	28,000	36,000	7,300		8,000	79,000	41,000	36,000
5,100		6,000	66,000	28,000	36,000	7,400		8,000	79,000	41,000	36,000
5,160	13/64	6,000	66,000	28,000	36,000	7,500		8,000	79,000	41,000	36,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,540	19/64	8,000	79,000	41,000	36,000	11,400		12,000	102,000	55,000	45,000
7,600		8,000	79,000	41,000	36,000	11,500		12,000	102,000	55,000	45,000
7,700		8,000	79,000	41,000	36,000	11,600		12,000	102,000	55,000	45,000
7,800		8,000	79,000	41,000	36,000	11,700		12,000	102,000	55,000	45,000
7,900		8,000	79,000	41,000	36,000	11,800		12,000	102,000	55,000	45,000
7,940	5/16	8,000	79,000	41,000	36,000	11,900		12,000	102,000	55,000	45,000
8,000		8,000	79,000	41,000	36,000	11,910	15/32	12,000	102,000	55,000	45,000
8,100		10,000	89,000	47,000	40,000	12,000		12,000	102,000	55,000	45,000
8,200		10,000	89,000	47,000	40,000	12,200		14,000	107,000	60,000	45,000
8,300		10,000	89,000	47,000	40,000	12,500		14,000	107,000	60,000	45,000
8,330	21/64	10,000	89,000	47,000	40,000	12,700	1/2	14,000	107,000	60,000	45,000
8,400		10,000	89,000	47,000	40,000	12,800		14,000	107,000	60,000	45,000
8,500		10,000	89,000	47,000	40,000	13,000		14,000	107,000	60,000	45,000
8,600		10,000	89,000	47,000	40,000	13,300		14,000	107,000	60,000	45,000
8,700		10,000	89,000	47,000	40,000	13,500		14,000	107,000	60,000	45,000
8,730	11/32	10,000	89,000	47,000	40,000	13,700		14,000	107,000	60,000	45,000
8,800		10,000	89,000	47,000	40,000	14,000		14,000	107,000	60,000	45,000
8,900		10,000	89,000	47,000	40,000	14,200		16,000	115,000	65,000	48,000
9,000		10,000	89,000	47,000	40,000	14,290	9/16	16,000	115,000	65,000	48,000
9,100		10,000	89,000	47,000	40,000	14,300		16,000	115,000	65,000	48,000
9,130	23/64	10,000	89,000	47,000	40,000	14,500		16,000	115,000	65,000	48,000
9,200		10,000	89,000	47,000	40,000	14,700		16,000	115,000	65,000	48,000
9,250		10,000	89,000	47,000	40,000	15,000		16,000	115,000	65,000	48,000
9,300		10,000	89,000	47,000	40,000	15,200		16,000	115,000	65,000	48,000
9,400		10,000	89,000	47,000	40,000	15,300		16,000	115,000	65,000	48,000
9,500		10,000	89,000	47,000	40,000	15,500		16,000	115,000	65,000	48,000
9,520	3/8	10,000	89,000	47,000	40,000	15,700		16,000	115,000	65,000	48,000
9,600		10,000	89,000	47,000	40,000	16,000		16,000	115,000	65,000	48,000
9,700		10,000	89,000	47,000	40,000	16,300		18,000	123,000	73,000	48,000
9,800		10,000	89,000	47,000	40,000	16,500		18,000	123,000	73,000	48,000
9,900		10,000	89,000	47,000	40,000	16,900		18,000	123,000	73,000	48,000
9,920	25/64	10,000	89,000	47,000	40,000	17,000		18,000	123,000	73,000	48,000
10,000		10,000	89,000	47,000	40,000	17,300		18,000	123,000	73,000	48,000
10,100		12,000	102,000	55,000	45,000	17,500		18,000	123,000	73,000	48,000
10,200		12,000	102,000	55,000	45,000	18,000		18,000	123,000	73,000	48,000
10,300		12,000	102,000	55,000	45,000	18,500		20,000	131,000	79,000	50,000
10,320	13/32	12,000	102,000	55,000	45,000	18,900		20,000	131,000	79,000	50,000
10,400		12,000	102,000	55,000	45,000	19,000		20,000	131,000	79,000	50,000
10,500		12,000	102,000	55,000	45,000	19,300		20,000	131,000	79,000	50,000
10,600		12,000	102,000	55,000	45,000	19,500		20,000	131,000	79,000	50,000
10,700		12,000	102,000	55,000	45,000	20,000		20,000	131,000	79,000	50,000
10,800		12,000	102,000	55,000	45,000						
10,900		12,000	102,000	55,000	45,000						
11,000		12,000	102,000	55,000	45,000						
11,100		12,000	102,000	55,000	45,000						
11,110	7/16	12,000	102,000	55,000	45,000						
11,200		12,000	102,000	55,000	45,000						
11,300		12,000	102,000	55,000	45,000						



Brocas-TS con refrigeración interior

Artículo N° 89423



P	M	K	N	S	H
•				•	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • forma del corte principal ligeramente cóncava • geometría de corte optimizada
aceros aleados y templados hasta a 1400 N/mm² • Inconel, Hastelloy, Monel • titanio y aleaciones de titanio

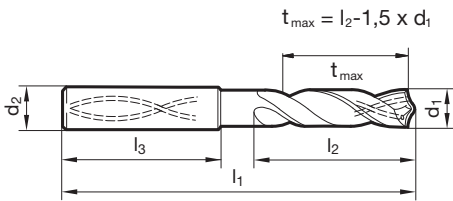
Artículo N° 89424



P	M	K	N	S	H
•				•	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • forma del corte principal ligeramente cóncava • geometría de corte optimizada
aceros aleados y templados hasta a 1400 N/mm² • Inconel, Hastelloy, Monel • titanio y aleaciones de titanio



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	62,000	20,000	36,000	5,200		6,000	66,000	28,000	36,000
3,100		6,000	62,000	20,000	36,000	5,300		6,000	66,000	28,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000	5,400		6,000	66,000	28,000	36,000
3,200		6,000	62,000	20,000	36,000	5,500		6,000	66,000	28,000	36,000
3,250		6,000	62,000	20,000	36,000	5,550		6,000	66,000	28,000	36,000
3,300		6,000	62,000	20,000	36,000	5,560	7/32	6,000	66,000	28,000	36,000
3,400		6,000	62,000	20,000	36,000	5,600		6,000	66,000	28,000	36,000
3,500		6,000	62,000	20,000	36,000	5,700		6,000	66,000	28,000	36,000
3,570	9/64	6,000	62,000	20,000	36,000	5,800		6,000	66,000	28,000	36,000
3,600		6,000	62,000	20,000	36,000	5,900		6,000	66,000	28,000	36,000
3,700		6,000	62,000	20,000	36,000	5,950	15/64	6,000	66,000	28,000	36,000
3,800		6,000	66,000	24,000	36,000	6,000		6,000	66,000	28,000	36,000
3,900		6,000	66,000	24,000	36,000	6,100		8,000	79,000	34,000	36,000
3,970	5/32	6,000	66,000	24,000	36,000	6,200		8,000	79,000	34,000	36,000
4,000		6,000	66,000	24,000	36,000	6,300		8,000	79,000	34,000	36,000
4,100		6,000	66,000	24,000	36,000	6,350	1/4	8,000	79,000	34,000	36,000
4,200		6,000	66,000	24,000	36,000	6,400		8,000	79,000	34,000	36,000
4,300		6,000	66,000	24,000	36,000	6,500		8,000	79,000	34,000	36,000
4,370	11/64	6,000	66,000	24,000	36,000	6,600		8,000	79,000	34,000	36,000
4,400		6,000	66,000	24,000	36,000	6,700		8,000	79,000	34,000	36,000
4,500		6,000	66,000	24,000	36,000	6,750	17/64	8,000	79,000	34,000	36,000
4,600		6,000	66,000	24,000	36,000	6,800		8,000	79,000	34,000	36,000
4,650		6,000	66,000	24,000	36,000	6,900		8,000	79,000	34,000	36,000
4,700		6,000	66,000	24,000	36,000	7,000		8,000	79,000	34,000	36,000
4,760	3/16	6,000	66,000	28,000	36,000	7,100		8,000	79,000	41,000	36,000
4,800		6,000	66,000	28,000	36,000	7,140	9/32	8,000	79,000	41,000	36,000
4,900		6,000	66,000	28,000	36,000	7,200		8,000	79,000	41,000	36,000
5,000		6,000	66,000	28,000	36,000	7,300		8,000	79,000	41,000	36,000
5,100		6,000	66,000	28,000	36,000	7,400		8,000	79,000	41,000	36,000
5,160	13/64	6,000	66,000	28,000	36,000	7,500		8,000	79,000	41,000	36,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,540	19/64	8,000	79,000	41,000	36,000	11,400		12,000	102,000	55,000	45,000
7,600		8,000	79,000	41,000	36,000	11,500		12,000	102,000	55,000	45,000
7,700		8,000	79,000	41,000	36,000	11,600		12,000	102,000	55,000	45,000
7,800		8,000	79,000	41,000	36,000	11,700		12,000	102,000	55,000	45,000
7,900		8,000	79,000	41,000	36,000	11,800		12,000	102,000	55,000	45,000
7,940	5/16	8,000	79,000	41,000	36,000	11,900		12,000	102,000	55,000	45,000
8,000		8,000	79,000	41,000	36,000	11,910	15/32	12,000	102,000	55,000	45,000
8,100		10,000	89,000	47,000	40,000	12,000		12,000	102,000	55,000	45,000
8,200		10,000	89,000	47,000	40,000	12,200		14,000	107,000	60,000	45,000
8,300		10,000	89,000	47,000	40,000	12,500		14,000	107,000	60,000	45,000
8,330	21/64	10,000	89,000	47,000	40,000	12,700	1/2	14,000	107,000	60,000	45,000
8,400		10,000	89,000	47,000	40,000	12,800		14,000	107,000	60,000	45,000
8,500		10,000	89,000	47,000	40,000	13,000		14,000	107,000	60,000	45,000
8,600		10,000	89,000	47,000	40,000	13,300		14,000	107,000	60,000	45,000
8,700		10,000	89,000	47,000	40,000	13,500		14,000	107,000	60,000	45,000
8,730	11/32	10,000	89,000	47,000	40,000	13,700		14,000	107,000	60,000	45,000
8,800		10,000	89,000	47,000	40,000	14,000		14,000	107,000	60,000	45,000
8,900		10,000	89,000	47,000	40,000	14,200		16,000	115,000	65,000	48,000
9,000		10,000	89,000	47,000	40,000	14,290	9/16	16,000	115,000	65,000	48,000
9,100		10,000	89,000	47,000	40,000	14,300		16,000	115,000	65,000	48,000
9,130	23/64	10,000	89,000	47,000	40,000	14,500		16,000	115,000	65,000	48,000
9,200		10,000	89,000	47,000	40,000	14,700		16,000	115,000	65,000	48,000
9,250		10,000	89,000	47,000	40,000	15,000		16,000	115,000	65,000	48,000
9,300		10,000	89,000	47,000	40,000	15,200		16,000	115,000	65,000	48,000
9,400		10,000	89,000	47,000	40,000	15,300		16,000	115,000	65,000	48,000
9,500		10,000	89,000	47,000	40,000	15,500		16,000	115,000	65,000	48,000
9,520	3/8	10,000	89,000	47,000	40,000	15,700		16,000	115,000	65,000	48,000
9,600		10,000	89,000	47,000	40,000	16,000		16,000	115,000	65,000	48,000
9,700		10,000	89,000	47,000	40,000	16,300		18,000	123,000	73,000	48,000
9,800		10,000	89,000	47,000	40,000	16,500		18,000	123,000	73,000	48,000
9,900		10,000	89,000	47,000	40,000	16,900		18,000	123,000	73,000	48,000
9,920	25/64	10,000	89,000	47,000	40,000	17,000		18,000	123,000	73,000	48,000
10,000		10,000	89,000	47,000	40,000	17,300		18,000	123,000	73,000	48,000
10,100		12,000	102,000	55,000	45,000	17,500		18,000	123,000	73,000	48,000
10,200		12,000	102,000	55,000	45,000	18,000		18,000	123,000	73,000	48,000
10,300		12,000	102,000	55,000	45,000	18,500		20,000	131,000	79,000	50,000
10,320	13/32	12,000	102,000	55,000	45,000	18,900		20,000	131,000	79,000	50,000
10,400		12,000	102,000	55,000	45,000	19,000		20,000	131,000	79,000	50,000
10,500		12,000	102,000	55,000	45,000	19,050	3/4	20,000	131,000	79,000	50,000
10,600		12,000	102,000	55,000	45,000	19,300		20,000	131,000	79,000	50,000
10,700		12,000	102,000	55,000	45,000	19,500		20,000	131,000	79,000	50,000
10,800		12,000	102,000	55,000	45,000	20,000		20,000	131,000	79,000	50,000
10,900		12,000	102,000	55,000	45,000						
11,000		12,000	102,000	55,000	45,000						
11,100		12,000	102,000	55,000	45,000						
11,110	7/16	12,000	102,000	55,000	45,000						
11,200		12,000	102,000	55,000	45,000						
11,300		12,000	102,000	55,000	45,000						

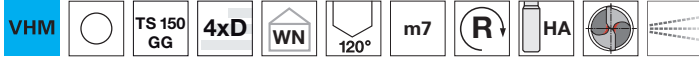


Brocas-TS con refrigeración interior

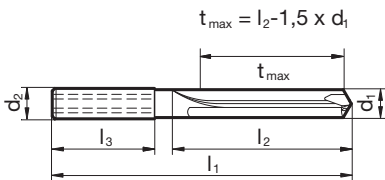
Artículo N° 89292



P	M	K	N	S	H
		○	●		



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • tolerancias en diámetro estrechas • cal. superficial del taladro muy buena
 • vigilar presión del refrigerante
 aluminio y sus aleaciones • aluminios con alto porcentaje de Si



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	66,000	24,000	36,000	8,400		10,000	103,000	61,000	40,000
3,100		6,000	66,000	24,000	36,000	8,500		10,000	103,000	61,000	40,000
3,200		6,000	66,000	24,000	36,000	8,700		10,000	103,000	61,000	40,000
3,300		6,000	66,000	24,000	36,000	9,000		10,000	103,000	61,000	40,000
3,400		6,000	66,000	24,000	36,000	9,400		10,000	103,000	61,000	40,000
3,500		6,000	66,000	24,000	36,000	10,000		10,000	103,000	61,000	40,000
3,600		6,000	66,000	24,000	36,000	10,200		12,000	118,000	71,000	45,000
3,700		6,000	66,000	24,000	36,000	10,500		12,000	118,000	71,000	45,000
3,800		6,000	74,000	30,000	36,000	11,000		12,000	118,000	71,000	45,000
3,900		6,000	74,000	30,000	36,000	11,500		12,000	118,000	71,000	45,000
4,000		6,000	74,000	30,000	36,000	12,000		12,000	118,000	71,000	45,000
4,200		6,000	74,000	30,000	36,000	12,300	31/64	14,000	124,000	74,000	45,000
5,000		6,000	74,000	36,000	36,000	12,500		14,000	124,000	74,000	45,000
5,100		6,000	74,000	36,000	36,000	12,700	1/2	14,000	124,000	74,000	45,000
5,300		6,000	74,000	36,000	36,000	13,000		14,000	124,000	74,000	45,000
5,900		6,000	74,000	36,000	36,000	14,000		14,000	124,000	74,000	45,000
6,000		6,000	74,000	36,000	36,000	15,000		16,000	133,000	83,000	48,000
6,200		8,000	91,000	53,000	36,000	16,000		16,000	133,000	83,000	48,000
6,300		8,000	91,000	53,000	36,000	16,500		18,000	143,000	93,000	48,000
6,400		8,000	91,000	53,000	36,000	17,000		18,000	143,000	93,000	48,000
6,600		8,000	91,000	53,000	36,000	17,500		18,000	143,000	93,000	48,000
6,700		8,000	91,000	53,000	36,000	18,000		18,000	143,000	93,000	48,000
6,800		8,000	91,000	53,000	36,000	19,000		20,000	153,000	101,000	50,000
7,000		8,000	91,000	53,000	36,000	20,000		20,000	153,000	101,000	50,000
7,400		8,000	91,000	53,000	36,000						
7,500		8,000	91,000	53,000	36,000						
8,000		8,000	91,000	53,000	36,000						
8,100		10,000	103,000	61,000	40,000						
8,200		10,000	103,000	61,000	40,000						
8,300		10,000	103,000	61,000	40,000						



Brocas-TS con refrigeración interior

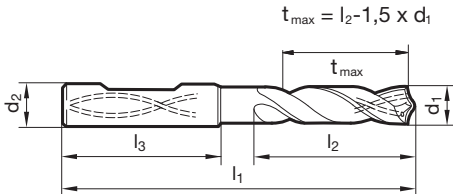
Artículo N° 89272



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,700$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados)
 hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AISi altamente aleables



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,700		6,000	66,000	28,000	36,000	10,800		12,000	118,000	71,000	45,000
5,000		6,000	82,000	44,000	36,000	11,000		12,000	118,000	71,000	45,000
5,160	13/64	6,000	82,000	44,000	36,000	11,110	7/16	12,000	118,000	71,000	45,000
5,500		6,000	82,000	44,000	36,000	11,200		12,000	118,000	71,000	45,000
5,560	7/32	6,000	82,000	44,000	36,000	11,500		12,000	118,000	71,000	45,000
5,800		6,000	82,000	44,000	36,000	11,510	29/64	12,000	118,000	71,000	45,000
6,000		6,000	82,000	44,000	36,000	11,800		12,000	118,000	71,000	45,000
6,350	1/4	8,000	91,000	53,000	36,000	11,910	15/32	12,000	118,000	71,000	45,000
6,400		8,000	91,000	53,000	36,000	12,000		12,000	118,000	71,000	45,000
6,500		8,000	91,000	53,000	36,000	12,500		14,000	124,000	77,000	45,000
6,750	17/64	8,000	91,000	53,000	36,000	12,700	1/2	14,000	124,000	77,000	45,000
6,800		8,000	91,000	53,000	36,000	13,000		14,000	124,000	77,000	45,000
7,000		8,000	91,000	53,000	36,000	13,500		14,000	124,000	77,000	45,000
7,140	9/32	8,000	91,000	53,000	36,000	14,000		14,000	124,000	77,000	45,000
7,500		8,000	91,000	53,000	36,000	14,290	9/16	16,000	133,000	83,000	48,000
7,540	19/64	8,000	91,000	53,000	36,000	14,500		16,000	133,000	83,000	48,000
7,700		8,000	91,000	53,000	36,000	15,000		16,000	133,000	83,000	48,000
7,800		8,000	91,000	53,000	36,000	15,500		16,000	133,000	83,000	48,000
7,940	5/16	8,000	91,000	53,000	36,000	15,870	5/8	16,000	133,000	83,000	48,000
8,000		8,000	91,000	53,000	36,000	16,000		16,000	133,000	83,000	48,000
8,500		10,000	103,000	61,000	40,000	16,500		18,000	143,000	93,000	48,000
8,600		10,000	103,000	61,000	40,000	17,000		18,000	143,000	93,000	48,000
8,730	11/32	10,000	103,000	61,000	40,000	17,500		18,000	143,000	93,000	48,000
8,800		10,000	103,000	61,000	40,000	18,000		18,000	143,000	93,000	48,000
9,000		10,000	103,000	61,000	40,000	19,500		20,000	153,000	101,000	50,000
9,300		10,000	103,000	61,000	40,000						
9,500		10,000	103,000	61,000	40,000						
9,520	3/8	10,000	103,000	61,000	40,000						
9,700		10,000	103,000	61,000	40,000						
9,800		10,000	103,000	61,000	40,000						
9,920	25/64	10,000	103,000	61,000	40,000						
10,000		10,000	103,000	61,000	40,000						
10,200		12,000	118,000	71,000	45,000						
10,320	13/32	12,000	118,000	71,000	45,000						
10,500		12,000	118,000	71,000	45,000						
10,720	27/64	12,000	118,000	71,000	45,000						



Brocas-TS con refrigeración interior

Artículo N° 89411



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados)
 hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AISi altamente aleables

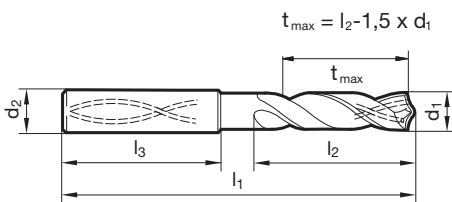
Artículo N° 89408



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados)
 hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AISi altamente aleables



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	66,000	28,000	36,000	5,200		6,000	82,000	44,000	36,000
3,100		6,000	66,000	28,000	36,000	5,300		6,000	82,000	44,000	36,000
3,170	1/8	6,000	66,000	28,000	36,000	5,400		6,000	82,000	44,000	36,000
3,200		6,000	66,000	28,000	36,000	5,500		6,000	82,000	44,000	36,000
3,250		6,000	66,000	28,000	36,000	5,550		6,000	82,000	44,000	36,000
3,300		6,000	66,000	28,000	36,000	5,560	7/32	6,000	82,000	44,000	36,000
3,400		6,000	66,000	28,000	36,000	5,600		6,000	82,000	44,000	36,000
3,500		6,000	66,000	28,000	36,000	5,700		6,000	82,000	44,000	36,000
3,570	9/64	6,000	66,000	28,000	36,000	5,800		6,000	82,000	44,000	36,000
3,600		6,000	66,000	28,000	36,000	5,900		6,000	82,000	44,000	36,000
3,700		6,000	66,000	28,000	36,000	5,950	15/64	6,000	82,000	44,000	36,000
3,800		6,000	74,000	36,000	36,000	6,000		6,000	82,000	44,000	36,000
3,900		6,000	74,000	36,000	36,000	6,100		8,000	91,000	53,000	36,000
3,970	5/32	6,000	74,000	36,000	36,000	6,200		8,000	91,000	53,000	36,000
4,000		6,000	74,000	36,000	36,000	6,300		8,000	91,000	53,000	36,000
4,100		6,000	74,000	36,000	36,000	6,350	1/4	8,000	91,000	53,000	36,000
4,200		6,000	74,000	36,000	36,000	6,400		8,000	91,000	53,000	36,000
4,300		6,000	74,000	36,000	36,000	6,500		8,000	91,000	53,000	36,000
4,370	11/64	6,000	74,000	36,000	36,000	6,600		8,000	91,000	53,000	36,000
4,400		6,000	74,000	36,000	36,000	6,700		8,000	91,000	53,000	36,000
4,500		6,000	74,000	36,000	36,000	6,750	17/64	8,000	91,000	53,000	36,000
4,600		6,000	74,000	36,000	36,000	6,800		8,000	91,000	53,000	36,000
4,650		6,000	74,000	36,000	36,000	6,900		8,000	91,000	53,000	36,000
4,700		6,000	74,000	36,000	36,000	7,000		8,000	91,000	53,000	36,000
4,760	3/16	6,000	82,000	44,000	36,000	7,100		8,000	91,000	53,000	36,000
4,800		6,000	82,000	44,000	36,000	7,140	9/32	8,000	91,000	53,000	36,000
4,900		6,000	82,000	44,000	36,000	7,200		8,000	91,000	53,000	36,000
5,000		6,000	82,000	44,000	36,000	7,300		8,000	91,000	53,000	36,000
5,100		6,000	82,000	44,000	36,000	7,400		8,000	91,000	53,000	36,000
5,160	13/64	6,000	82,000	44,000	36,000	7,500		8,000	91,000	53,000	36,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,540	19/64	8,000	91,000	53,000	36,000	11,400		12,000	118,000	71,000	45,000
7,600		8,000	91,000	53,000	36,000	11,500		12,000	118,000	71,000	45,000
7,700		8,000	91,000	53,000	36,000	11,600		12,000	118,000	71,000	45,000
7,800		8,000	91,000	53,000	36,000	11,700		12,000	118,000	71,000	45,000
7,900		8,000	91,000	53,000	36,000	11,800		12,000	118,000	71,000	45,000
7,940	5/16	8,000	91,000	53,000	36,000	11,900		12,000	118,000	71,000	45,000
8,000		8,000	91,000	53,000	36,000	11,910	15/32	12,000	118,000	71,000	45,000
8,100		10,000	103,000	61,000	40,000	12,000		12,000	118,000	71,000	45,000
8,200		10,000	103,000	61,000	40,000	12,100		14,000	124,000	77,000	45,000
8,300		10,000	103,000	61,000	40,000	12,200		14,000	124,000	77,000	45,000
8,330	21/64	10,000	103,000	61,000	40,000	12,300	31/64	14,000	124,000	77,000	45,000
8,400		10,000	103,000	61,000	40,000	12,400		14,000	124,000	77,000	45,000
8,500		10,000	103,000	61,000	40,000	12,500		14,000	124,000	77,000	45,000
8,600		10,000	103,000	61,000	40,000	12,600		14,000	124,000	77,000	45,000
8,700		10,000	103,000	61,000	40,000	12,700	1/2	14,000	124,000	77,000	45,000
8,730	11/32	10,000	103,000	61,000	40,000	12,800		14,000	124,000	77,000	45,000
8,800		10,000	103,000	61,000	40,000	13,000		14,000	124,000	77,000	45,000
8,900		10,000	103,000	61,000	40,000	13,100	33/64	14,000	124,000	77,000	45,000
9,000		10,000	103,000	61,000	40,000	13,300		14,000	124,000	77,000	45,000
9,100		10,000	103,000	61,000	40,000	13,500		14,000	124,000	77,000	45,000
9,130	23/64	10,000	103,000	61,000	40,000	13,700		14,000	124,000	77,000	45,000
9,200		10,000	103,000	61,000	40,000	13,800		14,000	124,000	77,000	45,000
9,250		10,000	103,000	61,000	40,000	14,000		14,000	124,000	77,000	45,000
9,300		10,000	103,000	61,000	40,000	14,100		16,000	133,000	83,000	48,000
9,400		10,000	103,000	61,000	40,000	14,200		16,000	133,000	83,000	48,000
9,500		10,000	103,000	61,000	40,000	14,290	9/16	16,000	133,000	83,000	48,000
9,520	3/8	10,000	103,000	61,000	40,000	14,500		16,000	133,000	83,000	48,000
9,600		10,000	103,000	61,000	40,000	14,700		16,000	133,000	83,000	48,000
9,700		10,000	103,000	61,000	40,000	14,800		16,000	133,000	83,000	48,000
9,800		10,000	103,000	61,000	40,000	15,000		16,000	133,000	83,000	48,000
9,900		10,000	103,000	61,000	40,000	15,100		16,000	133,000	83,000	48,000
9,920	25/64	10,000	103,000	61,000	40,000	15,200		16,000	133,000	83,000	48,000
10,000		10,000	103,000	61,000	40,000	15,300		16,000	133,000	83,000	48,000
10,100		12,000	118,000	71,000	45,000	15,500		16,000	133,000	83,000	48,000
10,200		12,000	118,000	71,000	45,000	15,700		16,000	133,000	83,000	48,000
10,300		12,000	118,000	71,000	45,000	15,800		16,000	133,000	83,000	48,000
10,320	13/32	12,000	118,000	71,000	45,000	16,000		16,000	133,000	83,000	48,000
10,400		12,000	118,000	71,000	45,000	16,500		18,000	143,000	93,000	48,000
10,500		12,000	118,000	71,000	45,000	16,900		18,000	143,000	93,000	48,000
10,600		12,000	118,000	71,000	45,000	17,000		18,000	143,000	93,000	48,000
10,700		12,000	118,000	71,000	45,000	17,500		18,000	143,000	93,000	48,000
10,800		12,000	118,000	71,000	45,000	18,000		18,000	143,000	93,000	48,000
10,900		12,000	118,000	71,000	45,000	18,500		20,000	153,000	101,000	50,000
11,000		12,000	118,000	71,000	45,000	18,900		20,000	153,000	101,000	50,000
11,100		12,000	118,000	71,000	45,000	19,000		20,000	153,000	101,000	50,000
11,110	7/16	12,000	118,000	71,000	45,000	19,050	3/4	20,000	153,000	101,000	50,000
11,200		12,000	118,000	71,000	45,000	19,500		20,000	153,000	101,000	50,000
11,300		12,000	118,000	71,000	45,000	20,000		20,000	153,000	101,000	50,000



Brocas-TS con refrigeración interior

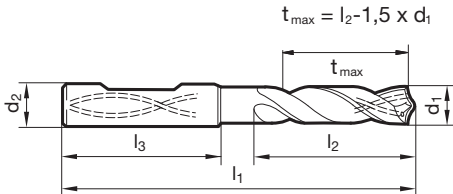
Artículo N° 89307



P	M	K	N	S	H
●	○	○	○		



vaciado de punta $\geq \varnothing 9,800$ • entrada cónica • portaherr. HSS con plaquita HM soldada • amortigua oscilaciones y golpes
 aceros no aleados y de baja aleación • fundición gris, fundición de grafito • latón, bronce, plásticos y grafitos



d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,800	16,000	127,000	75,000	48,000	16,500	20,000	166,000	112,000	50,000
10,000	16,000	127,000	75,000	48,000	16,800	20,000	166,000	112,000	50,000
10,200	16,000	127,000	75,000	48,000	17,000	20,000	166,000	112,000	50,000
10,500	16,000	127,000	75,000	48,000	17,200	20,000	166,000	112,000	50,000
10,600	16,000	127,000	75,000	48,000	17,300	20,000	166,000	112,000	50,000
10,700	16,000	127,000	75,000	48,000	17,500	20,000	166,000	112,000	50,000
10,800	16,000	127,000	75,000	48,000	18,000	20,000	166,000	112,000	50,000
11,000	16,000	127,000	75,000	48,000	18,300	25,000	184,000	124,000	56,000
11,800	16,000	127,000	75,000	48,000	18,500	25,000	184,000	124,000	56,000
11,900	16,000	127,000	75,000	48,000	19,000	25,000	184,000	124,000	56,000
12,000	16,000	127,000	75,000	48,000	19,500	25,000	184,000	124,000	56,000
12,300	16,000	139,000	87,000	48,000	19,700	25,000	184,000	124,000	56,000
12,500	16,000	139,000	87,000	48,000	20,000	25,000	184,000	124,000	56,000
12,700	16,000	139,000	87,000	48,000	20,500	25,000	197,000	137,000	56,000
12,900	16,000	139,000	87,000	48,000	21,000	25,000	197,000	137,000	56,000
13,000	16,000	139,000	87,000	48,000	22,000	25,000	197,000	137,000	56,000
13,100	16,000	139,000	87,000	48,000	22,220	25,000	209,000	149,000	56,000
13,500	16,000	139,000	87,000	48,000	22,500	25,000	209,000	149,000	56,000
13,600	16,000	139,000	87,000	48,000	23,000	25,000	209,000	149,000	56,000
13,700	16,000	139,000	87,000	48,000	23,500	25,000	209,000	149,000	56,000
13,900	16,000	139,000	87,000	48,000	24,000	25,000	209,000	149,000	56,000
14,000	16,000	139,000	87,000	48,000	24,500	32,000	226,000	162,000	60,000
14,500	20,000	154,000	100,000	50,000	25,000	32,000	226,000	162,000	60,000
14,600	20,000	154,000	100,000	50,000	25,500	32,000	226,000	162,000	60,000
15,000	20,000	154,000	100,000	50,000					
15,200	20,000	154,000	100,000	50,000					
15,500	20,000	154,000	100,000	50,000					
15,700	20,000	154,000	100,000	50,000					
16,000	20,000	154,000	100,000	50,000					
16,200	20,000	166,000	112,000	50,000					



Brocas-TS con refrigeración interior

Artículo N° 89451



P	M	K	N	S	H
	•			•	



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
aceros inoxidables y resistentes al ácido y al calor • titanio y aleaciones de titanio • Inconel, Hastelloy, Monel

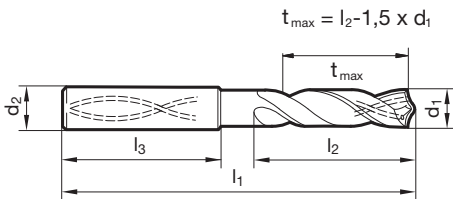
Artículo N° 89551



P	M	K	N	S	H
	•			•	



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
aceros inoxidables y resistentes al ácido y al calor • titanio y aleaciones de titanio • Inconel, Hastelloy, Monel



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	66,000	28,000	36,000	5,200		6,000	82,000	44,000	36,000
3,100		6,000	66,000	28,000	36,000	5,300		6,000	82,000	44,000	36,000
3,170	1/8	6,000	66,000	28,000	36,000	5,400		6,000	82,000	44,000	36,000
3,200		6,000	66,000	28,000	36,000	5,500		6,000	82,000	44,000	36,000
3,250		6,000	66,000	28,000	36,000	5,550		6,000	82,000	44,000	36,000
3,300		6,000	66,000	28,000	36,000	5,560	7/32	6,000	82,000	44,000	36,000
3,400		6,000	66,000	28,000	36,000	5,600		6,000	82,000	44,000	36,000
3,500		6,000	66,000	28,000	36,000	5,700		6,000	82,000	44,000	36,000
3,570	9/64	6,000	66,000	28,000	36,000	5,800		6,000	82,000	44,000	36,000
3,600		6,000	66,000	28,000	36,000	5,900		6,000	82,000	44,000	36,000
3,700		6,000	66,000	28,000	36,000	5,950	15/64	6,000	82,000	44,000	36,000
3,800		6,000	74,000	36,000	36,000	6,000		6,000	82,000	44,000	36,000
3,900		6,000	74,000	36,000	36,000	6,100		8,000	91,000	53,000	36,000
3,970	5/32	6,000	74,000	36,000	36,000	6,200		8,000	91,000	53,000	36,000
4,000		6,000	74,000	36,000	36,000	6,300		8,000	91,000	53,000	36,000
4,100		6,000	74,000	36,000	36,000	6,350	1/4	8,000	91,000	53,000	36,000
4,200		6,000	74,000	36,000	36,000	6,400		8,000	91,000	53,000	36,000
4,300		6,000	74,000	36,000	36,000	6,500		8,000	91,000	53,000	36,000
4,370	11/64	6,000	74,000	36,000	36,000	6,600		8,000	91,000	53,000	36,000
4,400		6,000	74,000	36,000	36,000	6,700		8,000	91,000	53,000	36,000
4,500		6,000	74,000	36,000	36,000	6,750	17/64	8,000	91,000	53,000	36,000
4,600		6,000	74,000	36,000	36,000	6,800		8,000	91,000	53,000	36,000
4,650		6,000	74,000	36,000	36,000	6,900		8,000	91,000	53,000	36,000
4,700		6,000	74,000	36,000	36,000	7,000		8,000	91,000	53,000	36,000
4,760	3/16	6,000	82,000	44,000	36,000	7,100		8,000	91,000	53,000	36,000
4,800		6,000	82,000	44,000	36,000	7,140	9/32	8,000	91,000	53,000	36,000
4,900		6,000	82,000	44,000	36,000	7,200		8,000	91,000	53,000	36,000
5,000		6,000	82,000	44,000	36,000	7,300		8,000	91,000	53,000	36,000
5,100		6,000	82,000	44,000	36,000	7,400		8,000	91,000	53,000	36,000
5,160	13/64	6,000	82,000	44,000	36,000	7,500		8,000	91,000	53,000	36,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,540	19/64	8,000	91,000	53,000	36,000	11,400		12,000	118,000	71,000	45,000
7,600		8,000	91,000	53,000	36,000	11,500		12,000	118,000	71,000	45,000
7,700		8,000	91,000	53,000	36,000	11,600		12,000	118,000	71,000	45,000
7,800		8,000	91,000	53,000	36,000	11,700		12,000	118,000	71,000	45,000
7,900		8,000	91,000	53,000	36,000	11,800		12,000	118,000	71,000	45,000
7,940	5/16	8,000	91,000	53,000	36,000	11,900		12,000	118,000	71,000	45,000
8,000		8,000	91,000	53,000	36,000	11,910	15/32	12,000	118,000	71,000	45,000
8,100		10,000	103,000	61,000	40,000	12,000		12,000	118,000	71,000	45,000
8,200		10,000	103,000	61,000	40,000	12,200		14,000	124,000	77,000	45,000
8,300		10,000	103,000	61,000	40,000	12,500		14,000	124,000	77,000	45,000
8,330	21/64	10,000	103,000	61,000	40,000	12,700	1/2	14,000	124,000	77,000	45,000
8,400		10,000	103,000	61,000	40,000	12,800		14,000	124,000	77,000	45,000
8,500		10,000	103,000	61,000	40,000	13,000		14,000	124,000	77,000	45,000
8,600		10,000	103,000	61,000	40,000	13,300		14,000	124,000	77,000	45,000
8,700		10,000	103,000	61,000	40,000	13,500		14,000	124,000	77,000	45,000
8,730	11/32	10,000	103,000	61,000	40,000	13,700		14,000	124,000	77,000	45,000
8,800		10,000	103,000	61,000	40,000	14,000		14,000	124,000	77,000	45,000
8,900		10,000	103,000	61,000	40,000	14,200		16,000	133,000	83,000	48,000
9,000		10,000	103,000	61,000	40,000	14,290	9/16	16,000	133,000	83,000	48,000
9,100		10,000	103,000	61,000	40,000	14,300		16,000	133,000	83,000	48,000
9,130	23/64	10,000	103,000	61,000	40,000	14,500		16,000	133,000	83,000	48,000
9,200		10,000	103,000	61,000	40,000	14,700		16,000	133,000	83,000	48,000
9,250		10,000	103,000	61,000	40,000	15,000		16,000	133,000	83,000	48,000
9,300		10,000	103,000	61,000	40,000	15,200		16,000	133,000	83,000	48,000
9,400		10,000	103,000	61,000	40,000	15,300		16,000	133,000	83,000	48,000
9,500		10,000	103,000	61,000	40,000	15,500		16,000	133,000	83,000	48,000
9,520	3/8	10,000	103,000	61,000	40,000	15,700		16,000	133,000	83,000	48,000
9,600		10,000	103,000	61,000	40,000	16,000		16,000	133,000	83,000	48,000
9,700		10,000	103,000	61,000	40,000	16,300		18,000	143,000	93,000	48,000
9,800		10,000	103,000	61,000	40,000	16,500		18,000	143,000	93,000	48,000
9,900		10,000	103,000	61,000	40,000	16,900		18,000	143,000	93,000	48,000
9,920	25/64	10,000	103,000	61,000	40,000	17,000		18,000	143,000	93,000	48,000
10,000		10,000	103,000	61,000	40,000	17,300		18,000	143,000	93,000	48,000
10,100		12,000	118,000	71,000	45,000	17,500		18,000	143,000	93,000	48,000
10,200		12,000	118,000	71,000	45,000	18,000		18,000	143,000	93,000	48,000
10,300		12,000	118,000	71,000	45,000	18,500		20,000	153,000	101,000	50,000
10,320	13/32	12,000	118,000	71,000	45,000	18,900		20,000	153,000	101,000	50,000
10,400		12,000	118,000	71,000	45,000	19,000		20,000	153,000	101,000	50,000
10,500		12,000	118,000	71,000	45,000	19,050	3/4	20,000	153,000	101,000	50,000
10,600		12,000	118,000	71,000	45,000	19,300		20,000	153,000	101,000	50,000
10,700		12,000	118,000	71,000	45,000	19,500		20,000	153,000	101,000	50,000
10,800		12,000	118,000	71,000	45,000	20,000		20,000	153,000	101,000	50,000
10,900		12,000	118,000	71,000	45,000						
11,000		12,000	118,000	71,000	45,000						
11,100		12,000	118,000	71,000	45,000						
11,110	7/16	12,000	118,000	71,000	45,000						
11,200		12,000	118,000	71,000	45,000						
11,300		12,000	118,000	71,000	45,000						



Brocas-TS con refrigeración interior

Artículo N° 89425



P	M	K	N	S	H
•				•	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • forma del corte principal ligeramente cóncava • geometría de corte optimizada
aceros aleados y templados hasta a 1400 N/mm² • Inconel, Hastelloy, Monel • titanio y aleaciones de titanio

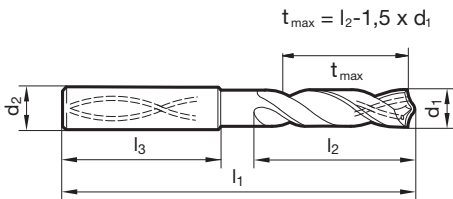
Artículo N° 89426



P	M	K	N	S	H
•				•	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • forma del corte principal ligeramente cóncava • geometría de corte optimizada
aceros aleados y templados hasta a 1400 N/mm² • Inconel, Hastelloy, Monel • titanio y aleaciones de titanio



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	66,000	28,000	36,000	5,200		6,000	82,000	44,000	36,000
3,100		6,000	66,000	28,000	36,000	5,300		6,000	82,000	44,000	36,000
3,170	1/8	6,000	66,000	28,000	36,000	5,400		6,000	82,000	44,000	36,000
3,200		6,000	66,000	28,000	36,000	5,500		6,000	82,000	44,000	36,000
3,250		6,000	66,000	28,000	36,000	5,550		6,000	82,000	44,000	36,000
3,300		6,000	66,000	28,000	36,000	5,560	7/32	6,000	82,000	44,000	36,000
3,400		6,000	66,000	28,000	36,000	5,600		6,000	82,000	44,000	36,000
3,500		6,000	66,000	28,000	36,000	5,700		6,000	82,000	44,000	36,000
3,570	9/64	6,000	66,000	28,000	36,000	5,800		6,000	82,000	44,000	36,000
3,600		6,000	66,000	28,000	36,000	5,900		6,000	82,000	44,000	36,000
3,700		6,000	66,000	28,000	36,000	5,950	15/64	6,000	82,000	44,000	36,000
3,800		6,000	74,000	36,000	36,000	6,000		6,000	82,000	44,000	36,000
3,900		6,000	74,000	36,000	36,000	6,100		8,000	91,000	53,000	36,000
3,970	5/32	6,000	74,000	36,000	36,000	6,200		8,000	91,000	53,000	36,000
4,000		6,000	74,000	36,000	36,000	6,300		8,000	91,000	53,000	36,000
4,100		6,000	74,000	36,000	36,000	6,350	1/4	8,000	91,000	53,000	36,000
4,200		6,000	74,000	36,000	36,000	6,400		8,000	91,000	53,000	36,000
4,300		6,000	74,000	36,000	36,000	6,500		8,000	91,000	53,000	36,000
4,370	11/64	6,000	74,000	36,000	36,000	6,600		8,000	91,000	53,000	36,000
4,400		6,000	74,000	36,000	36,000	6,700		8,000	91,000	53,000	36,000
4,500		6,000	74,000	36,000	36,000	6,750	17/64	8,000	91,000	53,000	36,000
4,600		6,000	74,000	36,000	36,000	6,800		8,000	91,000	53,000	36,000
4,650		6,000	74,000	36,000	36,000	6,900		8,000	91,000	53,000	36,000
4,700		6,000	74,000	36,000	36,000	7,000		8,000	91,000	53,000	36,000
4,760	3/16	6,000	82,000	44,000	36,000	7,100		8,000	91,000	53,000	36,000
4,800		6,000	82,000	44,000	36,000	7,140	9/32	8,000	91,000	53,000	36,000
4,900		6,000	82,000	44,000	36,000	7,200		8,000	91,000	53,000	36,000
5,000		6,000	82,000	44,000	36,000	7,300		8,000	91,000	53,000	36,000
5,100		6,000	82,000	44,000	36,000	7,400		8,000	91,000	53,000	36,000
5,160	13/64	6,000	82,000	44,000	36,000	7,500		8,000	91,000	53,000	36,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,540	19/64	8,000	91,000	53,000	36,000	11,400		12,000	118,000	71,000	45,000
7,600		8,000	91,000	53,000	36,000	11,500		12,000	118,000	71,000	45,000
7,700		8,000	91,000	53,000	36,000	11,600		12,000	118,000	71,000	45,000
7,800		8,000	91,000	53,000	36,000	11,700		12,000	118,000	71,000	45,000
7,900		8,000	91,000	53,000	36,000	11,800		12,000	118,000	71,000	45,000
7,940	5/16	8,000	91,000	53,000	36,000	11,900		12,000	118,000	71,000	45,000
8,000		8,000	91,000	53,000	36,000	11,910	15/32	12,000	118,000	71,000	45,000
8,100		10,000	103,000	61,000	40,000	12,000		12,000	118,000	71,000	45,000
8,200		10,000	103,000	61,000	40,000	12,200		14,000	124,000	77,000	45,000
8,300		10,000	103,000	61,000	40,000	12,500		14,000	124,000	77,000	45,000
8,330	21/64	10,000	103,000	61,000	40,000	12,700	1/2	14,000	124,000	77,000	45,000
8,400		10,000	103,000	61,000	40,000	12,800		14,000	124,000	77,000	45,000
8,500		10,000	103,000	61,000	40,000	13,000		14,000	124,000	77,000	45,000
8,600		10,000	103,000	61,000	40,000	13,300		14,000	124,000	77,000	45,000
8,700		10,000	103,000	61,000	40,000	13,500		14,000	124,000	77,000	45,000
8,730	11/32	10,000	103,000	61,000	40,000	13,700		14,000	124,000	77,000	45,000
8,800		10,000	103,000	61,000	40,000	14,000		14,000	124,000	77,000	45,000
8,900		10,000	103,000	61,000	40,000	14,200		16,000	133,000	83,000	48,000
9,000		10,000	103,000	61,000	40,000	14,290	9/16	16,000	133,000	83,000	48,000
9,100		10,000	103,000	61,000	40,000	14,300		16,000	133,000	83,000	48,000
9,130	23/64	10,000	103,000	61,000	40,000	14,500		16,000	133,000	83,000	48,000
9,200		10,000	103,000	61,000	40,000	14,700		16,000	133,000	83,000	48,000
9,250		10,000	103,000	61,000	40,000	15,000		16,000	133,000	83,000	48,000
9,300		10,000	103,000	61,000	40,000	15,200		16,000	133,000	83,000	48,000
9,400		10,000	103,000	61,000	40,000	15,300		16,000	133,000	83,000	48,000
9,500		10,000	103,000	61,000	40,000	15,500		16,000	133,000	83,000	48,000
9,520	3/8	10,000	103,000	61,000	40,000	15,700		16,000	133,000	83,000	48,000
9,600		10,000	103,000	61,000	40,000	16,000		16,000	133,000	83,000	48,000
9,700		10,000	103,000	61,000	40,000	16,300		18,000	143,000	93,000	48,000
9,800		10,000	103,000	61,000	40,000	16,500		18,000	143,000	93,000	48,000
9,900		10,000	103,000	61,000	40,000	16,900		18,000	143,000	93,000	48,000
9,920	25/64	10,000	103,000	61,000	40,000	17,000		18,000	143,000	93,000	48,000
10,000		10,000	103,000	61,000	40,000	17,300		18,000	143,000	93,000	48,000
10,100		12,000	118,000	71,000	45,000	17,500		18,000	143,000	93,000	48,000
10,200		12,000	118,000	71,000	45,000	18,000		18,000	143,000	93,000	48,000
10,300		12,000	118,000	71,000	45,000	18,500		20,000	153,000	101,000	50,000
10,320	13/32	12,000	118,000	71,000	45,000	18,900		20,000	153,000	101,000	50,000
10,400		12,000	118,000	71,000	45,000	19,000		20,000	153,000	101,000	50,000
10,500		12,000	118,000	71,000	45,000	19,050	3/4	20,000	153,000	101,000	50,000
10,600		12,000	118,000	71,000	45,000	19,300		20,000	153,000	101,000	50,000
10,700		12,000	118,000	71,000	45,000	19,500		20,000	153,000	101,000	50,000
10,800		12,000	118,000	71,000	45,000	20,000		20,000	153,000	101,000	50,000
10,900		12,000	118,000	71,000	45,000						
11,000		12,000	118,000	71,000	45,000						
11,100		12,000	118,000	71,000	45,000						
11,110	7/16	12,000	118,000	71,000	45,000						
11,200		12,000	118,000	71,000	45,000						
11,300		12,000	118,000	71,000	45,000						



Brocas-TS con refrigeración interior

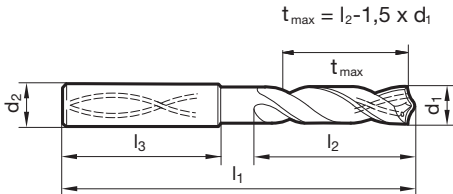
Artículo N° 89420



P	M	K	N	S	H
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vaciado de punta $\geq \varnothing 3,000$ • afilado con radios patentado • forma del corte recta (por corrección)
 fundición vermicular GGV y ADI, CDI • fundición gris, fundición maleable, fundición esférica



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	66,000	28,000	36,000	6,100		8,000	91,000	53,000	36,000
3,100		6,000	66,000	28,000	36,000	6,200		8,000	91,000	53,000	36,000
3,170	1/8	6,000	66,000	28,000	36,000	6,300		8,000	91,000	53,000	36,000
3,200		6,000	66,000	28,000	36,000	6,350	1/4	8,000	91,000	53,000	36,000
3,250		6,000	66,000	28,000	36,000	6,400		8,000	91,000	53,000	36,000
3,300		6,000	66,000	28,000	36,000	6,500		8,000	91,000	53,000	36,000
3,400		6,000	66,000	28,000	36,000	6,600		8,000	91,000	53,000	36,000
3,500		6,000	66,000	28,000	36,000	6,700		8,000	91,000	53,000	36,000
3,570	9/64	6,000	66,000	28,000	36,000	6,750	17/64	8,000	91,000	53,000	36,000
3,600		6,000	66,000	28,000	36,000	6,800		8,000	91,000	53,000	36,000
3,700		6,000	66,000	28,000	36,000	6,900		8,000	91,000	53,000	36,000
3,800		6,000	74,000	36,000	36,000	7,000		8,000	91,000	53,000	36,000
3,900		6,000	74,000	36,000	36,000	7,100		8,000	91,000	53,000	36,000
3,970	5/32	6,000	74,000	36,000	36,000	7,140	9/32	8,000	91,000	53,000	36,000
4,000		6,000	74,000	36,000	36,000	7,200		8,000	91,000	53,000	36,000
4,100		6,000	74,000	36,000	36,000	7,300		8,000	91,000	53,000	36,000
4,200		6,000	74,000	36,000	36,000	7,400		8,000	91,000	53,000	36,000
4,300		6,000	74,000	36,000	36,000	7,500		8,000	91,000	53,000	36,000
4,370	11/64	6,000	74,000	36,000	36,000	7,540	19/64	8,000	91,000	53,000	36,000
4,400		6,000	74,000	36,000	36,000	7,600		8,000	91,000	53,000	36,000
4,500		6,000	74,000	36,000	36,000	7,700		8,000	91,000	53,000	36,000
4,600		6,000	74,000	36,000	36,000	7,800		8,000	91,000	53,000	36,000
4,650		6,000	74,000	36,000	36,000	7,900		8,000	91,000	53,000	36,000
4,700		6,000	74,000	36,000	36,000	7,940	5/16	8,000	91,000	53,000	36,000
4,760	3/16	6,000	82,000	44,000	36,000	8,000		8,000	91,000	53,000	36,000
4,800		6,000	82,000	44,000	36,000	8,100		10,000	103,000	61,000	40,000
4,900		6,000	82,000	44,000	36,000	8,200		10,000	103,000	61,000	40,000
5,000		6,000	82,000	44,000	36,000	8,300		10,000	103,000	61,000	40,000
5,100		6,000	82,000	44,000	36,000	8,330	21/64	10,000	103,000	61,000	40,000
5,160	13/64	6,000	82,000	44,000	36,000	8,400		10,000	103,000	61,000	40,000
5,200		6,000	82,000	44,000	36,000	8,500		10,000	103,000	61,000	40,000
5,300		6,000	82,000	44,000	36,000	8,600		10,000	103,000	61,000	40,000
5,400		6,000	82,000	44,000	36,000	8,700		10,000	103,000	61,000	40,000
5,500		6,000	82,000	44,000	36,000	8,730	11/32	10,000	103,000	61,000	40,000
5,550		6,000	82,000	44,000	36,000	8,800		10,000	103,000	61,000	40,000
5,560	7/32	6,000	82,000	44,000	36,000	8,900		10,000	103,000	61,000	40,000
5,600		6,000	82,000	44,000	36,000	9,000		10,000	103,000	61,000	40,000
5,700		6,000	82,000	44,000	36,000	9,100		10,000	103,000	61,000	40,000
5,800		6,000	82,000	44,000	36,000	9,130	23/64	10,000	103,000	61,000	40,000
5,900		6,000	82,000	44,000	36,000	9,200		10,000	103,000	61,000	40,000
5,950	15/64	6,000	82,000	44,000	36,000	9,250		10,000	103,000	61,000	40,000
6,000		6,000	82,000	44,000	36,000	9,300		10,000	103,000	61,000	40,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,400		10,000	103,000	61,000	40,000	13,000		14,000	124,000	77,000	45,000
9,500		10,000	103,000	61,000	40,000	13,100	33/64	14,000	124,000	77,000	45,000
9,520	3/8	10,000	103,000	61,000	40,000	13,300		14,000	124,000	77,000	45,000
9,600		10,000	103,000	61,000	40,000	13,400		14,000	124,000	77,000	45,000
9,700		10,000	103,000	61,000	40,000	13,500		14,000	124,000	77,000	45,000
9,800		10,000	103,000	61,000	40,000	13,700		14,000	124,000	77,000	45,000
9,900		10,000	103,000	61,000	40,000	13,800		14,000	124,000	77,000	45,000
9,920	25/64	10,000	103,000	61,000	40,000	13,900		14,000	124,000	77,000	45,000
10,000		10,000	103,000	61,000	40,000	14,000		14,000	124,000	77,000	45,000
10,100		12,000	118,000	71,000	45,000	14,100		16,000	133,000	83,000	48,000
10,200		12,000	118,000	71,000	45,000	14,200		16,000	133,000	83,000	48,000
10,300		12,000	118,000	71,000	45,000	14,290	9/16	16,000	133,000	83,000	48,000
10,320	13/32	12,000	118,000	71,000	45,000	14,300		16,000	133,000	83,000	48,000
10,400		12,000	118,000	71,000	45,000	14,400		16,000	133,000	83,000	48,000
10,500		12,000	118,000	71,000	45,000	14,500		16,000	133,000	83,000	48,000
10,600		12,000	118,000	71,000	45,000	14,600		16,000	133,000	83,000	48,000
10,700		12,000	118,000	71,000	45,000	14,700		16,000	133,000	83,000	48,000
10,720	27/64	12,000	118,000	71,000	45,000	14,900		16,000	133,000	83,000	48,000
10,800		12,000	118,000	71,000	45,000	15,000		16,000	133,000	83,000	48,000
10,900		12,000	118,000	71,000	45,000	15,100		16,000	133,000	83,000	48,000
11,000		12,000	118,000	71,000	45,000	15,200		16,000	133,000	83,000	48,000
11,100		12,000	118,000	71,000	45,000	15,300		16,000	133,000	83,000	48,000
11,110	7/16	12,000	118,000	71,000	45,000	15,400		16,000	133,000	83,000	48,000
11,200		12,000	118,000	71,000	45,000	15,500		16,000	133,000	83,000	48,000
11,300		12,000	118,000	71,000	45,000	15,600		16,000	133,000	83,000	48,000
11,400		12,000	118,000	71,000	45,000	15,700		16,000	133,000	83,000	48,000
11,500		12,000	118,000	71,000	45,000	15,800		16,000	133,000	83,000	48,000
11,600		12,000	118,000	71,000	45,000	15,870	5/8	16,000	133,000	83,000	48,000
11,700		12,000	118,000	71,000	45,000	15,900		16,000	133,000	83,000	48,000
11,800		12,000	118,000	71,000	45,000	16,000		16,000	133,000	83,000	48,000
11,900		12,000	118,000	71,000	45,000	16,500		18,000	143,000	93,000	48,000
11,910	15/32	12,000	118,000	71,000	45,000	16,670	21/32	18,000	143,000	93,000	48,000
12,000		12,000	118,000	71,000	45,000	17,000		18,000	143,000	93,000	48,000
12,100		14,000	124,000	77,000	45,000	17,500		18,000	143,000	93,000	48,000
12,200		14,000	124,000	77,000	45,000	18,000		18,000	143,000	93,000	48,000
12,300	31/64	14,000	124,000	77,000	45,000	18,500		20,000	153,000	101,000	50,000
12,400		14,000	124,000	77,000	45,000	19,000		20,000	153,000	101,000	50,000
12,500		14,000	124,000	77,000	45,000	19,500		20,000	153,000	101,000	50,000
12,600		14,000	124,000	77,000	45,000	20,000		20,000	153,000	101,000	50,000
12,700	1/2	14,000	124,000	77,000	45,000						
12,800		14,000	124,000	77,000	45,000						
12,900		14,000	124,000	77,000	45,000						



Brocas-TS con refrigeración interior

Artículo N° 89412



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados)
 hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AISi altamente aleables

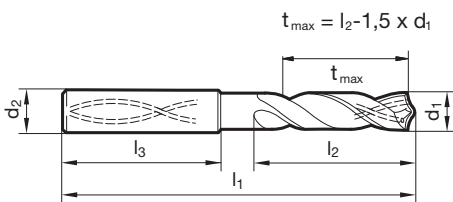
Artículo N° 89416



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados)
 hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AISi altamente aleables



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	70,000	30,000	36,000	5,200		6,000	90,000	50,000	36,000
3,100		6,000	70,000	30,000	36,000	5,300		6,000	90,000	50,000	36,000
3,170	1/8	6,000	70,000	30,000	36,000	5,400		6,000	97,000	57,000	36,000
3,200		6,000	70,000	30,000	36,000	5,500		6,000	97,000	57,000	36,000
3,250		6,000	70,000	30,000	36,000	5,700		6,000	97,000	57,000	36,000
3,300		6,000	70,000	30,000	36,000	5,800		6,000	97,000	57,000	36,000
3,400		6,000	75,000	35,500	36,000	5,900		6,000	97,000	57,000	36,000
3,500		6,000	75,000	35,500	36,000	5,950	15/64	6,000	97,000	57,000	36,000
3,570	9/64	6,000	75,000	35,500	36,000	6,000		6,000	97,000	57,000	36,000
3,600		6,000	75,000	35,500	36,000	6,200		8,000	106,000	66,000	36,000
3,700		6,000	75,000	35,500	36,000	6,300		8,000	106,000	66,000	36,000
3,800		6,000	75,000	37,500	36,000	6,350	1/4	8,000	106,000	66,000	36,000
3,900		6,000	75,000	37,500	36,000	6,500		8,000	106,000	66,000	36,000
3,970	5/32	6,000	75,000	37,500	36,000	6,600		8,000	106,000	66,000	36,000
4,000		6,000	75,000	37,500	36,000	6,700		8,000	106,000	66,000	36,000
4,100		6,000	75,000	37,500	36,000	6,800		8,000	106,000	66,000	36,000
4,200		6,000	75,000	37,500	36,000	6,900		8,000	116,000	76,000	36,000
4,300		6,000	85,000	45,000	36,000	7,000		8,000	116,000	76,000	36,000
4,370	11/64	6,000	85,000	45,000	36,000	7,100		8,000	116,000	76,000	36,000
4,400		6,000	85,000	45,000	36,000	7,200		8,000	116,000	76,000	36,000
4,500		6,000	85,000	45,000	36,000	7,500		8,000	116,000	76,000	36,000
4,600		6,000	85,000	45,000	36,000	7,600		8,000	116,000	76,000	36,000
4,650		6,000	85,000	45,000	36,000	7,700		8,000	116,000	76,000	36,000
4,700		6,000	85,000	45,000	36,000	7,800		8,000	116,000	76,000	36,000
4,760	3/16	6,000	90,000	50,000	36,000	8,000		8,000	116,000	76,000	36,000
4,800		6,000	90,000	50,000	36,000	8,100		10,000	131,000	87,000	40,000
4,900		6,000	90,000	50,000	36,000	8,200		10,000	131,000	87,000	40,000
5,000		6,000	90,000	50,000	36,000	8,400		10,000	131,000	87,000	40,000
5,100		6,000	90,000	50,000	36,000	8,500		10,000	131,000	87,000	40,000
5,160	13/64	6,000	90,000	50,000	36,000	8,600		10,000	131,000	87,000	40,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
8,700		10,000	131,000	87,000	40,000	14,000		14,000	182,000	133,000	45,000
8,800		10,000	131,000	87,000	40,000	14,100		16,000	204,000	152,000	48,000
9,000		10,000	131,000	87,000	40,000	14,200		16,000	204,000	152,000	48,000
9,100		10,000	139,000	95,000	40,000	14,500		16,000	204,000	152,000	48,000
9,200		10,000	139,000	95,000	40,000	15,000		16,000	204,000	152,000	48,000
9,250		10,000	139,000	95,000	40,000	15,100		16,000	204,000	152,000	48,000
9,300		10,000	139,000	95,000	40,000	15,500		16,000	204,000	152,000	48,000
9,400		10,000	139,000	95,000	40,000	16,000		16,000	204,000	152,000	48,000
9,500		10,000	139,000	95,000	40,000	16,500		18,000	223,000	171,000	48,000
9,520	3/8	10,000	139,000	95,000	40,000	16,900		18,000	223,000	171,000	48,000
9,700		10,000	139,000	95,000	40,000	17,000		18,000	223,000	171,000	48,000
9,800		10,000	139,000	95,000	40,000	17,500		18,000	223,000	171,000	48,000
9,900		10,000	139,000	95,000	40,000	18,000		18,000	223,000	171,000	48,000
10,000		10,000	139,000	95,000	40,000	18,500		20,000	244,000	190,000	50,000
10,200		12,000	155,000	106,000	45,000	18,900		20,000	244,000	190,000	50,000
10,300		12,000	155,000	106,000	45,000	19,000		20,000	244,000	190,000	50,000
10,500		12,000	155,000	106,000	45,000	19,050	3/4	20,000	244,000	190,000	50,000
10,800		12,000	155,000	106,000	45,000	19,500		20,000	244,000	190,000	50,000
11,000		12,000	155,000	106,000	45,000	20,000		20,000	244,000	190,000	50,000
11,200		12,000	163,000	114,000	45,000						
11,500		12,000	163,000	114,000	45,000						
11,800		12,000	163,000	114,000	45,000						
12,000		12,000	163,000	114,000	45,000						
12,100		14,000	182,000	133,000	45,000						
12,200		14,000	182,000	133,000	45,000						
12,500		14,000	182,000	133,000	45,000						
12,700	1/2	14,000	182,000	133,000	45,000						
13,000		14,000	182,000	133,000	45,000						
13,100	33/64	14,000	182,000	133,000	45,000						
13,500		14,000	182,000	133,000	45,000						



Brocas-TS con refrigeración interior

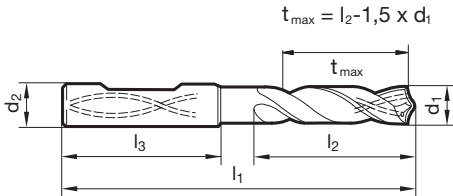
Artículo N° 89308



P	M	K	N	S	H
●	○	○	○		



vaciado de punta $\geq \varnothing 10,000$ • entrada cónica • amortigua oscilaciones y golpes • portaherr. HSS con plaquita HM soldada
 aceros no aleados y de baja aleación • fundición gris, fundición de grafito • latón, bronce, plásticos y grafitos



d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
10,000	16,000	151,000	99,000	48,000	18,000	20,000	202,000	148,000	50,000
11,000	16,000	151,000	99,000	48,000	19,000	25,000	224,000	164,000	56,000
11,800	16,000	151,000	99,000	48,000	20,000	25,000	224,000	164,000	56,000
12,000	16,000	151,000	99,000	48,000	22,000	25,000	241,000	181,000	56,000
13,000	16,000	167,000	115,000	48,000					
13,500	16,000	167,000	115,000	48,000					
14,000	16,000	167,000	115,000	48,000					
15,000	20,000	186,000	132,000	50,000					
16,000	20,000	186,000	132,000	50,000					
16,500	20,000	202,000	148,000	50,000					
17,000	20,000	202,000	148,000	50,000					
17,500	20,000	202,000	148,000	50,000					



Brocas-TS con refrigeración interior

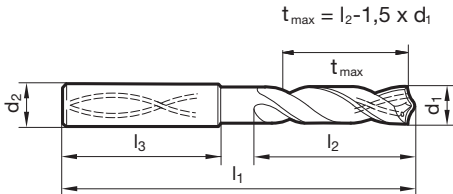
Artículo N° 89427



P	M	K	N	S	H
•				•	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • forma del corte principal ligeramente cóncava • geometría de corte optimizada
 aceros aleados y templados hasta a 1400 N/mm² • Inconel, Hastelloy, Monel • titanio y aleaciones de titanio



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	70,000	30,000	36,000	9,250		10,000	139,000	95,000	40,000
3,250		6,000	70,000	30,000	36,000	9,400		10,000	139,000	95,000	40,000
3,300		6,000	70,000	30,000	36,000	9,500		10,000	139,000	95,000	40,000
3,400		6,000	75,000	35,500	36,000	10,000		10,000	139,000	95,000	40,000
3,500		6,000	75,000	35,500	36,000	10,200		12,000	155,000	106,000	45,000
3,700		6,000	75,000	35,500	36,000	10,400		12,000	155,000	106,000	45,000
4,000		6,000	75,000	37,500	36,000	10,500		12,000	155,000	106,000	45,000
4,200		6,000	75,000	37,500	36,000	10,800		12,000	155,000	106,000	45,000
4,300		6,000	85,000	45,000	36,000	11,000		12,000	155,000	106,000	45,000
4,500		6,000	85,000	45,000	36,000	11,300		12,000	163,000	114,000	45,000
4,650		6,000	85,000	45,000	36,000	11,400		12,000	163,000	114,000	45,000
5,000		6,000	90,000	50,000	36,000	11,500		12,000	163,000	114,000	45,000
5,100		6,000	90,000	50,000	36,000	12,000		12,000	163,000	114,000	45,000
5,200		6,000	90,000	50,000	36,000	12,500		14,000	182,000	133,000	45,000
5,500		6,000	97,000	57,000	36,000	13,000		14,000	182,000	133,000	45,000
5,550		6,000	97,000	57,000	36,000	13,100	33/64	14,000	182,000	133,000	45,000
6,000		6,000	97,000	57,000	36,000	13,500		14,000	182,000	133,000	45,000
6,500		8,000	106,000	66,000	36,000	14,000		14,000	182,000	133,000	45,000
6,750	17/64	8,000	106,000	66,000	36,000	14,500		16,000	204,000	152,000	48,000
6,800		8,000	106,000	66,000	36,000	15,000		16,000	204,000	152,000	48,000
6,900		8,000	116,000	76,000	36,000	15,100		16,000	204,000	152,000	48,000
7,000		8,000	116,000	76,000	36,000	15,500		16,000	204,000	152,000	48,000
7,400		8,000	116,000	76,000	36,000	16,000		16,000	204,000	152,000	48,000
7,500		8,000	116,000	76,000	36,000						
7,800		8,000	116,000	76,000	36,000						
8,000		8,000	116,000	76,000	36,000						
8,500		10,000	131,000	87,000	40,000						
8,600		10,000	131,000	87,000	40,000						
8,800		10,000	131,000	87,000	40,000						
9,000		10,000	131,000	87,000	40,000						



Brocas-TS con refrigeración interior

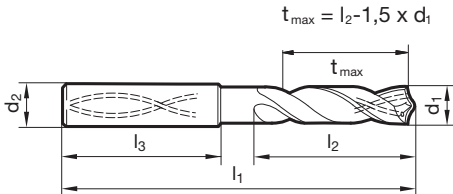
Artículo N° 89421



P	M	K	N	S	H
		•			



vaciado de punta $\geq \varnothing 4,000$ • afilado con radios patentado • forma del corte recta (por corrección)
 fundición vermicular GGV y ADI, CDI • fundición gris, fundición maleable, fundición esférica



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
4,000		6,000	75,000	37,500	36,000	7,200		8,000	116,000	76,000	36,000
4,100		6,000	75,000	37,500	36,000	7,300		8,000	116,000	76,000	36,000
4,200		6,000	75,000	37,500	36,000	7,400		8,000	116,000	76,000	36,000
4,300		6,000	85,000	45,000	36,000	7,500		8,000	116,000	76,000	36,000
4,370	11/64	6,000	85,000	45,000	36,000	7,540	19/64	8,000	116,000	76,000	36,000
4,400		6,000	85,000	45,000	36,000	7,600		8,000	116,000	76,000	36,000
4,500		6,000	85,000	45,000	36,000	7,700		8,000	116,000	76,000	36,000
4,600		6,000	85,000	45,000	36,000	7,800		8,000	116,000	76,000	36,000
4,650		6,000	85,000	45,000	36,000	7,900		8,000	116,000	76,000	36,000
4,700		6,000	85,000	45,000	36,000	7,940	5/16	8,000	116,000	76,000	36,000
4,760	3/16	6,000	90,000	50,000	36,000	8,000		8,000	116,000	76,000	36,000
4,800		6,000	90,000	50,000	36,000	8,100		10,000	131,000	87,000	40,000
4,900		6,000	90,000	50,000	36,000	8,200		10,000	131,000	87,000	40,000
5,000		6,000	90,000	50,000	36,000	8,300		10,000	131,000	87,000	40,000
5,100		6,000	90,000	50,000	36,000	8,330	21/64	10,000	131,000	87,000	40,000
5,160	13/64	6,000	90,000	50,000	36,000	8,400		10,000	131,000	87,000	40,000
5,200		6,000	90,000	50,000	36,000	8,500		10,000	131,000	87,000	40,000
5,300		6,000	90,000	50,000	36,000	8,600		10,000	131,000	87,000	40,000
5,400		6,000	97,000	57,000	36,000	8,700		10,000	131,000	87,000	40,000
5,500		6,000	97,000	57,000	36,000	8,730	11/32	10,000	131,000	87,000	40,000
5,550		6,000	97,000	57,000	36,000	8,800		10,000	131,000	87,000	40,000
5,560	7/32	6,000	97,000	57,000	36,000	8,900		10,000	131,000	87,000	40,000
5,600		6,000	97,000	57,000	36,000	9,000		10,000	131,000	87,000	40,000
5,700		6,000	97,000	57,000	36,000	9,100		10,000	139,000	95,000	40,000
5,800		6,000	97,000	57,000	36,000	9,130	23/64	10,000	139,000	95,000	40,000
5,900		6,000	97,000	57,000	36,000	9,200		10,000	139,000	95,000	40,000
5,950	15/64	6,000	97,000	57,000	36,000	9,250		10,000	139,000	95,000	40,000
6,000		6,000	97,000	57,000	36,000	9,300		10,000	139,000	95,000	40,000
6,100		8,000	106,000	66,000	36,000	9,400		10,000	139,000	95,000	40,000
6,200		8,000	106,000	66,000	36,000	9,500		10,000	139,000	95,000	40,000
6,300		8,000	106,000	66,000	36,000	9,520	3/8	10,000	139,000	95,000	40,000
6,350	1/4	8,000	106,000	66,000	36,000	9,600		10,000	139,000	95,000	40,000
6,400		8,000	106,000	66,000	36,000	9,700		10,000	139,000	95,000	40,000
6,500		8,000	106,000	66,000	36,000	9,800		10,000	139,000	95,000	40,000
6,600		8,000	106,000	66,000	36,000	9,900		10,000	139,000	95,000	40,000
6,700		8,000	106,000	66,000	36,000	9,920	25/64	10,000	139,000	95,000	40,000
6,750	17/64	8,000	106,000	66,000	36,000	10,000		10,000	139,000	95,000	40,000
6,800		8,000	106,000	66,000	36,000	10,100		12,000	155,000	106,000	45,000
6,900		8,000	116,000	76,000	36,000	10,200		12,000	155,000	106,000	45,000
7,000		8,000	116,000	76,000	36,000	10,300		12,000	155,000	106,000	45,000
7,100		8,000	116,000	76,000	36,000	10,320	13/32	12,000	155,000	106,000	45,000
7,140	9/32	8,000	116,000	76,000	36,000	10,400		12,000	155,000	106,000	45,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
10,500		12,000	155,000	106,000	45,000	14,000		14,000	182,000	133,000	45,000
10,600		12,000	155,000	106,000	45,000	14,100		16,000	204,000	152,000	48,000
10,700		12,000	155,000	106,000	45,000	14,200		16,000	204,000	152,000	48,000
10,720	27/64	12,000	155,000	106,000	45,000	14,290	9/16	16,000	204,000	152,000	48,000
10,800		12,000	155,000	106,000	45,000	14,300		16,000	204,000	152,000	48,000
10,900		12,000	155,000	106,000	45,000	14,400		16,000	204,000	152,000	48,000
11,000		12,000	155,000	106,000	45,000	14,500		16,000	204,000	152,000	48,000
11,100		12,000	163,000	114,000	45,000	14,600		16,000	204,000	152,000	48,000
11,110	7/16	12,000	163,000	114,000	45,000	14,700		16,000	204,000	152,000	48,000
11,200		12,000	163,000	114,000	45,000	14,900		16,000	204,000	152,000	48,000
11,300		12,000	163,000	114,000	45,000	15,000		16,000	204,000	152,000	48,000
11,400		12,000	163,000	114,000	45,000	15,100		16,000	204,000	152,000	48,000
11,500		12,000	163,000	114,000	45,000	15,200		16,000	204,000	152,000	48,000
11,600		12,000	163,000	114,000	45,000	15,300		16,000	204,000	152,000	48,000
11,700		12,000	163,000	114,000	45,000	15,400		16,000	204,000	152,000	48,000
11,800		12,000	163,000	114,000	45,000	15,500		16,000	204,000	152,000	48,000
11,900		12,000	163,000	114,000	45,000	15,600		16,000	204,000	152,000	48,000
11,910	15/32	12,000	163,000	114,000	45,000	15,700		16,000	204,000	152,000	48,000
12,000		12,000	163,000	114,000	45,000	15,800		16,000	204,000	152,000	48,000
12,100		14,000	182,000	133,000	45,000	15,870	5/8	16,000	204,000	152,000	48,000
12,200		14,000	182,000	133,000	45,000	15,900		16,000	204,000	152,000	48,000
12,300	31/64	14,000	182,000	133,000	45,000	16,000		16,000	204,000	152,000	48,000
12,400		14,000	182,000	133,000	45,000	16,500		18,000	223,000	171,000	48,000
12,500		14,000	182,000	133,000	45,000	16,670	21/32	18,000	223,000	171,000	48,000
12,600		14,000	182,000	133,000	45,000	17,000		18,000	223,000	171,000	48,000
12,700	1/2	14,000	182,000	133,000	45,000	17,500		18,000	223,000	171,000	48,000
12,800		14,000	182,000	133,000	45,000	18,000		18,000	223,000	171,000	48,000
12,900		14,000	182,000	133,000	45,000	18,500		20,000	244,000	190,000	50,000
13,000		14,000	182,000	133,000	45,000	19,000		20,000	244,000	190,000	50,000
13,100	33/64	14,000	182,000	133,000	45,000	19,500		20,000	244,000	190,000	50,000
13,300		14,000	182,000	133,000	45,000	20,000		20,000	244,000	190,000	50,000
13,400		14,000	182,000	133,000	45,000						
13,500		14,000	182,000	133,000	45,000						
13,700		14,000	182,000	133,000	45,000						
13,800		14,000	182,000	133,000	45,000						
13,900		14,000	182,000	133,000	45,000						

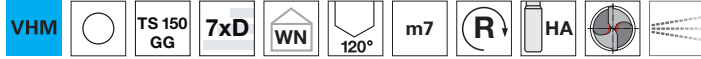


Brocas-TS con refrigeración interior

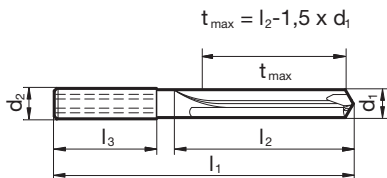
Artículo N° 89294



P	M	K	N	S	H
		○	●		



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • tolerancias en diámetro estrechas • cal. superficial del taladro muy buena
 • vigilar presión óptima del refrigerante
 aluminio y sus aleaciones • aluminios con alto porcentaje de Si



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	74,000	32,000	36,000	9,500		10,000	139,000	95,000	40,000
3,100		6,000	74,000	32,000	36,000	10,000		10,000	139,000	95,000	40,000
3,200		6,000	74,000	32,000	36,000	10,200		12,000	163,000	114,000	45,000
3,300		6,000	74,000	32,000	36,000	10,500		12,000	163,000	114,000	45,000
3,400		6,000	74,000	34,000	36,000	11,000		12,000	163,000	114,000	45,000
3,500		6,000	74,000	34,000	36,000	11,500		12,000	163,000	114,000	45,000
3,600		6,000	74,000	34,000	36,000	12,000		12,000	163,000	114,000	45,000
3,700		6,000	74,000	34,000	36,000	12,300	31/64	14,000	182,000	133,000	45,000
3,800		6,000	97,000	45,000	36,000	12,500		14,000	182,000	133,000	45,000
3,900		6,000	97,000	45,000	36,000	12,700	1/2	14,000	182,000	133,000	45,000
4,000		6,000	97,000	45,000	36,000	13,000		14,000	182,000	133,000	45,000
4,100		6,000	97,000	45,000	36,000	13,500		14,000	182,000	133,000	45,000
4,200		6,000	97,000	45,000	36,000	14,000		14,000	182,000	133,000	45,000
4,300		6,000	97,000	45,000	36,000	14,500		16,000	204,000	152,000	48,000
4,400		6,000	97,000	45,000	36,000	15,000		16,000	204,000	152,000	48,000
4,500		6,000	97,000	45,000	36,000	15,500		16,000	204,000	152,000	48,000
4,700		6,000	97,000	45,000	36,000	16,000		16,000	204,000	152,000	48,000
4,800		6,000	97,000	57,000	36,000	16,500		18,000	223,000	171,000	48,000
4,900		6,000	97,000	57,000	36,000	17,000		18,000	223,000	171,000	48,000
5,000		6,000	97,000	57,000	36,000	17,500		18,000	223,000	171,000	48,000
5,500		6,000	97,000	57,000	36,000	18,000		18,000	223,000	171,000	48,000
6,000		6,000	97,000	57,000	36,000	18,500		20,000	244,000	190,000	50,000
6,500		8,000	116,000	76,000	36,000	19,000		20,000	244,000	190,000	50,000
6,800		8,000	116,000	76,000	36,000	19,500		20,000	244,000	190,000	50,000
7,000		8,000	116,000	76,000	36,000	20,000		20,000	244,000	190,000	50,000
7,500		8,000	116,000	76,000	36,000						
7,800		8,000	116,000	76,000	36,000						
8,000		8,000	116,000	76,000	36,000						
8,500		10,000	139,000	95,000	40,000						
9,000		10,000	139,000	95,000	40,000						

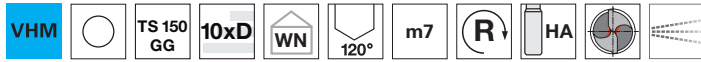


Brocas-TS con refrigeración interior

Artículo N° 89293



P	M	K	N	S	H
		○	●		

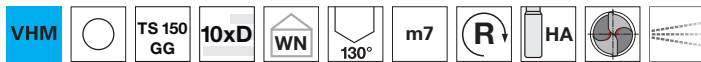


vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • tolerancias en diámetro estrechas • cal. superficial del taladro muy buena
 • vigilar presión óptima del refrigerante
 aluminio y sus aleaciones • aluminios con alto porcentaje de Si

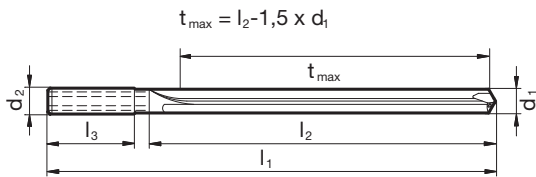
Artículo N° 89295



P	M	K	N	S	H
		●	○		



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • tolerancias en diámetro estrechas • cal. superficial del taladro muy buena
 • vigilar presión óptima del refrigerante
 fundición gris, fundición maleable, fundición esferica



d1	inch	d2 h6	l1	l2	l3	d1	inch	d2 h6	l1	l2	l3
mm		mm	mm	mm	mm	mm		mm	mm	mm	mm
3,000		6,000	91,000	42,000	36,000	8,000		8,000	146,000	106,000	36,000
3,100		6,000	91,000	42,000	36,000	8,330	21/64	10,000	175,000	130,000	40,000
3,170	1/8	6,000	91,000	42,000	36,000	8,500		10,000	175,000	130,000	40,000
3,250		6,000	91,000	42,000	36,000	8,730	11/32	10,000	175,000	130,000	40,000
3,300		6,000	91,000	42,000	36,000	9,000		10,000	175,000	130,000	40,000
3,500		6,000	91,000	48,000	36,000	9,130	23/64	10,000	175,000	130,000	40,000
3,570	9/64	6,000	91,000	48,000	36,000	9,500		10,000	175,000	130,000	40,000
3,600		6,000	91,000	48,000	36,000	9,520	3/8	10,000	175,000	130,000	40,000
3,700		6,000	91,000	48,000	36,000	10,000		10,000	175,000	130,000	40,000
3,800		6,000	121,000	77,000	36,000	10,200		12,000	209,000	159,000	45,000
3,900		6,000	121,000	77,000	36,000	10,320	13/32	12,000	209,000	159,000	45,000
3,970	5/32	6,000	121,000	77,000	36,000	10,500		12,000	209,000	159,000	45,000
4,000		6,000	121,000	77,000	36,000	10,720	27/64	12,000	209,000	159,000	45,000
4,200		6,000	121,000	77,000	36,000	11,000		12,000	209,000	159,000	45,000
4,400		6,000	121,000	77,000	36,000	11,110	7/16	12,000	209,000	159,000	45,000
4,500		6,000	121,000	77,000	36,000	11,500		12,000	209,000	159,000	45,000
4,700		6,000	121,000	77,000	36,000	11,510	29/64	12,000	209,000	159,000	45,000
4,800		6,000	121,000	82,000	36,000	12,000		12,000	209,000	159,000	45,000
4,900		6,000	121,000	82,000	36,000	12,300	31/64	14,000	233,000	183,000	45,000
5,000		6,000	121,000	82,000	36,000	12,500		14,000	233,000	183,000	45,000
5,500		6,000	121,000	82,000	36,000	12,700	1/2	14,000	233,000	183,000	45,000
6,000		6,000	121,000	82,000	36,000	13,000		14,000	233,000	183,000	45,000
6,350	1/4	8,000	146,000	106,000	36,000	13,500		14,000	233,000	183,000	45,000
6,500		8,000	146,000	106,000	36,000	14,000		14,000	233,000	183,000	45,000
6,800		8,000	146,000	106,000	36,000	14,500		16,000	260,000	207,000	48,000
7,000		8,000	146,000	106,000	36,000	15,000		16,000	260,000	207,000	48,000
7,140	9/32	8,000	146,000	106,000	36,000	15,500		16,000	260,000	207,000	48,000
7,500		8,000	146,000	106,000	36,000	16,000		16,000	260,000	207,000	48,000
7,800		8,000	146,000	106,000	36,000	17,500		18,000	284,000	231,000	48,000
7,940	5/16	8,000	146,000	106,000	36,000	18,000		18,000	284,000	231,000	48,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
18,500		20,000	308,000	255,000	50,000						
19,500		20,000	308,000	255,000	50,000						
20,000		20,000	308,000	255,000	50,000						



Brocas-TS con refrigeración interior

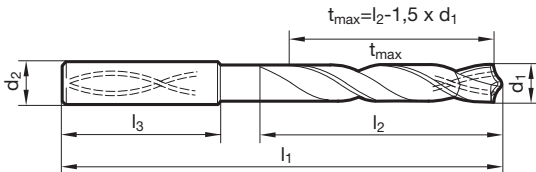
Artículo N° 89418



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • recubrimiento de la cabeza • forma recta del corte principal • geometría de corte optimizada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros (aleados/no aleados)
 hasta 1200 N/mm² • fundición • bronce, latón • aleaciones de AISi altamente aleables



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	90,000	50,000	36,000	7,000		8,000	146,000	108,000	36,000
3,100		6,000	90,000	50,000	36,000	7,100		8,000	146,000	108,000	36,000
3,170	1/8	6,000	90,000	50,000	36,000	7,200		8,000	146,000	108,000	36,000
3,200		6,000	90,000	50,000	36,000	7,300		8,000	146,000	108,000	36,000
3,300		6,000	90,000	50,000	36,000	7,400		8,000	146,000	108,000	36,000
3,400		6,000	90,000	50,000	36,000	7,500		8,000	146,000	108,000	36,000
3,500		6,000	90,000	50,000	36,000	7,600		8,000	146,000	108,000	36,000
3,600		6,000	90,000	50,000	36,000	7,700		8,000	146,000	108,000	36,000
3,700		6,000	90,000	50,000	36,000	7,800		8,000	146,000	108,000	36,000
3,800		6,000	102,000	64,000	36,000	7,900		8,000	146,000	108,000	36,000
3,900		6,000	102,000	64,000	36,000	8,000		8,000	146,000	108,000	36,000
4,000		6,000	102,000	64,000	36,000	8,100		10,000	162,000	120,000	40,000
4,100		6,000	102,000	64,000	36,000	8,200		10,000	162,000	120,000	40,000
4,200		6,000	102,000	64,000	36,000	8,300		10,000	162,000	120,000	40,000
4,300		6,000	102,000	64,000	36,000	8,400		10,000	162,000	120,000	40,000
4,400		6,000	102,000	64,000	36,000	8,500		10,000	162,000	120,000	40,000
4,500		6,000	102,000	64,000	36,000	8,600		10,000	162,000	120,000	40,000
4,600		6,000	102,000	64,000	36,000	8,700		10,000	162,000	120,000	40,000
4,700		6,000	102,000	64,000	36,000	8,800		10,000	162,000	120,000	40,000
4,800		6,000	116,000	78,000	36,000	8,900		10,000	162,000	120,000	40,000
4,900		6,000	116,000	78,000	36,000	9,000		10,000	162,000	120,000	40,000
5,000		6,000	116,000	78,000	36,000	9,100		10,000	162,000	120,000	40,000
5,100		6,000	116,000	78,000	36,000	9,200		10,000	162,000	120,000	40,000
5,200		6,000	116,000	78,000	36,000	9,300		10,000	162,000	120,000	40,000
5,300		6,000	116,000	78,000	36,000	9,400		10,000	162,000	120,000	40,000
5,400		6,000	116,000	78,000	36,000	9,500		10,000	162,000	120,000	40,000
5,500		6,000	116,000	78,000	36,000	9,520	3/8	10,000	162,000	120,000	40,000
5,600		6,000	116,000	78,000	36,000	9,600		10,000	162,000	120,000	40,000
5,700		6,000	116,000	78,000	36,000	9,700		10,000	162,000	120,000	40,000
5,800		6,000	116,000	78,000	36,000	9,800		10,000	162,000	120,000	40,000
5,900		6,000	116,000	78,000	36,000	9,900		10,000	162,000	120,000	40,000
6,000		6,000	116,000	78,000	36,000	10,000		10,000	162,000	120,000	40,000
6,100		8,000	146,000	108,000	36,000	10,200		12,000	204,000	156,000	45,000
6,200		8,000	146,000	108,000	36,000	10,500		12,000	204,000	156,000	45,000
6,300		8,000	146,000	108,000	36,000	11,000		12,000	204,000	156,000	45,000
6,350	1/4	8,000	146,000	108,000	36,000	11,500		12,000	204,000	156,000	45,000
6,400		8,000	146,000	108,000	36,000	12,000		12,000	204,000	156,000	45,000
6,500		8,000	146,000	108,000	36,000	12,500		14,000	230,000	182,000	45,000
6,600		8,000	146,000	108,000	36,000	12,700	1/2	14,000	230,000	182,000	45,000
6,700		8,000	146,000	108,000	36,000	13,000		14,000	230,000	182,000	45,000
6,800		8,000	146,000	108,000	36,000	13,500		14,000	230,000	182,000	45,000
6,900		8,000	146,000	108,000	36,000	14,000		14,000	230,000	182,000	45,000



Brocas-TS con refrigeración interior

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
14,500		16,000	260,000	208,000	48,000	20,000		20,000	310,000	258,000	50,000
15,000		16,000	260,000	208,000	48,000						
15,500		16,000	260,000	208,000	48,000						
16,000		16,000	260,000	208,000	48,000						
16,500		18,000	285,000	234,000	48,000						
17,000		18,000	285,000	234,000	48,000						
17,500		18,000	285,000	234,000	48,000						
18,000		18,000	285,000	234,000	48,000						
18,500		20,000	310,000	258,000	50,000						
19,000		20,000	310,000	258,000	50,000						
19,050	3/4	20,000	310,000	258,000	50,000						
19,500		20,000	310,000	258,000	50,000						



Brocas-TS con refrigeración interior

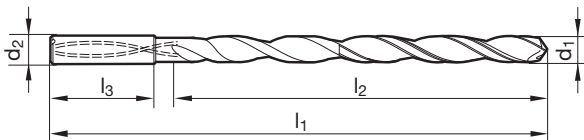
Artículo N° 86509



P	M	K	N	S	H
•	•	•	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • recubrimiento de la cabeza • forma cóncava del corte principal • sección de ranura optimizada • sección máxima del canal de lubricación • vigilar presión del refrigerante
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	95,000	55,000	36,000	7,940	5/16	8,000	183,000	143,000	36,000
3,170	1/8	6,000	106,000	67,000	36,000	8,000		8,000	183,000	143,000	36,000
3,500		6,000	116,000	76,000	36,000	8,330	21/64	10,000	204,000	160,000	40,000
3,570	9/64	6,000	116,000	76,000	36,000	8,500		10,000	204,000	160,000	40,000
3,970	5/32	6,000	116,000	76,000	36,000	9,000		10,000	204,000	160,000	40,000
4,000		6,000	116,000	76,000	36,000	9,130	23/64	10,000	221,000	177,000	40,000
4,370	11/64	6,000	133,000	93,000	36,000	9,520	3/8	10,000	221,000	177,000	40,000
4,500		6,000	133,000	93,000	36,000	9,920	25/64	10,000	221,000	177,000	40,000
4,760	3/16	6,000	133,000	93,000	36,000	10,000		10,000	221,000	177,000	40,000
5,000		6,000	133,000	93,000	36,000	10,320	13/32	12,000	247,000	198,000	45,000
5,100		6,000	150,000	110,000	36,000	10,720	27/64	12,000	247,000	198,000	45,000
5,160	13/64	6,000	150,000	110,000	36,000	11,000		12,000	247,000	198,000	45,000
5,410		6,000	150,000	110,000	36,000	11,110	7/16	12,000	263,000	214,000	45,000
5,500		6,000	150,000	110,000	36,000	11,510	29/64	12,000	263,000	214,000	45,000
5,560	7/32	6,000	150,000	110,000	36,000	11,910	15/32	12,000	263,000	214,000	45,000
5,950	15/64	6,000	150,000	110,000	36,000	12,000		12,000	263,000	214,000	45,000
6,000		6,000	150,000	110,000	36,000	12,300	31/64	14,000	297,000	248,000	45,000
6,350	1/4	8,000	167,000	127,000	36,000	12,700	1/2	14,000	297,000	248,000	45,000
6,500		8,000	167,000	127,000	36,000	13,100	33/64	14,000	297,000	248,000	45,000
6,750	17/64	8,000	167,000	127,000	36,000	13,490	17/32	14,000	297,000	248,000	45,000
7,000		8,000	167,000	127,000	36,000	13,890	35/64	14,000	297,000	248,000	45,000
7,140	9/32	8,000	183,000	143,000	36,000	14,000		14,000	297,000	248,000	45,000
7,500		8,000	183,000	143,000	36,000						
7,540	19/64	8,000	183,000	143,000	36,000						



Brocas-TS con refrigeración interior

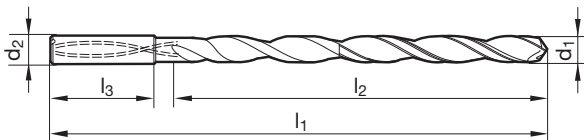
Artículo N° 86511



P	M	K	N	S	H
•	•	•	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • recubrimiento de la cabeza • forma cóncava del corte principal • sección de ranura optimizada • sección máxima del canal de lubricación • vigilar presión del refrigerante
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	110,000	70,000	36,000	9,000		10,000	249,000	205,000	40,000
3,170	1/8	6,000	123,000	83,000	36,000	9,920	25/64	10,000	271,000	227,000	40,000
3,500		6,000	136,000	96,000	36,000	10,000		10,000	271,000	227,000	40,000
3,970	5/32	6,000	136,000	96,000	36,000	11,000		12,000	302,000	253,000	45,000
4,000		6,000	136,000	96,000	36,000	12,000		12,000	323,000	274,000	45,000
4,500		6,000	158,000	118,000	36,000	12,300	31/64	14,000	367,000	318,000	45,000
4,760	3/16	6,000	158,000	118,000	36,000	13,100	33/64	14,000	367,000	318,000	45,000
5,000		6,000	158,000	118,000	36,000	13,490	17/32	14,000	367,000	318,000	45,000
5,500		6,000	180,000	140,000	36,000	13,890	35/64	14,000	367,000	318,000	45,000
5,560	7/32	6,000	180,000	140,000	36,000	14,000		14,000	367,000	318,000	45,000
6,000		6,000	180,000	140,000	36,000						
6,350	1/4	8,000	202,000	162,000	36,000						
6,500		8,000	202,000	162,000	36,000						
7,000		8,000	202,000	162,000	36,000						
7,140	9/32	8,000	223,000	183,000	36,000						
7,500		8,000	223,000	183,000	36,000						
8,000		8,000	223,000	183,000	36,000						
8,500		10,000	249,000	205,000	40,000						



Brocas-TS con refrigeración interior

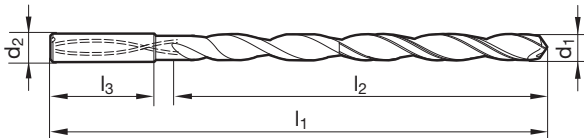
Artículo N° 86512



P	M	K	N	S	H
•	•	•	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • recubrimiento de la cabeza • forma cóncava del corte principal • sección de ranura optimizada • sección máxima del canal de lubricación • vigilar presión del refrigerante
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1		d2 h6	l1	l2	l3	d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm	mm	inch	mm	mm	mm	mm
3,000		6,000	125,000	85,000	36,000	7,140	9/32	8,000	263,000	223,000	36,000
3,100		6,000	141,000	101,000	36,000	7,500		8,000	263,000	223,000	36,000
3,170	1/8	6,000	141,000	101,000	36,000	8,000		8,000	263,000	223,000	36,000
3,500		6,000	156,000	116,000	36,000	8,500		10,000	294,000	250,000	40,000
3,800		6,000	156,000	116,000	36,000	8,800		10,000	294,000	250,000	40,000
3,970	5/32	6,000	156,000	116,000	36,000	9,000		10,000	294,000	250,000	40,000
4,000		6,000	156,000	116,000	36,000	9,920	25/64	10,000	321,000	277,000	40,000
4,200		6,000	183,000	143,000	36,000	10,000		10,000	321,000	277,000	40,000
4,500		6,000	183,000	143,000	36,000	10,320	13/32	12,000	359,000	310,000	45,000
4,760	3/16	6,000	183,000	143,000	36,000	11,000		12,000	359,000	310,000	45,000
5,000		6,000	183,000	143,000	36,000	11,510	29/64	12,000	386,000	337,000	45,000
5,500		6,000	210,000	170,000	36,000	11,910	15/32	12,000	386,000	337,000	45,000
5,560	7/32	6,000	210,000	170,000	36,000	12,000		12,000	386,000	337,000	45,000
6,000		6,000	210,000	170,000	36,000						
6,300		8,000	237,000	197,000	36,000						
6,350	1/4	8,000	237,000	197,000	36,000						
6,500		8,000	237,000	197,000	36,000						
7,000		8,000	237,000	197,000	36,000						

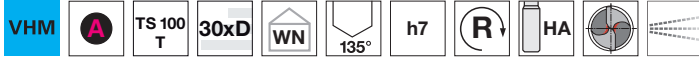


Brocas-TS con refrigeración interior

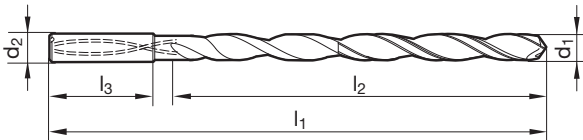
Artículo N° 86513



P	M	K	N	S	H
•	•	•	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • recubrimiento de la cabeza • forma cóncava del corte principal • sección de ranura optimizada • sección máxima del canal de lubricación • vigilar presión del refrigerante
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	140,000	100,000	36,000	7,140	9/32	8,000	303,000	263,000	36,000
3,100		6,000	158,000	118,000	36,000	7,500		8,000	303,000	263,000	36,000
3,170	1/8	6,000	158,000	118,000	36,000	8,000		8,000	303,000	263,000	36,000
3,500		6,000	176,000	136,000	36,000	8,500		10,000	339,000	295,000	40,000
3,800		6,000	176,000	136,000	36,000	8,800		10,000	339,000	295,000	40,000
3,970	5/32	6,000	176,000	136,000	36,000	9,000		10,000	339,000	295,000	40,000
4,000		6,000	176,000	136,000	36,000	9,920	25/64	10,000	371,000	327,000	40,000
4,200		6,000	208,000	168,000	36,000	10,000		10,000	371,000	327,000	40,000
4,500		6,000	208,000	168,000	36,000						
4,760	3/16	6,000	208,000	168,000	36,000						
5,000		6,000	208,000	168,000	36,000						
5,500		6,000	240,000	200,000	36,000						
5,560	7/32	6,000	240,000	200,000	36,000						
6,000		6,000	240,000	200,000	36,000						
6,300		8,000	272,000	232,000	36,000						
6,350	1/4	8,000	272,000	232,000	36,000						
6,500		8,000	272,000	232,000	36,000						
7,000		8,000	272,000	232,000	36,000						



Brocas-TS con refrigeración interior

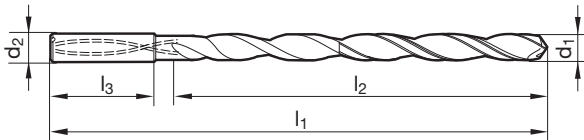
Artículo N° 86514



P	M	K	N	S	H
•	•	•	○	○	○



vaciado de punta $\geq \varnothing 3,000$ • entrada cónica • recubrimiento de la cabeza • forma cóncava del corte principal • sección de ranura optimizada • sección máxima del canal de lubricación • vigilar presión del refrigerante
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	170,000	130,000	36,000	5,950	15/64	6,000	300,000	260,000	36,000
3,100		6,000	193,000	153,000	36,000	6,000		6,000	300,000	260,000	36,000
3,170	1/8	6,000	193,000	153,000	36,000	6,300		8,000	322,000	282,000	36,000
3,500		6,000	193,000	153,000	36,000	6,350	1/4	8,000	322,000	282,000	36,000
3,570	9/64	6,000	216,000	176,000	36,000	6,500		8,000	322,000	282,000	36,000
3,800		6,000	216,000	176,000	36,000	6,750	17/64	8,000	342,000	302,000	36,000
3,970	5/32	6,000	216,000	176,000	36,000	7,000		8,000	342,000	302,000	36,000
4,000		6,000	216,000	176,000	36,000	7,140	9/32	8,000	363,000	323,000	36,000
4,200		6,000	238,000	198,000	36,000	7,500		8,000	363,000	323,000	36,000
4,370	11/64	6,000	238,000	198,000	36,000	7,540	19/64	8,000	383,000	343,000	36,000
4,500		6,000	238,000	198,000	36,000	7,940	5/16	8,000	383,000	343,000	36,000
4,760	3/16	6,000	258,000	218,000	36,000	8,000		8,000	383,000	343,000	36,000
5,000		6,000	258,000	218,000	36,000						
5,100		6,000	280,000	240,000	36,000						
5,160	13/64	6,000	280,000	240,000	36,000						
5,410		6,000	280,000	240,000	36,000						
5,500		6,000	280,000	240,000	36,000						
5,560	7/32	6,000	300,000	260,000	36,000						

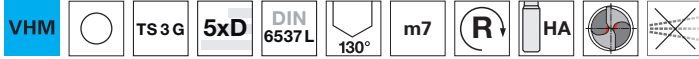


Brocas-TS, 3 cortes

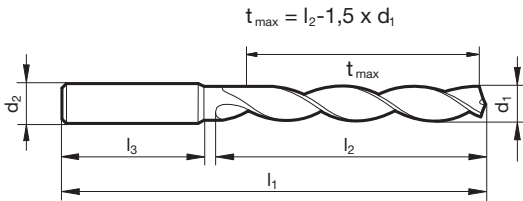
Artículo N° 89247



P	M	K	N	S	H
		•	•		



vaciado de punta $\geq \varnothing 3,000$ • afilado spiropoint • ranuras amplias • centrado óptimo • adecuado para corte interrumpido
fundición • aleaciones de aluminio de viruta larga • latón, bronce



d1 mm	d2 mm	l1 mm	l2 mm	l3 mm	d1 mm	d2 mm	l1 mm	l2 mm	l3 mm
3,000	6,000	66,000	28,000	36,000	8,700	10,000	103,000	61,000	40,000
3,100	6,000	66,000	28,000	36,000	8,800	10,000	103,000	61,000	40,000
3,200	6,000	66,000	28,000	36,000	9,000	10,000	103,000	61,000	40,000
3,300	6,000	66,000	28,000	36,000	9,100	10,000	103,000	61,000	40,000
3,500	6,000	66,000	28,000	36,000	9,500	10,000	103,000	61,000	40,000
3,700	6,000	66,000	28,000	36,000	9,800	10,000	103,000	61,000	40,000
3,800	6,000	74,000	36,000	36,000	10,000	10,000	103,000	61,000	40,000
4,000	6,000	74,000	36,000	36,000	10,100	12,000	118,000	71,000	45,000
4,100	6,000	74,000	36,000	36,000	10,200	12,000	118,000	71,000	45,000
4,200	6,000	74,000	36,000	36,000	10,300	12,000	118,000	71,000	45,000
4,500	6,000	74,000	36,000	36,000	10,500	12,000	118,000	71,000	45,000
4,800	6,000	82,000	44,000	36,000	11,000	12,000	118,000	71,000	45,000
5,000	6,000	82,000	44,000	36,000	11,200	12,000	118,000	71,000	45,000
5,100	6,000	82,000	44,000	36,000	11,500	12,000	118,000	71,000	45,000
5,200	6,000	82,000	44,000	36,000	11,800	12,000	118,000	71,000	45,000
5,300	6,000	82,000	44,000	36,000	12,000	12,000	118,000	71,000	45,000
5,500	6,000	82,000	44,000	36,000	12,100	14,000	124,000	77,000	45,000
5,800	6,000	82,000	44,000	36,000	12,500	14,000	124,000	77,000	45,000
6,000	6,000	82,000	44,000	36,000	13,000	14,000	124,000	77,000	45,000
6,100	8,000	91,000	53,000	36,000	13,500	14,000	124,000	77,000	45,000
6,200	8,000	91,000	53,000	36,000	14,000	14,000	124,000	77,000	45,000
6,400	8,000	91,000	53,000	36,000	14,500	16,000	133,000	83,000	48,000
6,500	8,000	91,000	53,000	36,000	15,000	16,000	133,000	83,000	48,000
6,700	8,000	91,000	53,000	36,000	15,500	16,000	133,000	83,000	48,000
6,800	8,000	91,000	53,000	36,000	16,000	16,000	133,000	83,000	48,000
7,000	8,000	91,000	53,000	36,000	16,500	18,000	143,000	93,000	48,000
7,100	8,000	91,000	53,000	36,000	17,000	18,000	143,000	93,000	48,000
7,400	8,000	91,000	53,000	36,000	17,500	18,000	143,000	93,000	48,000
7,500	8,000	91,000	53,000	36,000	18,000	18,000	143,000	93,000	48,000
7,800	8,000	91,000	53,000	36,000	18,500	20,000	153,000	101,000	50,000
8,000	8,000	91,000	53,000	36,000	19,000	20,000	153,000	101,000	50,000
8,100	10,000	103,000	61,000	40,000	19,500	20,000	153,000	101,000	50,000
8,200	10,000	103,000	61,000	40,000	20,000	20,000	153,000	101,000	50,000
8,400	10,000	103,000	61,000	40,000					
8,500	10,000	103,000	61,000	40,000					
8,600	10,000	103,000	61,000	40,000					



Brocas-TS, 3 cortes

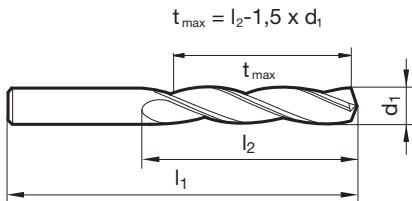
Artículo N° 89239



P	M	K	N	S	H
		•	•		



vaciado de punta $\geq \varnothing 3,000$ • afilado plano • para taladros muy precisos en medida • cal. superficial del taladro muy buena
 • adecuado para corte interrumpido
 fundición • aleaciones de aluminio y fundición



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
3,000	46,000	22,000	7,400	74,000	45,000
3,100	49,000	24,000	7,500	74,000	45,000
3,200	49,000	24,000	7,600	79,000	48,000
3,300	49,000	24,000	7,700	79,000	48,000
3,400	52,000	27,000	7,800	79,000	48,000
3,500	52,000	27,000	8,000	79,000	48,000
3,600	52,000	27,000	8,100	79,000	48,000
3,700	52,000	27,000	8,200	79,000	48,000
3,800	55,000	30,000	8,400	79,000	48,000
3,900	55,000	30,000	8,500	79,000	48,000
4,000	55,000	30,000	8,700	84,000	52,000
4,100	55,000	30,000	8,800	84,000	52,000
4,200	55,000	30,000	9,000	84,000	52,000
4,300	58,000	32,000	9,100	84,000	52,000
4,500	58,000	32,000	9,200	84,000	52,000
4,600	58,000	32,000	9,300	84,000	52,000
4,700	58,000	32,000	9,500	84,000	52,000
4,800	62,000	35,000	9,600	89,000	55,000
4,900	62,000	35,000	9,700	89,000	55,000
5,000	62,000	35,000	9,800	89,000	55,000
5,100	62,000	35,000	10,000	89,000	55,000
5,200	62,000	35,000	10,200	89,000	55,000
5,300	62,000	35,000	10,300	89,000	55,000
5,400	66,000	39,000	10,500	89,000	55,000
5,500	66,000	39,000	10,700	95,000	60,000
5,600	66,000	39,000	11,000	95,000	60,000
5,700	66,000	39,000	11,110	95,000	60,000
5,800	66,000	39,000	11,200	95,000	60,000
5,900	66,000	39,000	11,500	95,000	60,000
6,000	66,000	39,000	11,800	95,000	60,000
6,100	70,000	42,000	12,000	102,000	65,000
6,200	70,000	42,000	12,500	102,000	65,000
6,300	70,000	42,000	12,700	102,000	65,000
6,400	70,000	42,000	13,000	102,000	65,000
6,500	70,000	42,000	13,500	107,000	66,000
6,600	70,000	42,000	13,800	107,000	66,000
6,700	70,000	42,000	14,000	107,000	66,000
6,800	74,000	45,000	14,300	111,000	70,000
7,000	74,000	45,000	14,500	111,000	70,000
7,100	74,000	45,000	15,000	111,000	70,000
7,200	74,000	45,000	15,500	115,000	73,000
7,300	74,000	45,000	16,000	115,000	73,000



HARTNER

Brocas-TS, 3 cortes

d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
17,000	119,000	73,000			
18,500	127,000	76,000			
19,000	127,000	76,000			
20,000	131,000	79,000			



Desbarbador

Artículo N° 84100

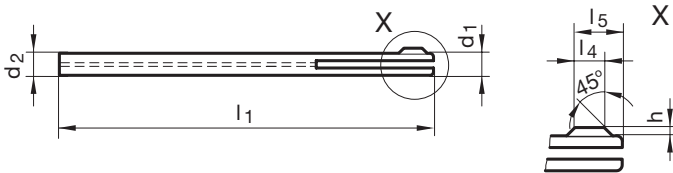


P	M	K	N	S	H
•	•	•	○	•	○



con refrigeración interna • con mango cilíndrico para el agarre con pinzas

rebarbado interno y externo • aplicable universalmente en máquinas herramientas, fresadoras, tornos y robots



Campo de dia.	d1 mm	d2 mm	l1 mm	l4 mm	l5 mm	h mm	Código N°
1,91-2,15	1,900	1,900	80,000	1,000	2,050	0,350	2,000
2,16-2,40	2,100	2,100	80,000	1,500	2,600	0,400	2,250
2,41-2,70	2,400	2,400	80,000	1,500	2,900	0,400	2,500
2,71-2,90	2,600	2,600	90,000	1,500	2,950	0,450	2,750
2,91-3,25	2,900	2,900	90,000	2,000	3,650	0,450	3,000
3,26-3,60	3,200	3,200	90,000	2,000	3,800	0,600	3,500
3,61-4,25	3,600	3,600	90,000	2,000	4,100	0,700	4,000
4,26-4,75	4,200	4,200	90,000	2,500	4,600	0,700	4,500
4,76-5,30	4,700	4,700	100,000	2,500	4,850	0,750	5,000
5,31-5,80	5,200	5,200	100,000	2,500	4,850	0,750	5,500
5,81-6,20	5,600	5,600	110,000	3,000	5,800	0,800	6,000
6,21-6,70	6,000	6,000	110,000	3,000	5,900	0,900	6,500
6,71-7,10	6,500	6,500	110,000	3,000	5,850	0,850	7,000
7,11-7,60	6,900	6,900	110,000	3,500	6,950	0,950	7,500
7,61-8,05	7,300	7,300	110,000	3,500	7,000	1,000	8,000



Desbarbador

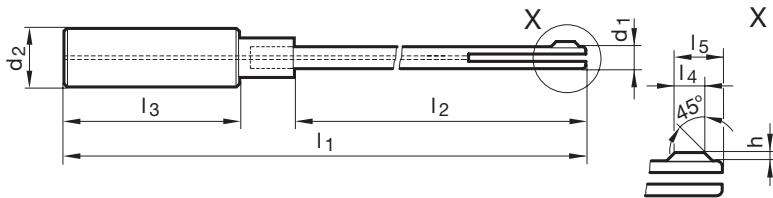
Artículo N° 84101



P	M	K	N	S	H
•	•	•	○	•	○



para portaherramientas hidráulicos y térmicos • con mango según DIN 6535 • con refrigeración interna
rebarbado interno y externo • aplicable universalmente en máquinas herramientas, fresadoras, tornos y robots



Campo de dia.	d1 mm	d2 mm	l1 mm	l2 mm	l3 mm	l4 mm	l5 mm	h mm	Código N°
1,91 -2,15	1,900	6,000	120,000	69,000	36,000	1,000	2,050	0,350	2,000
2,16 -2,40	2,100	6,000	120,000	69,000	36,000	1,500	2,600	0,400	2,250
2,41 -2,70	2,400	6,000	120,000	69,000	36,000	1,500	2,900	0,400	2,500
2,71 -2,90	2,600	6,000	130,000	79,000	36,000	1,500	2,950	0,450	2,750
2,91 -3,25	2,900	6,000	130,000	79,000	36,000	2,000	3,650	0,450	3,000
3,26 -3,60	3,200	10,000	135,000	80,000	40,000	2,000	3,800	0,600	3,500
3,61 -4,25	3,600	10,000	135,000	80,000	40,000	2,000	4,100	0,700	4,000
4,26 -4,75	4,200	10,000	135,000	80,000	40,000	2,500	4,600	0,700	4,500
4,76 -5,30	4,700	10,000	145,000	80,000	40,000	2,500	4,850	0,750	5,000
5,31 -5,80	5,200	10,000	145,000	90,000	40,000	2,500	4,850	0,750	5,500
5,81 -6,20	5,600	10,000	155,000	90,000	40,000	3,000	5,800	0,800	6,000
6,21 -6,70	6,000	16,000	165,000	102,000	48,000	3,000	5,900	0,900	6,500
6,71 -7,10	6,500	16,000	165,000	102,000	48,000	3,000	5,850	0,850	7,000
7,11 -7,60	6,900	16,000	165,000	102,000	48,000	3,500	6,950	0,950	7,500
7,61 -8,05	7,300	16,000	165,000	102,000	48,000	3,500	7,000	1,000	8,000



HARTNER

Rebarbadores 90°

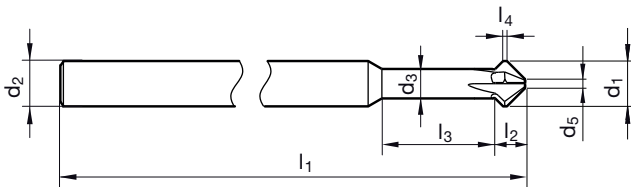
Artículo N° 80495



P	M	K	N	S	H
•	•	•	○	•	○



con mango según DIN 6535 • para portaherramientas hidráulicos y térmicos
 rebarbado interno y externo • rebarbado de taladros y conturas

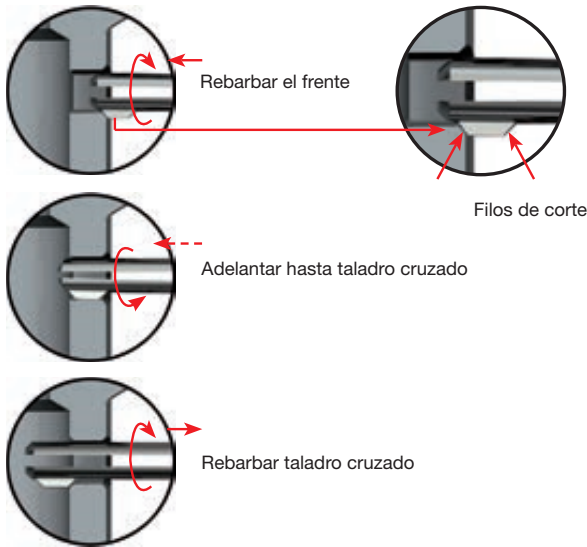


d1 mm	d2 h6 mm	d3 mm	d5 mm	l1 mm	l2 mm	l3 mm	l4 mm	Z	Código N°
3,000	4,000	2,200	0,600	75,000	2,10	9,300	0,500	4	3,000
4,000	4,000	2,900	0,800	75,000	2,70	12,300	0,500	4	4,000
5,000	5,000	3,900	1,000	75,000	3,00	15,000	0,500	4	5,000
6,000	6,000	3,900	1,200	100,000	3,90	14,300	0,500	4	6,000
8,000	6,000	6,000	1,600	100,000	4,70		0,500	4	8,000
10,000	6,000	6,000	2,000	100,000	6,50		0,500	4	10,000
12,000	6,000	6,000	2,400	100,000	8,30		0,500	4	12,000



Desbarbador en metal duro TS 100 EG

Operación



Paso a paso:

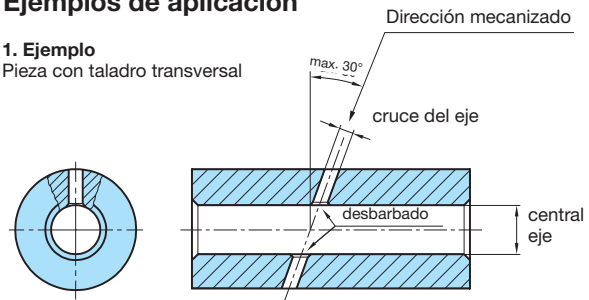
Chaflandores para interiores y exteriores en metal duro TS 100 EG es una fácil y económica alternativa a las costosas operaciones manuales. Una única herramienta para todos los pasos del mecanizado.

Rango de Ø (mm)	v_c m/min	f_u (mm)
< Ø 4	8 - 10	0,1 - 0,2
Ø 4 - < Ø 6	10 - 14	0,1 - 0,2
6 - Ø 8	14 - 20	0,1 - 0,2

Ejemplos de aplicación

1. Ejemplo

Pieza con taladro transversal

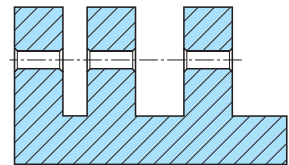


En piezas con taladro transversal tener en cuenta:

- el diámetro del taladro transversal debe ser máximo un 35% del diámetro del taladro central
- El diámetro del agujero cruzado debe ser 40% más largo que la longitud de corte. l_4

2. Ejemplo

Pieza de trabajo con corte multi-interrumpido



Aplicación universal:

El nuevo sistema de desbarbadores permiten trabajar tanto en agujeros cruzados al eje como en trabajar con corte multiinterrumpido y produce chaflanados y avellanados de gran calidad tanto en la caras como en el interior de la pieza.

Importante:

Por favor tenga en cuenta que estos valores son orientativos. Se pueden adaptar en más o menos.

Rebarbadores de avance y retroceso TS 100 VR

Valores de corte rebarbadores de avance y retroceso TS 100 VR

Grupo de material	Tenacidad dureza MPa (N/mm ²)	v_c (m/min)	Nº de avance
Aceros	< 850	120 - 200	71
	850-1200	100 - 180	71
	> 1200	80 - 140	71
Aceros endurecidos	< 54 HRC	60 - 120	71
	54-60 HRC	40 - 80	71
Aceros inox. y resist. al ácido	< 850	80 - 120	71
Aleaciones de Níquel	< 1300	30 - 60	71
Aleaciones de Titanio	< 1300	50 - 100	71
Fundición	< 240 HB30	120 - 180	72
	> 240 HB30	100 - 160	72
Aleac. past. de Al < 3% Si		150 - 250	72
Aleac. fund. de Al > 3% Si		100 - 200	72
Aleaciones de Magnesio		150 - 250	72
Aleaciones no ferríticas	< 850	30 - 200	72

Código de avance (mm/rev.)

Ø	71	72
≤ 3,00	0,060	0,080
4,00	0,100	0,125
5,00	0,100	0,125
6,30	0,125	0,160
8,00	0,160	0,200
10,00	0,200	0,250
12,50	0,200	0,250

Importante:

Por favor tenga en cuenta que estos valores son orientativos. Se pueden adaptar en más o menos.

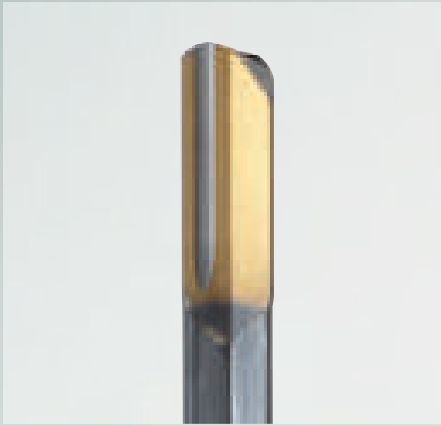


HARTNER

Precision Cutting Tools



MULTIPLEx





HARTNER

Precision Cutting Tools

BROCAS CAÑÓN DE UNO Y DOS LABIOS DE CORTE

fabricada en metal duro, con cabeza de metal
duro soldada o con plaquita intercambiable,
brillante y con recubrimiento

Brocas cañón de uno
y dos labios de corte



P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Broca monolabio E 100













						Norma de fab.	TLB E 100	Metal duro		derecha	HA	25xD	2,380 - 12,000	89520	253
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	50xD	2,380 - 8,000	89521	254
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	75xD	2,380 - 6,000	89522	255
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	45.000	1,200 - 3,200	89503	256
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	45.000	1,200 - 3,200	89510	256
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	80.000	1,200 - 5,000	89501	257
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	80.000	1,200 - 5,000	89511	257
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	120.000	1,500 - 5,000	89504	258
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	120.000	1,500 - 5,000	89512	258
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	160.000	1,500 - 8,000	89502	259
						Norma de fab.	TLB E 100	Metal duro		derecha	HA	160.000	1,500 - 8,000	89513	259

Broca monolabio E 80

						Norma de fab.	TLB E 80	Carbide		derecha	HA	20xD	3,970 - 12,700	89505	260
						Norma de fab.	TLB E 80	Carbide		derecha	HA	20xD	3,970 - 12,700	89514	260

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Broca monolabio E 80

	•	○	•	○	○	○	Norma de fab.	TLB E 80	Carbide		derecha	HA	30xD	3,970 - 12,700	89509	261
	○	•	○	•	○	○	Norma de fab.	TLB E 80	Carbide		derecha	HA	30xD	3,970 - 12,700	89515	261
	•	○	•	○	○	○	Norma de fab.	TLB E 80	Carbide		derecha	HA	40xD	3,970 - 12,700	89506	262
	○	•	○	•	○	○	Norma de fab.	TLB E 80	Carbide		derecha	HA	40xD	3,970 - 12,700	89516	262
	•	○	•	○	○	○	Norma de fab.	TLB E 80	Carbide		derecha	HA	80xD	4,950 - 12,650	89507	263
	○	•	○	•	○	○	Norma de fab.	TLB E 80	Carbide		derecha	HA	80xD	4,950 - 12,650	89517	263

Broca monolabio con plaquita E-800

	•	○	○	•	○	○	Norma de fab.	TLB E 800	Carbide		derecha	HB	30xD	12,000 - 24,000	89530	264
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Plaquetas de corte para brocas monolabio E 800

•	○	○	•	○	○	Norma de fab.		Metal duro		derecha			12,000 - 40,000	89535	265
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Patines guía per brocas monolabio E 800

•	○	○	•	○	○	Norma de fab.		Metal duro					12,000 - 40,000	89536	266
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Brocas cañon con 2 labios de corte Z 80

			•			Norma de fab.	TLB Z 80	Carbide		derecha	HA	30xD	8,000 - 12,000	89508	267
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P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Brocas cañon con 2 labios de corte Z 80



		•				Norma de fab.	TLB Z 80	Carbide	○	derecha	HA	30xD	8,000 - 12,000	89518	267
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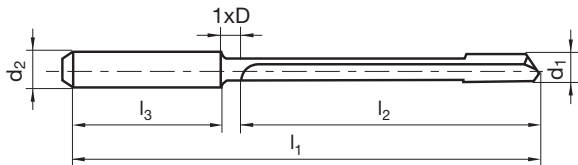
Broca monolabio E 100

Artículo N° 89520

P	M	K	N	S	H
•	•	○	•	○	○



profundidad hasta 25xD • forma de circunferencia G • mango MMS con final cónico desde d1 = 3 mm es decir d2 = 6mm



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
2,380	3/32	4,000	100,000	70,000	28,000
2,500		4,000	115,000	85,000	28,000
2,780	7/64	4,000	115,000	85,000	28,000
3,000		6,000	145,000	105,000	36,000
3,170	1/8	6,000	145,000	105,000	36,000
3,500		6,000	145,000	105,000	36,000
3,970	5/32	6,000	160,000	120,000	36,000
4,000		6,000	160,000	120,000	36,000
5,000		6,000	220,000	180,000	36,000
5,560	7/32	6,000	220,000	180,000	36,000
6,000		6,000	220,000	180,000	36,000
6,350	1/4	8,000	260,000	210,000	36,000
7,000		8,000	260,000	210,000	36,000
7,140	9/32	8,000	285,000	240,000	36,000
8,000		8,000	285,000	240,000	36,000
9,000		10,000	350,000	300,000	40,000
10,000		10,000	350,000	300,000	40,000
11,000		12,000	420,000	360,000	45,000
12,000		12,000	420,000	360,000	45,000



HARTNER

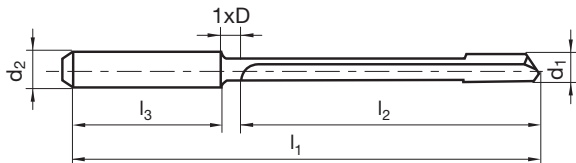
Broca monolabio E 100

Artículo N° 89521

P	M	K	N	S	H
•	•	○	•	○	○



profundidad hasta 50xD • forma de circunferencia G • mango MMS con final cónico desde d1 = 3 mm es decir d2 = 6mm



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
2,380	3/32	4,000	160,000	130,000	28,000
2,500		4,000	185,000	155,000	28,000
2,780	7/64	4,000	185,000	155,000	28,000
3,000		6,000	230,000	190,000	36,000
3,170	1/8	6,000	230,000	190,000	36,000
3,500		6,000	230,000	190,000	36,000
3,970	5/32	6,000	260,000	220,000	36,000
4,000		6,000	260,000	220,000	36,000
5,000		6,000	370,000	330,000	36,000
5,560	7/32	6,000	370,000	330,000	36,000
6,000		6,000	370,000	330,000	36,000
6,350	1/4	8,000	430,000	385,000	36,000
7,000		8,000	430,000	385,000	36,000
7,140	9/32	8,000	485,000	440,000	36,000
8,000		8,000	485,000	440,000	36,000



HARTNER

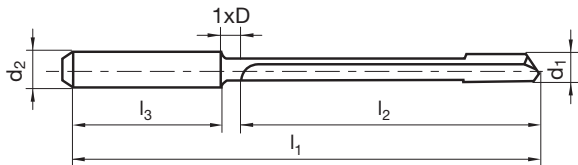
Broca monolabio E 100

Artículo N° 89522

P	M	K	N	S	H
•	•	○	•	○	○



profundidad hasta 75xD • forma de circunferencia G • mango MMS con final cónico desde d1 = 3 mm es decir d2 = 6mm



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
2,380	3/32	4,000	220,000	190,000	28,000
2,500		4,000	255,000	220,000	28,000
2,780	7/64	4,000	255,000	220,000	28,000
3,000		6,000	320,000	280,000	36,000
3,170	1/8	6,000	320,000	280,000	36,000
3,500		6,000	320,000	280,000	36,000
3,970	5/32	6,000	360,000	320,000	36,000
4,000		6,000	360,000	320,000	36,000
5,000		6,000	525,000	485,000	36,000
5,560	7/32	6,000	525,000	485,000	36,000
6,000		6,000	525,000	485,000	36,000



HARTNER

Broca monolabio E 100

Artículo N° 89503



P	M	K	N	S	H
○	○	○	●	●	○



longitud de corte 45 mm • forma de circunferencia G

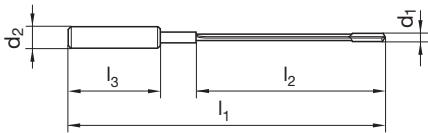
Artículo N° 89510



P	M	K	N	S	H
●	○	●	○	○	○



longitud de corte 45 mm • forma de circunferencia G



d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm
1,200		4,000	90,000	45,000	28,000
1,500		4,000	90,000	45,000	28,000
1,600		4,000	90,000	45,000	28,000
2,000		4,000	90,000	45,000	28,000
2,500		10,000	100,000	45,000	40,000
2,700		10,000	100,000	45,000	40,000
3,000		10,000	100,000	45,000	40,000
3,200		10,000	100,000	45,000	40,000



Broca monolabio E 100

Artículo N° 89501



P	M	K	N	S	H
○	○	○	●	●	○



longitud de corte 80 mm • forma de circunferencia G

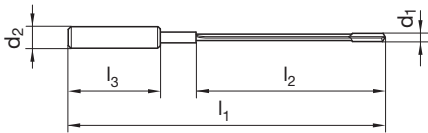
Artículo N° 89511



P	M	K	N	S	H
●	○	●	○	○	○



longitud de corte 80 mm • forma de circunferencia G



d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm
1,200		4,000	125,000	80,000	28,000
1,500		4,000	125,000	80,000	28,000
1,600		4,000	125,000	80,000	28,000
2,000		4,000	125,000	80,000	28,000
2,500		10,000	135,000	80,000	40,000
2,700		10,000	135,000	80,000	40,000
3,000		10,000	135,000	80,000	40,000
3,200		10,000	135,000	80,000	40,000
3,500		10,000	135,000	80,000	40,000
4,000		10,000	135,000	80,000	40,000
4,200		10,000	135,000	80,000	40,000
4,500		10,000	135,000	80,000	40,000
5,000		10,000	135,000	80,000	40,000



Broca monolabio E 100

Artículo N° 89504



P	M	K	N	S	H
○	○	○	●	●	○



longitud de corte 120 mm • forma de circunferencia G

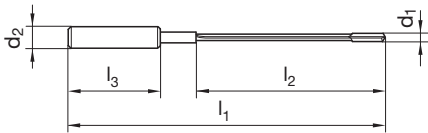
Artículo N° 89512



P	M	K	N	S	H
●	○	●	○	○	○



longitud de corte 120 mm • forma de circunferencia G



d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm
1,500		4,000	165,000	120,000	28,000
1,600		4,000	165,000	120,000	28,000
2,000		4,000	165,000	120,000	28,000
2,500		10,000	175,000	120,000	40,000
2,700		10,000	175,000	120,000	40,000
3,000		10,000	175,000	120,000	40,000
3,200		10,000	175,000	120,000	40,000
3,500		10,000	175,000	120,000	40,000
4,000		10,000	175,000	120,000	40,000
4,200		10,000	175,000	120,000	40,000
4,500		10,000	175,000	120,000	40,000
5,000		10,000	175,000	120,000	40,000



HARTNER

Broca monolabio E 100

Artículo N° 89502



P	M	K	N	S	H
○	○	○	●	●	○



longitud de corte 160 mm • forma de circunferencia G

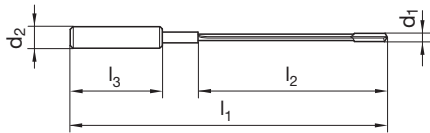
Artículo N° 89513



P	M	K	N	S	H
●	○	●	○	○	○



longitud de corte 160 mm • forma de circunferencia G



d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm
1,500		4,000	205,000	160,000	28,000
1,600		4,000	205,000	160,000	28,000
2,000		4,000	205,000	160,000	28,000
2,500		10,000	215,000	160,000	40,000
2,700		10,000	215,000	160,000	40,000
3,000		10,000	215,000	160,000	40,000
3,200		10,000	215,000	160,000	40,000
3,500		10,000	215,000	160,000	40,000
4,000		10,000	215,000	160,000	40,000
4,200		10,000	215,000	160,000	40,000
4,500		10,000	215,000	160,000	40,000
5,000		10,000	215,000	160,000	40,000
6,000		16,000	225,000	160,000	48,000
8,000		16,000	225,000	160,000	48,000



Broca monolabio E 80

Artículo N° 89505



P	M	K	N	S	H
●	○	●	○	○	○



profundidad hasta 20xD • forma de circunferencia G • con rompevirutas longitudinal

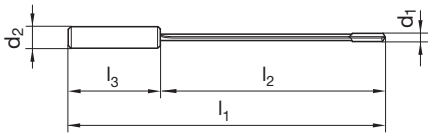
Artículo N° 89514



P	M	K	N	S	H
○	●	○	○	●	○



profundidad hasta 20xD • forma de circunferencia G • para aceros aleados y altamente aleables



d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm
3,970	5/32	10,000	150,000	100,000	40,000
4,000		12,000	150,000	100,000	45,000
4,200		12,000	160,000	110,000	45,000
4,500		12,000	170,000	120,000	45,000
5,000		16,000	180,000	130,000	48,000
5,156		16,000	180,000	130,000	48,000
5,500		16,000	190,000	140,000	48,000
6,000		16,000	210,000	160,000	48,000
6,350	1/4	16,000	220,000	170,000	48,000
6,500		16,000	220,000	170,000	48,000
7,000		16,000	235,000	185,000	48,000
7,938	5/16	16,000	260,000	210,000	48,000
8,000		16,000	260,000	210,000	48,000
9,000		16,000	280,000	230,000	48,000
9,525	3/8	16,000	290,000	240,000	48,000
10,000		20,000	320,000	260,000	50,000
11,000		20,000	340,000	290,000	50,000
11,113	7/16	20,000	340,000	290,000	50,000
12,000		20,000	370,000	310,000	50,000
12,700	1/2	20,000	385,000	330,000	50,000



Broca monolabio E 80

Artículo N° 89509



P	M	K	N	S	H
●	○	●	○	○	○



profundidad hasta 30xD • forma de circunferencia G • con rompevirutas longitudinal

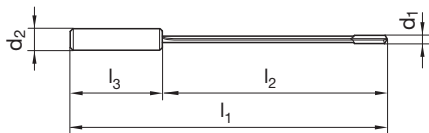
Artículo N° 89515



P	M	K	N	S	H
○	●	○	○	●	○



profundidad hasta 30xD • forma de circunferencia G • para aceros aleados y altamente aleables



d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm
3,970	5/32	10,000	200,000	155,000	40,000
4,000		12,000	200,000	155,000	45,000
4,200		12,000	210,000	165,000	45,000
4,500		12,000	220,000	175,000	45,000
5,000		16,000	230,000	182,000	48,000
5,156		16,000	230,000	182,000	48,000
5,500		16,000	245,000	197,000	48,000
6,000		16,000	260,000	212,000	48,000
6,350	1/4	16,000	275,000	227,000	48,000
6,500		16,000	275,000	227,000	48,000
7,000		16,000	290,000	242,000	48,000
7,938	5/16	16,000	320,000	272,000	48,000
8,000		16,000	320,000	272,000	48,000
9,000		16,000	350,000	302,000	48,000
9,525	3/8	16,000	380,000	330,000	48,000
10,000		20,000	400,000	350,000	50,000
11,000		20,000	430,000	380,000	50,000
11,113	7/16	20,000	430,000	380,000	50,000
12,000		20,000	450,000	400,000	50,000
12,700	1/2	20,000	500,000	450,000	50,000



HARTNER

Broca monolabio E 80

Artículo N° 89506



P	M	K	N	S	H
●	○	●	○	○	○



profundidad hasta 40xD • forma de circunferencia G • con rompevirutas longitudinal

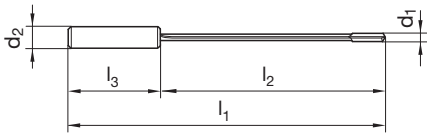
Artículo N° 89516



P	M	K	N	S	H
○	●	○	○	●	○



profundidad hasta 40xD • forma de circunferencia G • para aceros aleados y altamente aleables



d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm
3,970	5/32	10,000	230,000	185,000	40,000
4,000		12,000	230,000	185,000	45,000
4,200		12,000	240,000	195,000	45,000
4,500		12,000	250,000	205,000	45,000
5,000		16,000	280,000	232,000	48,000
5,156		16,000	280,000	232,000	48,000
5,500		16,000	300,000	252,000	48,000
6,000		16,000	320,000	272,000	48,000
6,350	1/4	16,000	340,000	292,000	48,000
6,500		16,000	340,000	292,000	48,000
7,000		16,000	370,000	322,000	48,000
7,938	5/16	16,000	420,000	372,000	48,000
8,000		16,000	420,000	372,000	48,000
9,000		16,000	450,000	402,000	48,000
9,525	3/8	16,000	480,000	432,000	48,000
10,000		20,000	510,000	460,000	50,000
11,000		20,000	550,000	500,000	50,000
11,113	7/16	20,000	550,000	500,000	50,000
12,000		20,000	600,000	550,000	50,000
12,700	1/2	20,000	635,000	585,000	50,000



HARTNER

Broca monolabio E 80

Artículo N° 89507



P	M	K	N	S	H
●	○	●	○	○	○



profundidad hasta 80xD • forma de circunferencia G • con rompevirutas longitudinal • para materiales de viruta larga • profundidad máxima de taladrado por herramienta 40xD, para profundidades más grandes utilizar art.n°. 89506

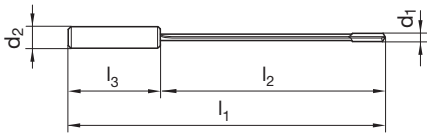
Artículo N° 89517



P	M	K	N	S	H
○	●	○	○	●	○



profundidad hasta 80xD • forma de circunferencia G • taladrado máximo por herramienta 40xD, en mayores profundidades de taladrado antes utilizar broca art.n° 89516 • para aceros aleados y altamente aleables



d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm
4,950		16,000	480,000	432,000	48,000
5,106		16,000	480,000	432,000	48,000
5,950	15/64	16,000	560,000	512,000	48,000
6,300		16,000	590,000	542,000	48,000
6,950		16,000	650,000	602,000	48,000
7,888		16,000	740,000	692,000	48,000
7,950		16,000	740,000	692,000	48,000
8,950		16,000	820,000	772,000	48,000
9,475		16,000	870,000	822,000	48,000
9,950		20,000	910,000	860,000	50,000
10,950		20,000	995,000	945,000	50,000
11,063		20,000	995,000	945,000	50,000
11,950		20,000	1080,000	1030,000	50,000
12,650		20,000	1140,000	1090,000	50,000



Broca·monolabio·con plaquita E-800

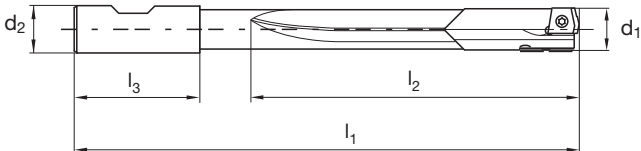
Artículo N° 89530



P	M	K	N	S	H
•	○	○	•	○	



profundidad hasta 30xD • con placa intercambiable • con patines guía intercambiables • con atornillador • con tornillos • aplicación universal



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
12,000		20,000	446,000	384,000	50,000
12,700	1/2	20,000	468,000	406,000	50,000
14,000		20,000	510,000	448,000	50,000
15,000		25,000	548,000	480,000	56,000
16,000		25,000	580,000	512,000	56,000
18,000		25,000	644,000	576,000	56,000
20,000		32,000	712,000	640,000	60,000
24,000		32,000	840,000	768,000	60,000



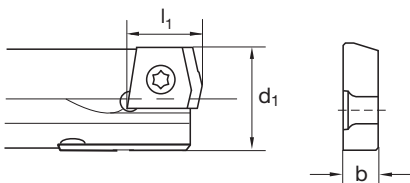
Plaquitas de corte para brocas monolabio E 800

Artículo N° 89535

P	M	K	N	S	H
●	○	○	●	○	○



aplicación universal



d1 mm	l1 mm	b mm	Código N°	d1 mm	l1 mm	b mm	Código N°
12,000	10,000	2,800	12,000	25,500	15,000	4,000	25,500
12,500	10,000	2,800	12,500	25,800	15,000	4,000	25,800
12,700	10,000	2,800	12,700	26,000	16,000	5,000	26,000
13,000	10,000	2,800	13,000	26,500	16,000	5,000	26,500
13,500	10,000	2,800	13,500	27,000	16,000	5,000	27,000
14,000	10,000	2,800	14,000	27,500	16,000	5,000	27,500
14,500	10,000	2,800	14,500	28,000	16,000	5,000	28,000
15,000	10,000	2,800	15,000	28,100	16,000	5,000	28,100
16,000	12,000	3,000	16,000	28,500	16,000	5,000	28,500
16,100	12,000	3,000	16,100	29,000	16,000	5,000	29,000
16,300	12,000	3,000	16,300	29,500	16,000	5,000	29,500
16,500	12,000	3,000	16,500	29,700	16,000	5,000	29,700
17,000	12,000	3,000	17,000	30,000	18,000	6,000	30,000
17,500	12,000	3,000	17,500	30,100	18,000	6,000	30,100
18,000	12,000	3,000	18,000	30,500	18,000	6,000	30,500
18,400	12,000	3,000	18,400	31,000	18,000	6,000	31,000
18,500	12,000	3,000	18,500	31,500	18,000	6,000	31,500
19,000	12,000	3,000	19,000	32,000	18,000	6,000	32,000
19,300	12,000	3,000	19,300	32,500	18,000	6,000	32,500
19,500	12,000	3,000	19,500	33,000	18,000	6,000	33,000
19,800	12,000	3,000	19,800	33,500	18,000	6,000	33,500
20,000	15,000	4,000	20,000	34,000	19,000	6,500	34,000
20,200	15,000	4,000	20,200	34,500	19,000	6,500	34,500
20,500	15,000	4,000	20,500	35,000	19,000	6,500	35,000
21,000	15,000	4,000	21,000	35,500	19,000	6,500	35,500
21,500	15,000	4,000	21,500	36,000	19,000	6,500	36,000
22,000	15,000	4,000	22,000	36,500	19,000	6,500	36,500
22,200	15,000	4,000	22,200	37,000	19,000	6,500	37,000
22,500	15,000	4,000	22,500	37,500	19,000	6,500	37,500
23,000	15,000	4,000	23,000	37,700	19,000	6,500	37,700
23,500	15,000	4,000	23,500	38,000	20,000	7,000	38,000
24,000	15,000	4,000	24,000	38,100	20,000	7,000	38,100
24,500	15,000	4,000	24,500	38,500	20,000	7,000	38,500
25,000	15,000	4,000	25,000	39,000	20,000	7,000	39,000
25,100	15,000	4,000	25,100	39,500	20,000	7,000	39,500
25,400	15,000	4,000	25,400	40,000	20,000	7,000	40,000



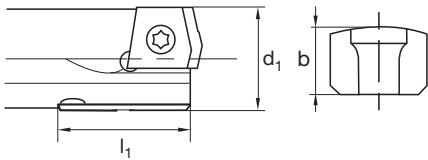
Patines guía per brocas monolabio E 800

Artículo N° 89536

P	M	K	N	S	H
●	○	○	●	○	○



aplicación universal



d1 mm	l1 mm	b mm	Código N°	d1 mm	l1 mm	b mm	Código N°
12,000	19,950	2,150	12,000	25,500	25,000	3,350	25,500
12,500	19,950	2,150	12,500	25,800	25,000	3,500	25,800
12,700	19,950	2,250	12,700	26,000	25,000	3,850	26,000
13,000	19,950	2,150	13,000	26,500	25,000	3,850	26,500
13,500	19,950	2,150	13,500	27,000	25,000	3,850	27,000
14,000	19,950	2,150	14,000	27,500	25,000	3,850	27,500
14,500	19,950	2,150	14,500	28,000	25,000	3,850	28,000
15,000	19,950	2,150	15,000	28,100	25,000	3,900	28,100
16,000	20,000	2,850	16,000	28,500	25,000	3,850	28,500
16,100	20,000	2,900	16,100	29,000	25,000	3,850	29,000
16,300	20,000	3,000	16,300	29,500	25,000	3,850	29,500
16,500	20,000	2,850	16,500	29,700	25,000	3,950	29,700
17,000	20,000	2,850	17,000	30,000	30,000	4,350	30,000
17,500	20,000	2,850	17,500	30,100	30,000	4,400	30,100
18,000	20,000	2,850	18,000	30,500	30,000	4,350	30,500
18,400	20,000	3,050	18,400	31,000	30,000	4,350	31,000
18,500	20,000	2,850	18,500	31,500	30,000	4,350	31,500
19,000	20,000	2,850	19,000	32,000	30,000	4,350	32,000
19,300	20,000	3,000	19,300	32,500	30,000	4,350	32,500
19,500	20,000	2,850	19,500	33,000	30,000	4,350	33,000
19,800	20,000	3,000	19,800	33,500	30,000	4,350	33,500
20,000	25,000	3,350	20,000	34,000	30,000	4,850	34,000
20,200	25,000	3,450	20,200	34,500	30,000	4,850	34,500
20,500	25,000	3,350	20,500	35,000	30,000	4,850	35,000
21,000	25,000	3,350	21,000	35,500	30,000	4,850	35,500
21,500	25,000	3,350	21,500	36,000	30,000	4,850	36,000
22,000	25,000	3,350	22,000	36,500	30,000	4,850	36,500
22,200	25,000	3,450	22,200	37,000	30,000	4,850	37,000
22,500	25,000	3,350	22,500	37,500	30,000	4,850	37,500
23,000	25,000	3,350	23,000	37,700	30,000	4,950	37,700
23,500	25,000	3,350	23,500	38,000	30,000	5,350	38,000
24,000	25,000	3,350	24,000	38,100	30,000	5,400	38,100
24,500	25,000	3,350	24,500	38,500	30,000	5,350	38,500
25,000	25,000	3,350	25,000	39,000	30,000	5,350	39,000
25,100	25,000	3,400	25,100	39,500	30,000	5,350	39,500
25,400	25,000	3,550	25,400	40,000	30,000	5,600	40,000



Brocas cañon con 2 labios de corte Z 80

Artículo N° 89508



P	M	K	N	S	H
			•		



profundidad hasta 30xD • brocas cañón de 4 facetas • para aluminio

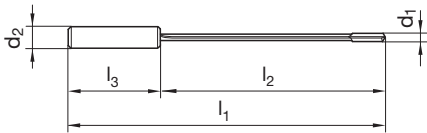
Artículo N° 89518



P	M	K	N	S	H
		•			



profundidad hasta 30xD • brocas cañón de 4 facetas • para fundición



d1		d2 h6	l1	l2	l3
mm	inch	mm	mm	mm	mm
8,000		16,000	330,000	280,000	48,000
10,000		20,000	390,000	340,000	50,000
12,000		20,000	450,000	400,000	50,000



Brocas p. agujeros profundos E 100

Válido para casi todo tipo de materiales, disponible de \varnothing 0,9-12,0 mm, longitud ranura máx. 500* mm



* dependiente de \varnothing

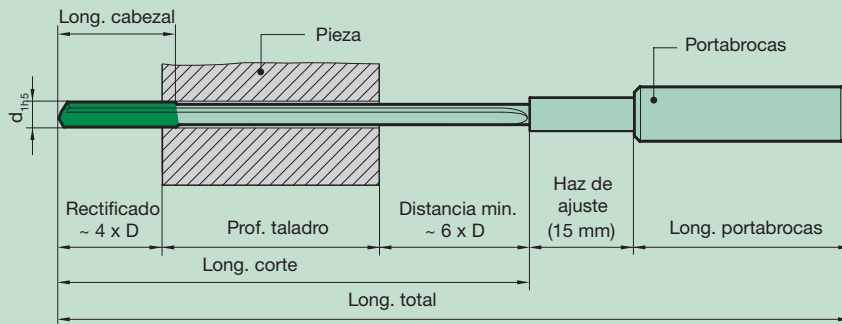


Si quiere que se ofrezca y fabrique el E 100 especial, utilice por favor el formulario para hacer su petición de oferta y pedido.

En algunos casos, no se puede garantizar el funcionamiento de las herramientas sin recubrimiento. Por lo tanto, el recubrimiento es inevitable en determinados materiales ver aplicaciones recomendaciones en parte técnica.

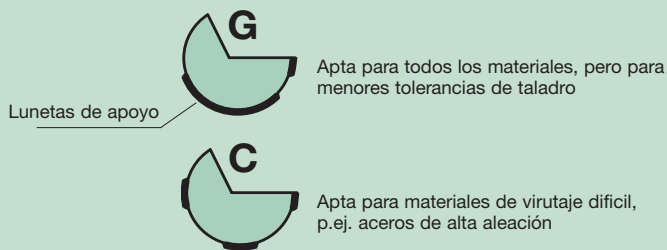
T TiN **A** TiAIN **C** TiCN **F** FIRE **Y** TiAISIN **A** AlTiN **a** AlTiN nano

Dimensiones necesarias para el cálculo de longitud para máquinas de herramientas convencionales



Formas de circunferencia

Possibilidad de suministro de formas de circunferencia especiales)



Destalonados estándar

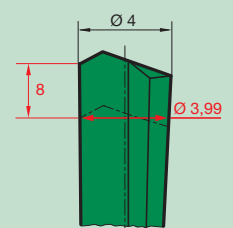
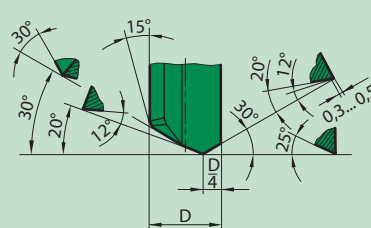
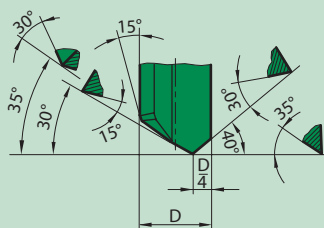
(Posibilidad de suministro de destalonados especiales)

\varnothing 2...4,00 mm

\varnothing > 4,01...20 mm

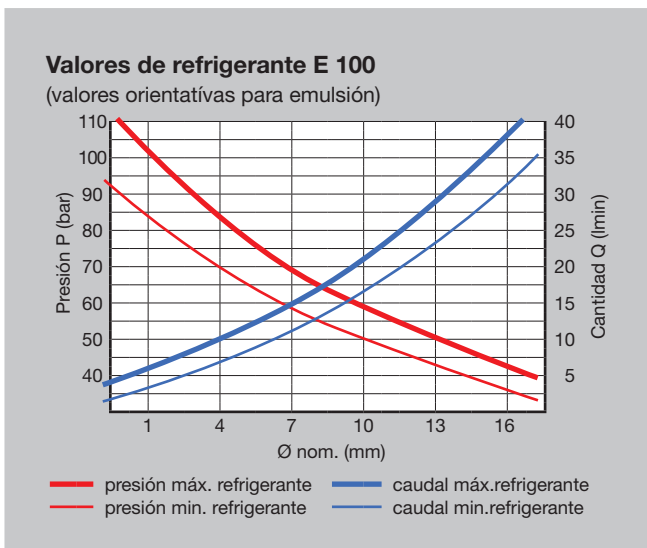
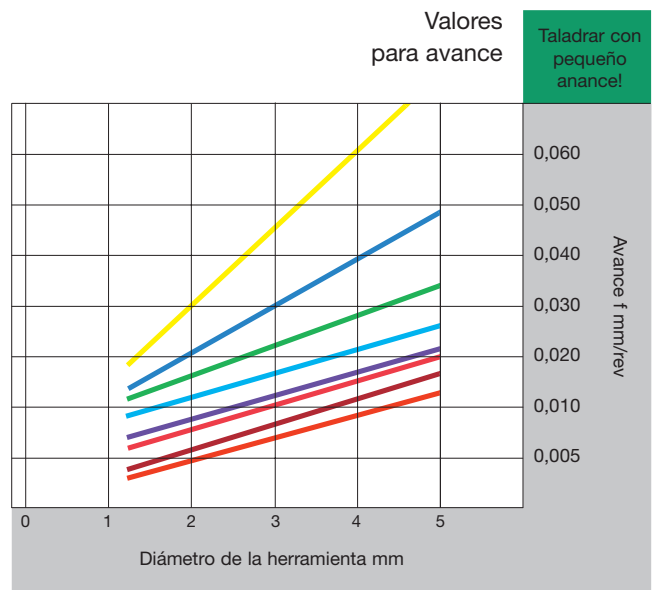
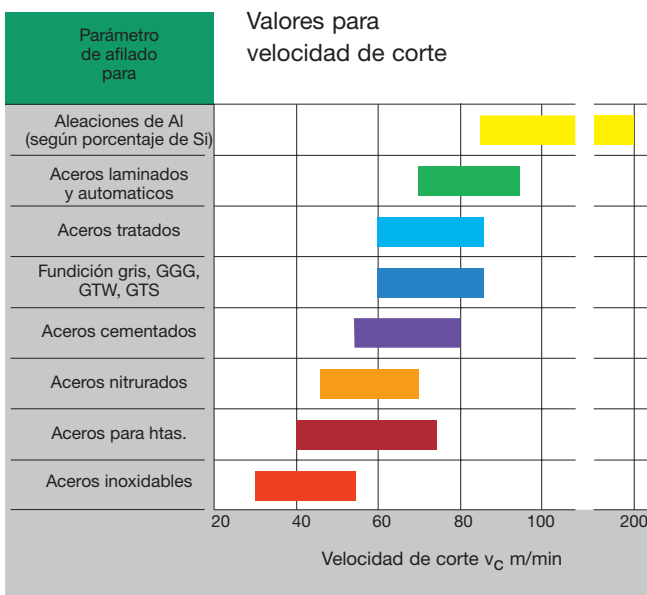
Conicidad
(Dimensiones en mm)

1:800 (Standard)





Brocas p. agujeros profundos E 100



E100 metal duro integral con mango sólido



Recubrimiento AlTiN nano adecuado para todo tipo de materiales



Metal duro integral con mango sólido con final de mango cónico para MQL



Brocas monolabio, cabeza MD E 80

Válido para casi todo tipo de materiales, disponible desde \varnothing 2-40,0 mm, longitud total max. 3000 mm



Si quiere que se ofrezca y fabrique el EB 80 especial, utilice por favor el formulario para hacer su petición de oferta y pedido.

Bajo consulta, podemos utilizar filos de PKD o PKB para \varnothing 6,0...20,0 mm.

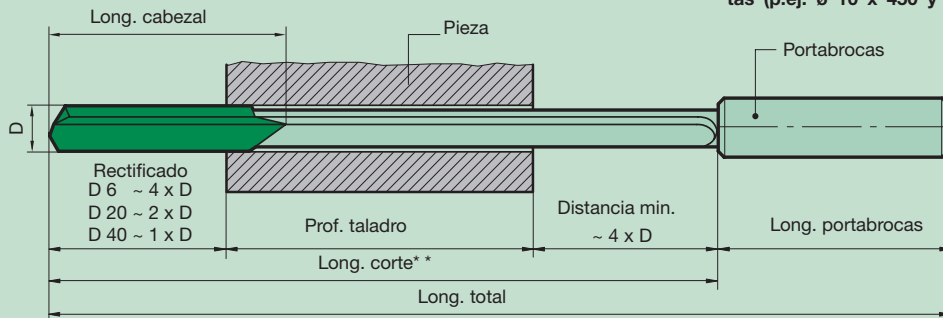
De este modo, la vida útil se multiplica, p.ej. con aleaciones AISi.

En algunos casos, no se puede garantizar el funcionamiento de las herramientas sin recubrimiento. Por lo tanto, el recubrimiento es inevitable en determinados materiales ver aplicaciones recomendaciones en parte técnica.

T TiN **A** TiAIN **C** TiCN **F** FIRE **Y** TiAISiN **A** AlTiN **a** AlTiN nano

Dimensiones necesarias para el cálculo de longitud para máquinas de herramientas convencionales

* Largo máx. ranura de sujeción por herramienta 40xD; para mayores profundidades de taladro, utilizar dos herramientas (p.ej. \varnothing 10 x 450 y \varnothing 9,95 x 850 mm)



Formas de circunferencia

(Posición de lunetas de apoyo)

Versiones estándar



Apta para todos los materiales, pero para menores tolerancias de taladro



Apta para materiales de virutaje difícil, p.ej. aceros de alta aleación

luneta de apoyo

Versiones especiales



Apta para todos los materiales, pero para mayores tolerancias de taladro

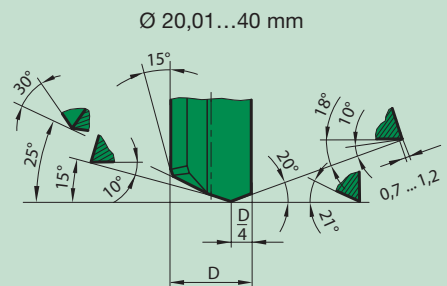
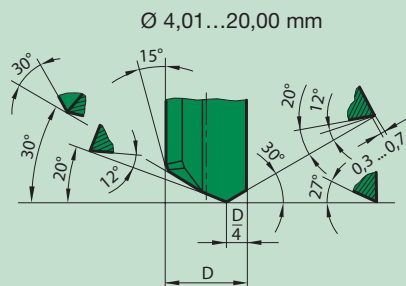
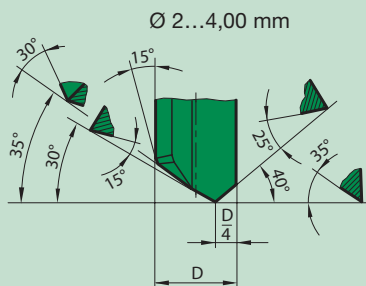


Apta para todos los materiales, pero solo en condiciones malas de centrado



Este tipo es apropiado para fundición gris

Destalonados estándar (Posibilidad de suministro con destalonados especiales)

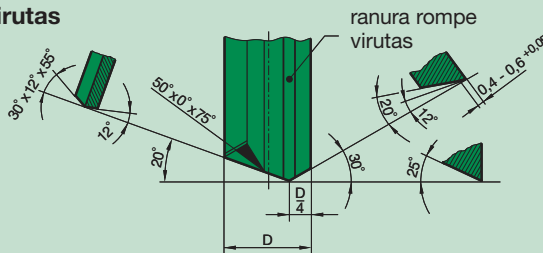




Brocas monolabio, cabeza MD E 80

EB 80 punta rectificada estándar con ranura rompe virutas

para art. no 89505, 89509, 89506 and 89507



Brocas monolabio soldadas

Adicional al programa estándar ofrece Hartner un servicio rápido para las siguientes medidas con afilado estándar y mango estándar. El plazo de entrega es apr. 3 semanas.

Ø nom. mm	aumento en mm	Forma circunf.	Long. total	Precios bajo consulta
2,00...13,90	0,1	G	≤ 7,5 mm Ø 650 max	
4,00...13,90	0,1	C	> 7,5 mm Ø 1200 max	
14,00...22,00	0,5	G	1200 max	
14,00...22,00	0,5	C	1200 max	

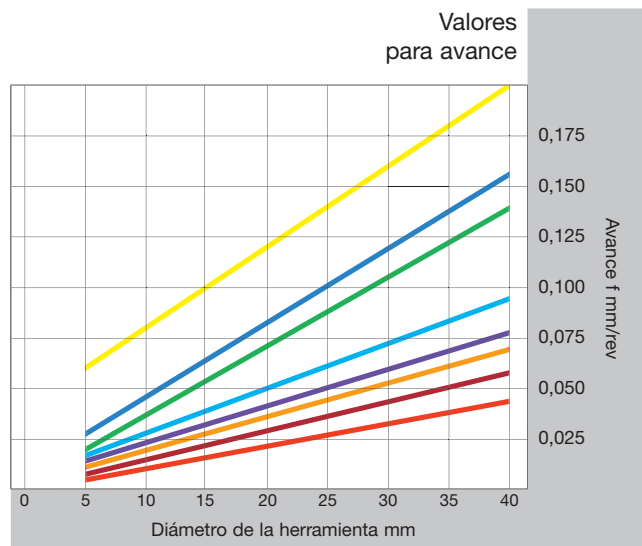
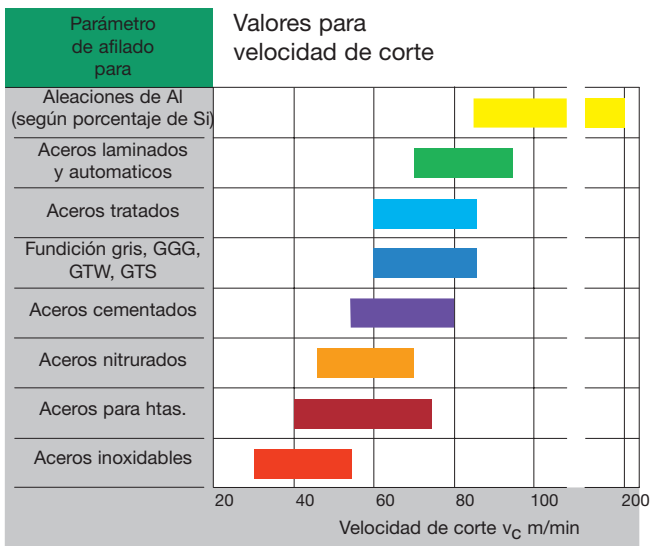
Material de corte: metal duro

Superficie:

Long. cabeza estándar (mm)

Ø total	Long.	Ø total	Long.
2,00...2,49	15	10,00...10,99	35
2,50...2,99	18	11,00...17,00	40
3,00...3,99	20	17,01...20,00	45
4,00...5,19	25	20,01...23,00	50
5,20...6,99	30	23,01...26,00	55
7,00...9,99	35	26,01...40,00	65

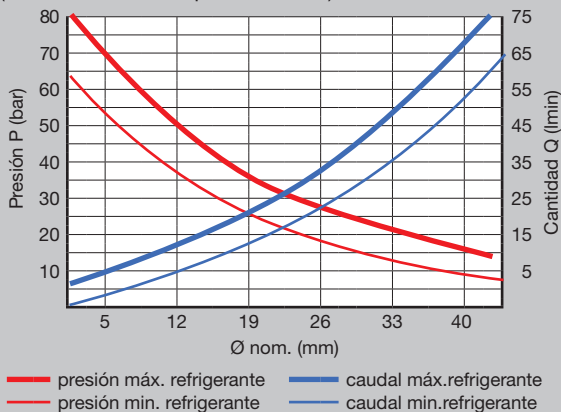
Long. corte: min. 20 x D



(Para ver parámetros de corte más detallados ver conceptos de mecanizado)

Valores de refrigerante E 80

(valores orientativos para emulsión)



Recubrimiento TiN diseñado con rompe virutas para aceros de viruta larga

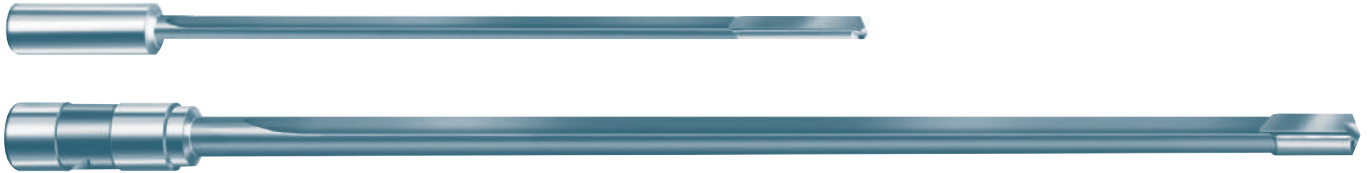


Recubrimiento TiCN diseñado sin rompe virutas para aceros aleados y altamentente aleados



Brocas de dos labios cabeza MD Z 80

Válido para fundición, aluminio y aceros de viruta corta, desde Ø 6,0 - 27,0 mm, longitud total max. 1000 mm



Si quiere que se ofrezca y fabrique el Z 80 especial, utilice por favor el formulario para hacer su petición de oferta y pedido.

F FIRE

a AITiN nano

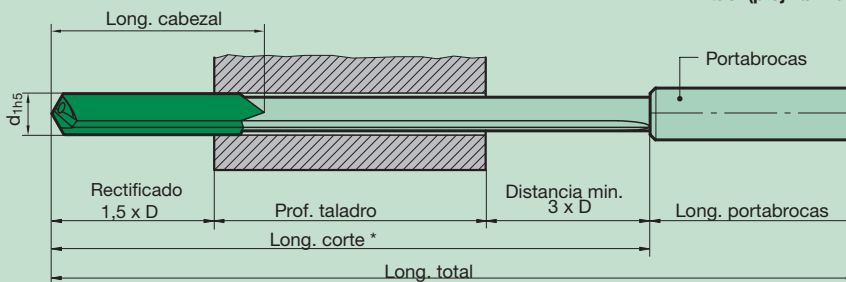
En algunos casos, no se puede garantizar el funcionamiento de las herramientas sin recubrimiento. Por lo tanto, el recubrimiento es inevitable en determinados materiales ver aplicaciones recomendaciones en parte técnica.

La ventaja esencial de las brocas para agujeros profundos de dos labios frente a las brocas monolabio es el avance netamente mayor con el cual se puede trabajar durante la ejecución de taladros. Resulta de la construcción de la broca de dos labios con dos filos y dos ranuras de sujeción. De este modo, la ejecución de los taladros resulta considerablemente más rápida.

Sin embargo, este aumento en la velocidad de mecanizado va unido a una reducción de la precisión de taladrado.

También ésta es una consecuencia directa de la construcción de la broca con dos filos. Dado que existe un filo opuesto, el efecto de alisado y la guía son mejores que en una broca monolabio. Para profundidades de taladro de $\leq 10 \times D$ recomendamos el uso de la broca TS 150 GG. Está disponible y resulta para estas profundidades de taladro más económico que brocas para agujeros profundos soldadas. Además, la broca TS 150 GG permite pres. en muchos casos de mecanizado del taladro piloto.

Dimensiones necesarias para el cálculo de longitud para máquinas herramienta convencionales

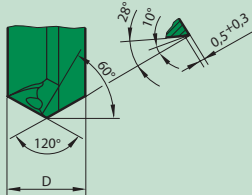


* Largo máx. ranura de sujeción por herramienta 40xD; para mayores profundidades de taladro, utilizar dos herramientas (p.ej. Ø 10 x 450 y Ø 9,95 x 850 mm)

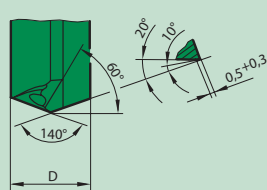
Destalonados estándar

(Posibilidad de suministro con destalonados especiales)

Destalonado G para el mecanizado de fundición

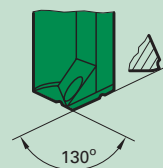


Destalonado A para el mecanizado de aluminio

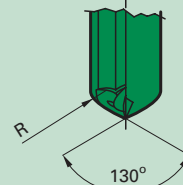


Afilados especiales p.ej.

aluminio

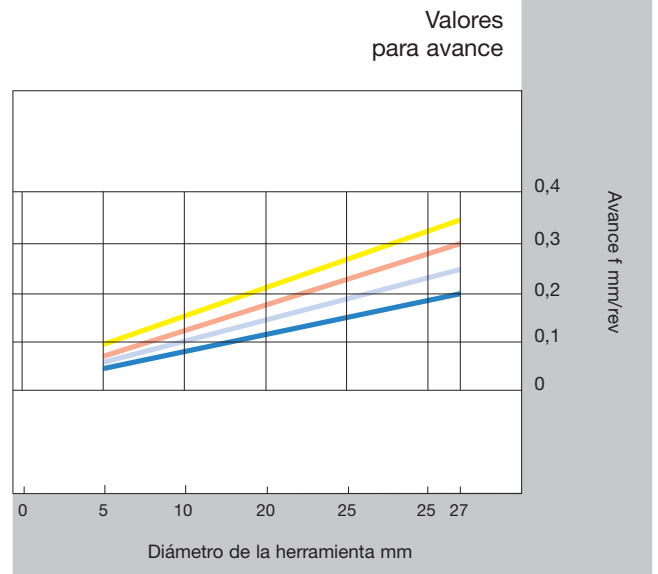
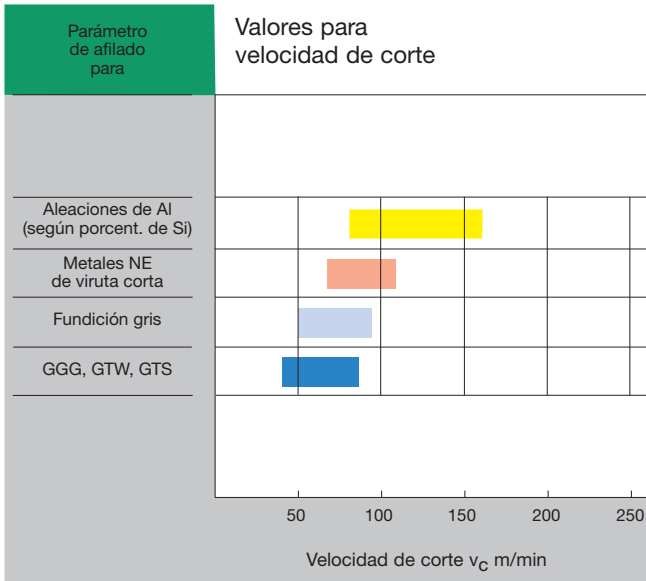


fundición

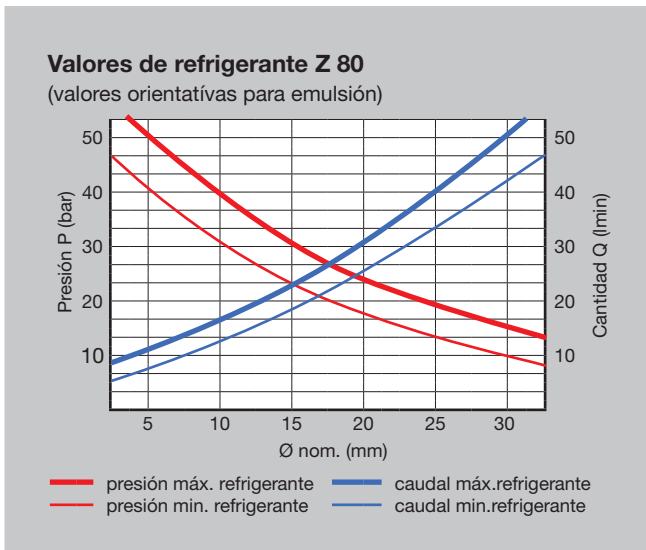




Brocas de dos labios cabeza MD Z 80



(Para ver parámetros de corte más detallados ver conceptos de mecanizado)



Art. no. 89518 con punta rectificada para materiales de fundición

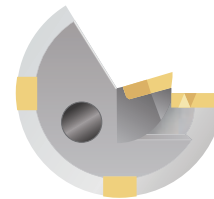
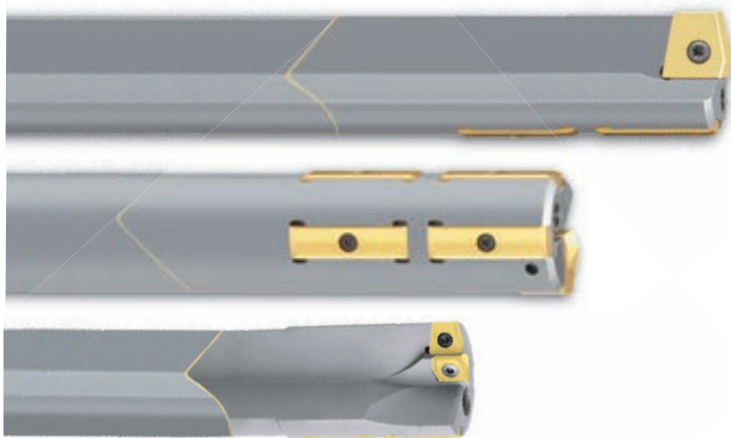


Art. no. 89508 con punta rectificada para aluminio

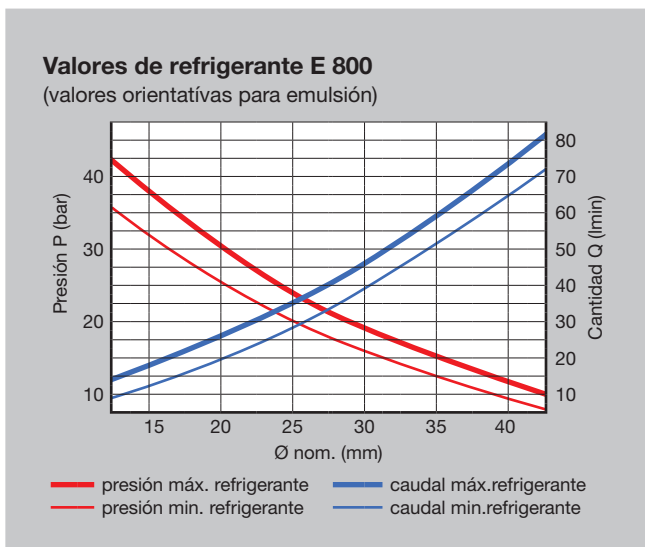
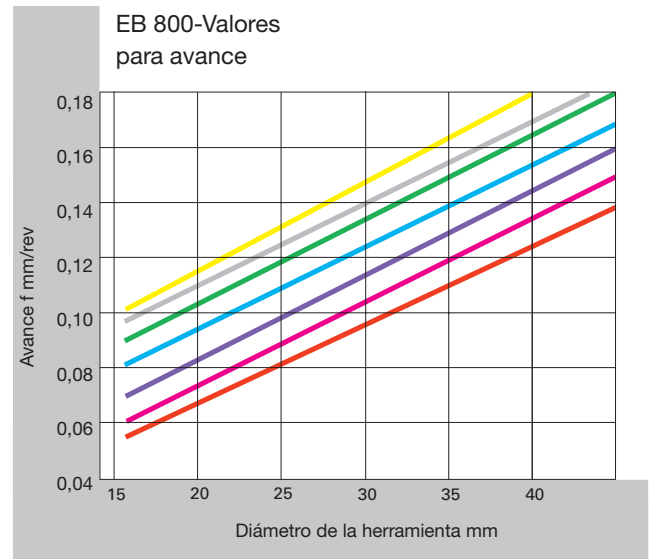
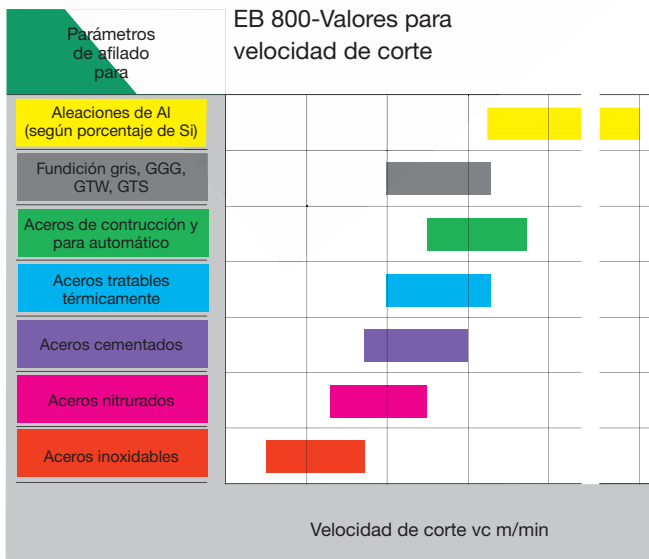


Brocas p. agujeros profundos E 800

Con plaquitas intercamb, y patines guía intercamb. válido para casi todo tipo, de Ø 12,0 - 52,0 mm, longitud total max. 3000 mm



Dia. 40,01 - 52,00 mm con plaquitas interiores y exteriores



Si quiere que se ofrezca y fabrique el E 800 especial, utilice por favor el formulario para hacer su petición de oferta y pedido.



Brocas p. agujeros profundos E 800

Relación de accesorios

Con el primer pedido recibirán la broca cañón con plaquitas intercam. E800 completa, incl. plaquitas intercambiables, patines guía y accesorios. Para pedidos posteriores rogamos indiquen los siguientes números de material y art. resp.:

Ø	plaquita	tornillo p. placa	destornillador p. placa	patines guía	tornillo p. p. guía	destornillador p. p. guía
16	Art. 89535 Ø 16,0 + TiN	89537 3,002	89538 9.001	Art. 89536 Ø 16,0 + TiN	89537 2,203	89538 7.001
18	Art. 89535 Ø 18,0 + TiN	89537 3,002	89538 9.001	Art. 89536 Ø 18,0 + TiN	89537 2,203	89538 7.001
20	Art. 89535 Ø 20,0 + TiN	89537 4,001	89538 15.001	Art. 89536 Ø 20,0 + TiN	89537 2,502	89538 8.001
24	Art. 89535 Ø 24,0 + TiN	89537 4,001	89538 15.001	Art. 89536 Ø 24,0 + TiN	89537 2,502	89538 8.001

Cada broca para agujeros profundos con piezas intercambiables E800 sea del programa estándar o una solución especial se podrá modificar dentro de los campos de diámetro abajo indicados.

Medida	Diámetro (mm)	Medida	Diámetro (mm)
0.00	12,00 - 12,49	3.02	27,00 - 27,49
0.01	12,50 - 12,99	3.03	27,50 - 27,99
0.02	13,00 - 13,49	3.04	28,00 - 28,49
0.03	13,50 - 13,99	3.05	28,50 - 28,99
0.04	14,00 - 14,49	3.06	29,00 - 29,49
0.05	14,50 - 14,99	3.07	29,50 - 29,99
0.06	15,00 - 15,49	4.00	30,00 - 30,49
0.07	15,50 - 15,99	4.01	30,50 - 30,99
1.00	16,00 - 16,49	4.02	31,00 - 31,49
1.01	16,50 - 16,99	4.03	31,50 - 31,99
1.02	17,00 - 17,49	4.04	32,00 - 32,49
1.03	17,50 - 17,99	4.05	32,50 - 32,99
1.04	18,00 - 18,49	4.06	33,00 - 33,49
1.05	18,50 - 18,99	4.07	33,50 - 33,99
1.06	19,00 - 19,49	5.00	34,00 - 34,49
1.07	19,50 - 19,99	5.01	34,50 - 34,99
2.00	20,00 - 20,49	5.02	35,00 - 35,49
2.01	20,50 - 20,99	5.03	35,50 - 35,99
2.02	21,00 - 21,49	5.04	36,00 - 36,49
2.03	21,50 - 21,99	5.05	36,50 - 36,99
2.04	22,00 - 22,49	5.06	37,00 - 37,49
2.05	22,50 - 22,99	5.07	37,50 - 37,99
2.06	23,00 - 23,49	6.00	38,00 - 38,49
2.07	23,50 - 23,99	6.01	38,50 - 38,99
2.08	24,00 - 24,49	6.02	39,00 - 39,49
2.09	24,50 - 24,99	6.03	39,50 - 40,00
2.10	25,00 - 25,49	7.00	40,01 - 43,99
2.11	25,50 - 25,99	8.00	44,00 - 47,99
3.00	26,00 - 26,49	9.00	48,00 - 52,00
3.01	26,50 - 26,99		



Broca·monolabio·con plaquita E-800

Accesorios para Ø 12,0 - 52,0 mm

Tamaño	Diámetro / Campo de sujeción	Cuerpo base / Porta-herramientas	Plaquitas		
			Plaq. intercamb. cortes Recubiertas de TIN	Tornillos	Atornillador
0.	Ø12,00 - Ø12,49 Ø12,50 - Ø12,99 Ø13,00 - Ø13,49 Ø13,50 - Ø13,99 Ø14,00 - Ø14,49 Ø14,50 - Ø14,99 Ø15,00 - Ø15,49 Ø15,50 - Ø15,99	Cuerpo base / porta-herramientas individual según deseos del cliente. Longitud total hasta 3000 mm, longitud de corte desde 15 x D. Alternativa: Programa estándar artículo nº 89530 desde dia. 12,00 mm hasta 24,00 mm in medidas preferentes completas con plaquitas intercambiables de TIN y patines guía de TIN	Artículo N° 89535 + diámetro nominal = Pedido N°	Pedido N° 4071 2,502 T8 M2,5x 5,2	Pedido N° 86842 8,001
	1.			Ø16,00 - Ø16,49 Ø16,50 - Ø16,99 Ø17,00 - Ø17,49 Ø17,50 - Ø17,99 Ø18,00 - Ø18,49 Ø18,50 - Ø18,99 Ø19,00 - Ø19,49 Ø19,50 - Ø19,99	Pedido N° 4071 3,002 T9 M3x6,4
2.				Ø20,00 - Ø20,49 Ø20,50 - Ø20,99 Ø21,00 - Ø21,49 Ø21,50 - Ø21,99 Ø22,00 - Ø22,49 Ø22,50 - Ø22,99 Ø23,00 - Ø23,49 Ø23,50 - Ø23,99 Ø24,00 - Ø24,49 Ø24,50 - Ø24,99 Ø25,00 - Ø25,49 Ø25,50 - Ø25,99	Pedido N° 4071 4,001 T15 M4x7,7
	3.			Ø26,00 - Ø26,49 Ø26,50 - Ø26,99 Ø27,00 - Ø27,49 Ø27,50 - Ø27,99 Ø28,00 - Ø28,49 Ø28,50 - Ø28,99 Ø29,00 - Ø29,49 Ø29,50 - Ø29,99	Pedido N° 4071 4,002 T15 M4x10,6
4.				Ø30,00 - Ø30,49 Ø30,50 - Ø30,99 Ø31,00 - Ø31,49 Ø31,50 - Ø31,99 Ø32,00 - Ø32,49 Ø32,50 - Ø32,99 Ø33,00 - Ø33,49 Ø33,50 - Ø33,99	Pedido N° 4071 5,002 T20 M5x14,2
	5.			Ø34,00 - Ø34,49 Ø34,50 - Ø34,99 Ø35,00 - Ø35,49 Ø35,50 - Ø35,99 Ø36,00 - Ø36,49 Ø36,50 - Ø36,99 Ø37,00 - Ø37,49 Ø37,50 - Ø37,99	
6.				Ø38,00 - Ø38,49 Ø38,50 - Ø38,99 Ø39,00 - Ø39,49 Ø39,50 - Ø40,00	Pedido N° 4071 3,002 TX9 M3x6,4
	7.			Ø40,01 - Ø40,49 Ø40,50 - Ø40,99 Ø41,00 - Ø41,49 Ø41,50 - Ø41,99 Ø42,00 - Ø42,49 Ø42,50 - Ø42,99 Ø43,00 - Ø43,49 Ø43,50 - Ø43,99	
8.				Ø44,00 - Ø44,49 Ø44,50 - Ø44,99 Ø45,00 - Ø45,49 Ø45,50 - Ø45,99 Ø46,00 - Ø46,49 Ø46,50 - Ø46,99 Ø47,00 - Ø47,49 Ø47,50 - Ø47,99	Pedido N° 4071 4,001 TX15 M4x7,7
	9.			Ø48,00 - Ø48,49 Ø48,50 - Ø48,99 Ø49,00 - Ø49,49 Ø49,50 - Ø49,99 Ø50,00 - Ø50,49 Ø50,50 - Ø50,99 Ø51,00 - Ø51,49 Ø51,50 - Ø52,00	Pedido N° 4071 4,002 TX15 M4x10,6



Broca·monolabio·con plaquita E-800

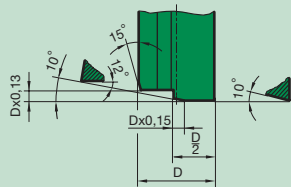
Plaquetas			Patines guía		
Pla. inter. interiores	Tornillos	Atornillador	Patines guía	Tornillos	Atornillador
			Recubiertas de TIN	Pedido N° 4071 1,601 T5 M1,6x4,4	Pedido N° 86842 5,001
				Pedido N° 4071 2,203 T7 / M2,2x 4,6	Pedido N° 86842 7,001
				Pedido N° 4071 2,202 T7 / M2,2x5,6	
				Pedido N° 4071 2,502 T8 M2,5x 5,2	Pedido N° 86842 8,001
				artículo N° 89536 + diámetro nominal = Pedido N° Pedido N° 4071 2,501 T8 M2,5x6,4	
			Pedido N° 4071 3,003 T9 M3x8	Pedido N° 86842 9,001	
a petición	Pedido N° 4071 4,501 T15 M4,5x11,8	Pedido N° 86842 15,001	a petición		



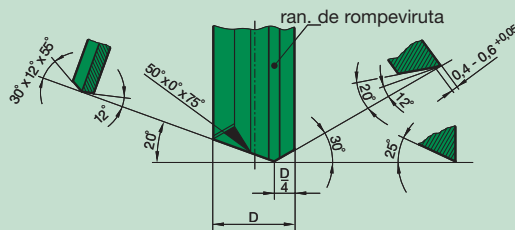
Parámetros técnicos complementarios

Ejemplos para destalonados especiales para brocas de un corte, cabeza MD

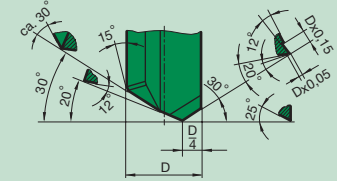
con espacio de aceite retirado



con ranura de rompeviruta



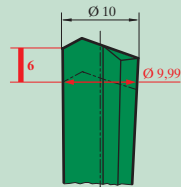
con ranura de rompeviruta



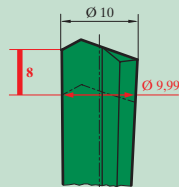
Conicidad

(Dimensiones en mm)

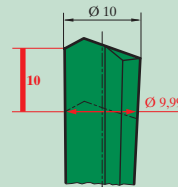
1:600



1:800 (Standard)

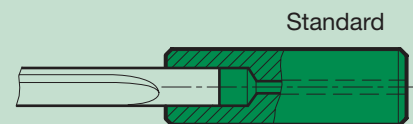


1:1000

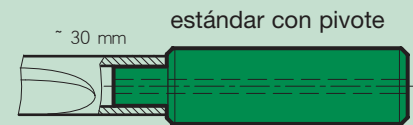


Variantes de fabricación en los mangos de las brocas cañón con mango redondo de tubo

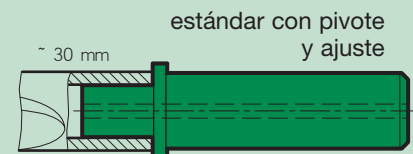
Proceder para \varnothing nominal $< \varnothing$ mango (la diferencia debe ser aprox. 6mm):
El mango redondo está en el portabrocas.



Proceder para \varnothing nominal \neq mango nominal (max. hasta):
El mango redondo está sobre el muñón.



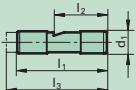
Proceder para \varnothing nominal $> \varnothing$ mango:
El mango redondo está sobre el pivote cuyo \varnothing nominal es $> \varnothing$ mango
y ajusta perfectamente.



Casquillos

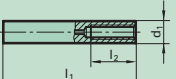
Casquillos para máquinas taladros prof.

1



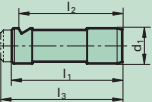
Cód. nº	d ₁	l ₁	l ₂	l ₃
1.1	10	40	24	-
1.2	10	40	24	45
1.3	10	40	24	55
1.4	16	45	31,2	-
1.5	25	70	34	-
1.6	25	70	34	78

5



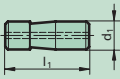
Cód. nº	d ₁	l ₁	l ₂
5.1	10	60	20
5.2	16	80	28
5.3	25	100	50
5.4	10	100	-
5.5	10	110	-

2



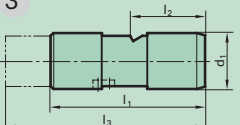
Cód. nº	d ₁	l ₁	l ₂	l ₃
2.1	16	50	47	-
2.2	16	50	47	55
2.3	16	50	47	70

6



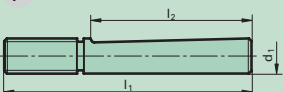
Cód. nº	d ₁	l ₁
6.1	12.7	38
6.2	19.05	70
6.3	38.1	70

3



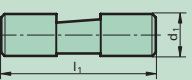
Cód. nº	d ₁	l ₁	l ₂	l ₃
3.1	25	70	34	100

7



Cód. nº	d ₁	l ₁	l ₂
7.1	16	112	73
7.2	20	126	82

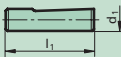
4



Cód. nº	d ₁	l ₁
4.1	19,05	70
4.2	12,70	70
4.3	25,40	70
4.4	31,75	70
4.5	38,10	70

Casquillos según DIN 1835

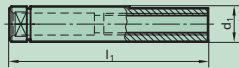
9 Form E



Cód. nº	d ₁	l ₁
9.1	8	36
9.2	10	40
9.3	12	45
9.4	16	48
9.5	20	50
9.6	25	56
9.7	32	60
9.8	31.75	70
9.9	38.1	70
9.10	40	70

Casquillos según proyecto VDI

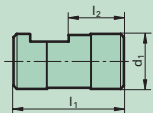
12



Cód. nº	d ₁	l ₁
12.1	10	68
12.2	16	90
12.3	25	112

Casquillos según sistema Speed-Bit

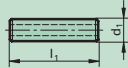
13



Cód. nº	d ₁	l ₁	l ₂
13.1	16	40	16
13.2	25	50	25
13.3	35.6	60	-

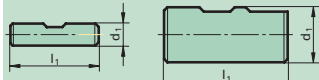
Casquillos según DIN 6535

10 Form HA



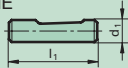
Cód. nº	d ₁	l ₁
10.1	8	36
10.2	10	40
10.3	12	45
10.4	16	48
10.5	20	50
10.6	25	56
10.7	32	60
10.8	25	70
10.9	40	70

8 Form HB a Cód. nº 8.6, 8.7, 8.8



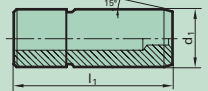
Cód. nº	d ₁	l ₁
8.1	8	36
8.2	10	40
8.3	12	45
8.4	16	48
8.5	20	50
8.6	25	56
8.7	32	60
8.8	40	70

11 Form HE



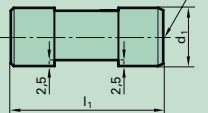
Cód. nº	d ₁	l ₁
11.1	8	36
11.2	10	40
11.3	12	45
11.4	16	48
11.5	20	50
11.6	25.4	70
11.7	25	56
11.8	32	60
11.9	40	70

16 sim. Form HA



Cód. nº	d ₁	l ₁
16.1	10	50
16.2	16	64
16.3	20	70
16.4	25	81
16.5	32	92

17 sim. Form HE 2 DIN 332



Cód. nº	d ₁	l ₁
17.1	19.05	70
17.2	25.40	70
17.3	31.75	70
17.4	38.1	70

El programa de casquillos que se presenta aquí se encuentra en almacén, pero representa tan sólo una selección de casquillos de sujeción. Naturalmente, fabricamos casquillos individuales según planos del cliente con máxima precisión. ¡Atención! Con E100 se precisan casquillos de sujeción con espiga de ajuste. Información bajo consulta.



El procedimiento de taladrado

Breve introducción

En la técnica de virutaje se habla a partir de una profundidad de taladro de $10 \times D$ y más del denominado taladrado de agujeros profundos; naturalmente, también se pueden ejecutar taladros más cortos con brocas para taladros profundos. De este modo, se aprovechan los fenómenos acompañantes positivos del taladrado, tales como una buena superficie, una reducida desviación del diámetro y una rectitud optimizada.

Procedimiento en máquinas herramienta convencionales:

- Fabricar un agujero piloto (tolerancia H8). Taladrar con un número de revoluciones aprox. de 200 r/ min. avance aprox. 500 mm / min.
- Regular la presión del lubricante y las revoluciones.
- Para el uso de la broca cañón con gran proporción longitud-diámetro (p. Ej. E 100 a partir de 160 mm de longitud de ranura), nosotros recomendamos trabajar hasta una profundidad de taladro aprox. 25mm con parámetros de corte reducidos (aprox. 75% de la velocidad de corte óptima)
- Desconexión de la entrada del lubricante después de conseguir la profundidad de taladro.
- Retirada rápida con husillo parado.

Refrigeración de alta presión - convertida en estándar.

Dado que, en los últimos años, la refrigeración interna se ha ido imponiendo en todas las herramientas de taladrado, el lubricante refrigerador hace honor a su nombre y se conduce a través de unos canales de refrigeración al punto donde más se necesita. Con esta medida se consigue claras mejoras de rendimiento y menos roturas en la herramienta, también en brocas espirales, machos de roscar etc. Hoy en día, toda máquina herramienta convencional se ofrece con refrigeración interna de alta presión, siendo también apta para taladrar agujeros profundos.

Por lo tanto, la proporción de brocas para taladros profundos en centros de mecanizado, tornos, etc. adquiere una creciente importancia. Así, este procedimiento es cada vez más popular en la técnica del virutaje.



Todas las brocas para agujeros prof. se tienen que guiar para iniciar el taladro. Las brocas para agujeros prof. no se deben mover nunca a plena velocidad libre. en el espacio de la máquina.

El taladrado de agujeros profundos no es un misterio, sino que está al alcance de cualquiera cumpliendo ciertos requisitos.

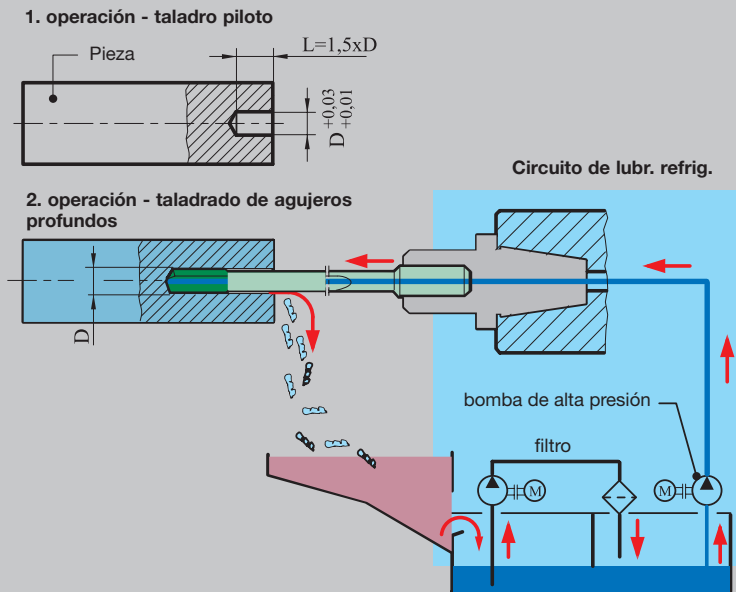
¡Valores orientativos para el uso de las brocas para agujeros profundos Hartner se encuentran en las páginas del tipo en cuestión!



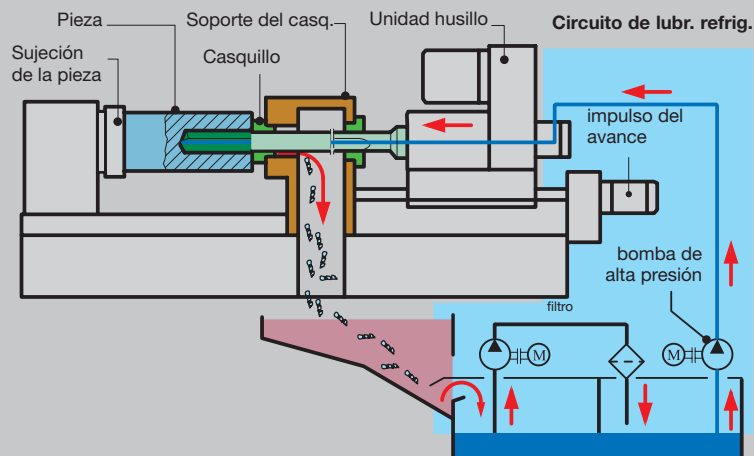
Conceptos de mecanizados

Diagramas esquematicos

Taladrado de agujeros profundos en máquinas herramientas convencionales



Taladrado de agujeros profundos en máquinas para taladrar profundo



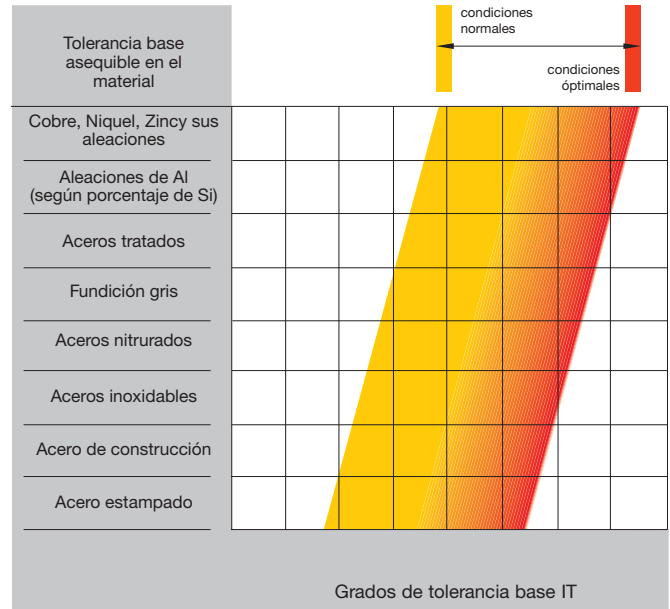


Precisión

En brocas de un corte para agujeros profundos

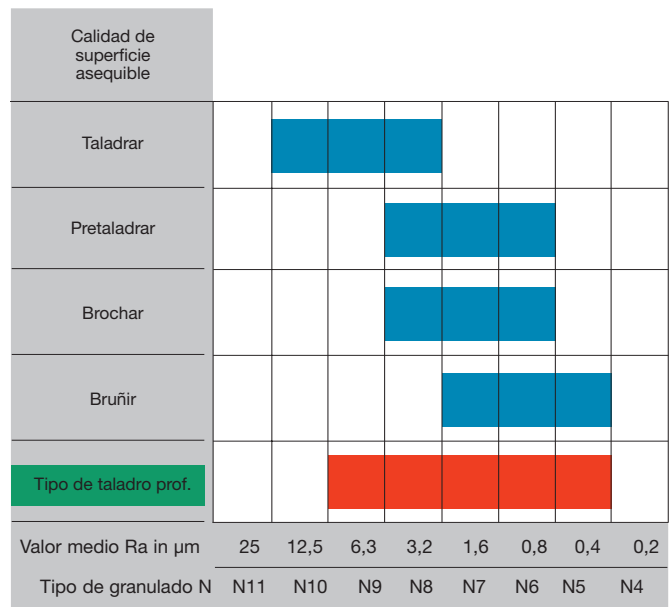
Tolerancias básicas

Con las brocas de un corte se puede alcanzar una menor tolerancia básica, dado que las fuerzas de corte en el filo son absorbidas por las lunetas de apoyo existentes y no se produce, como p.ej. en brocas espiral, enseguida un taladro de mayor tamaño como consecuencia de reducidas desviaciones entre los dos filos.



Calidad de superficie

Las fuerzas son absorbidas en el filo por las lunetas de apoyo que, por su parte, alisan la superficie. La película de lubricante entre las lunetas de apoyo y la superficie del taladro tiene, por tanto, una función importante. Cuando mejor sea el lubricante refrigerador, mejor será también la calidad de la superficie.

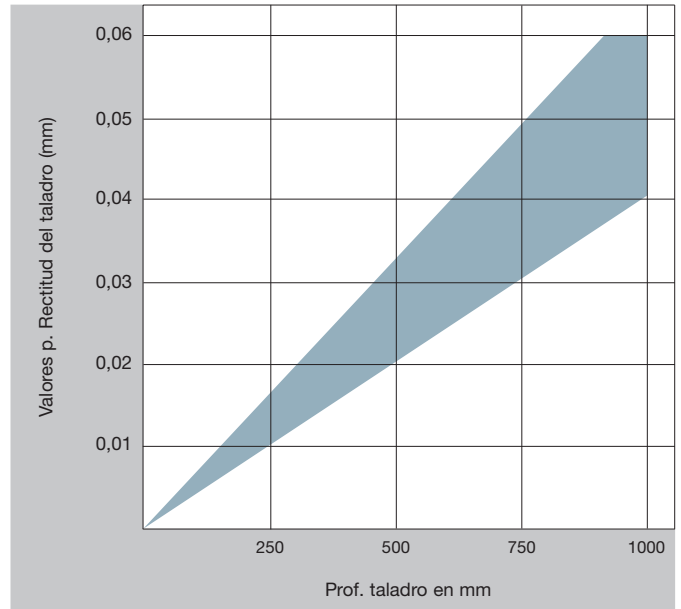




Precisión

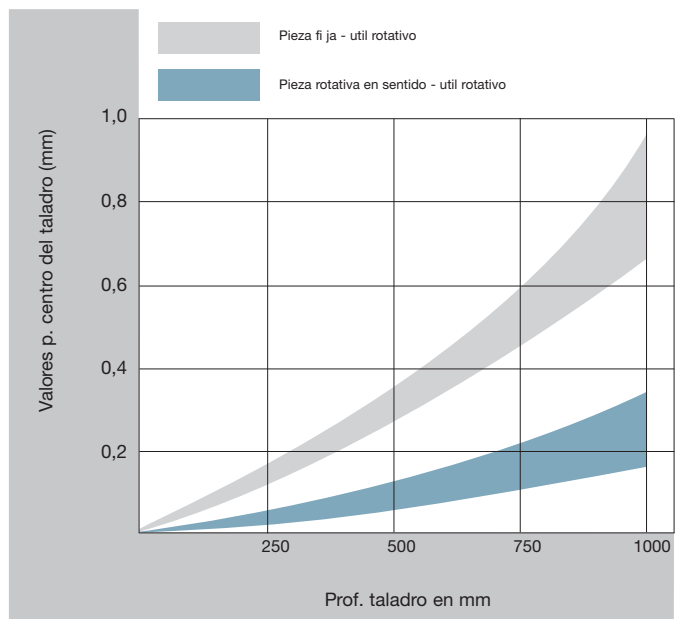
Rectitud del taladro

Dado que, en brocas de un corte soldadas, la cabeza de precisión de MD es soldada siempre en un vástago tubular flexible, la herramienta produce un taladro muy recto, independientemente de eventuales excentricidades. Sin embargo, variaciones extremas del material y otros factores de influencia pueden perjudicar la rectitud.



Continuidad del centro del taladro

Si un taladro se ejecuta, p.ej., con una broca espiral convencional, la calidad del destalonado de punta influye, entre otros, en la continuidad del centro del taladro. Se produce un desequilibrio de fuerzas en los filos. En el trabajo con brocas monolabio, las lunetas de apoyo absorben las fuerzas de corte, de lo cual resulta una buena continuidad del centro del taladro.





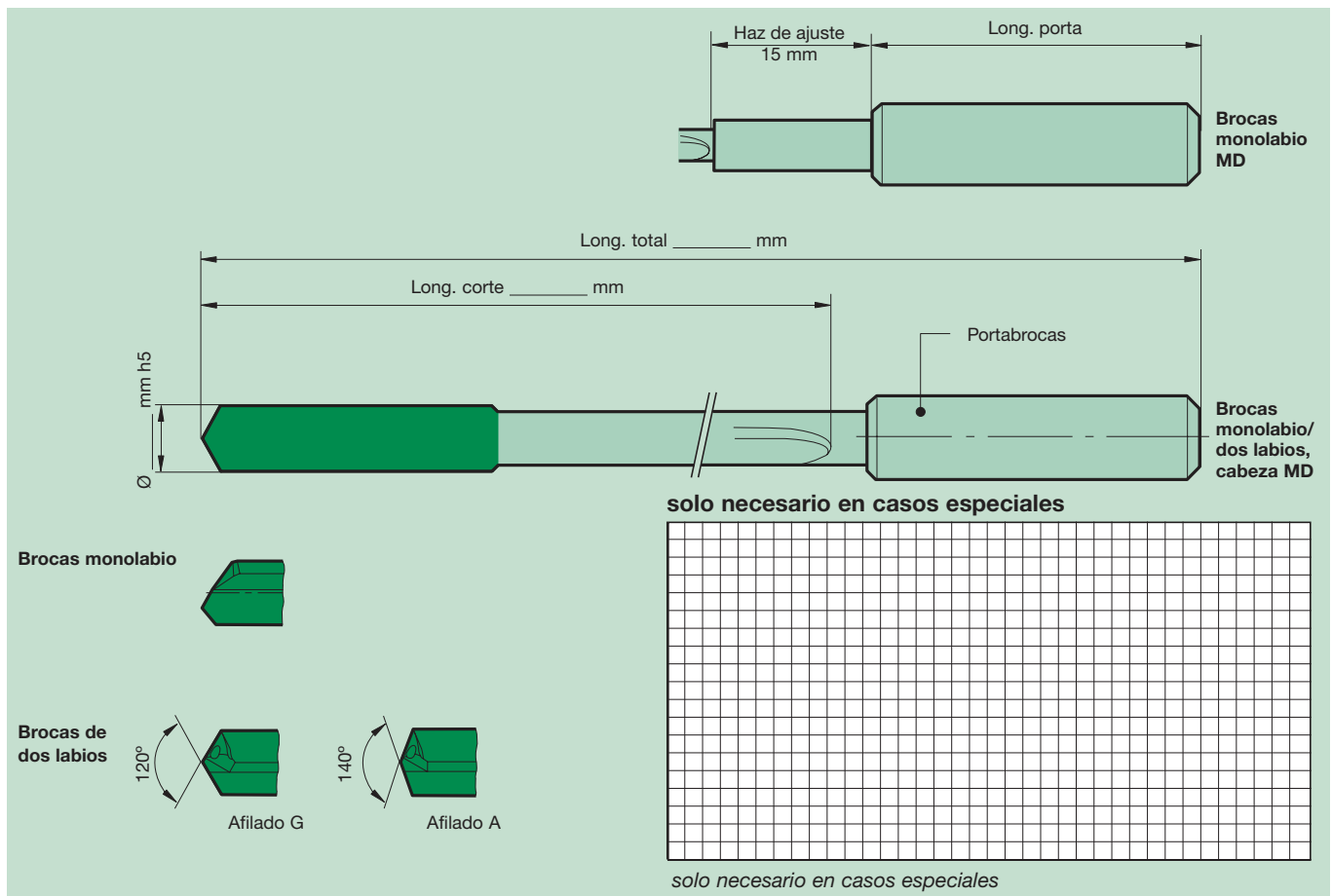
Formulario de pedido E 100, E 80 y Z 80

Pedido Consulta per Fax: +49 7431 125 - 21547
or by e-mail to: info@hartner.de

	<input type="text"/> N° cliente	<input type="text"/> Cliente nuevo	<input type="text"/> N° pedido
<input type="text"/> Persona de contacto	<input type="text"/> Empresa	<input type="text"/> Persona de contacto	
Hartner GmbH Apart. postal 10 04 27 D-72425 Albstadt Tel. +49 74 31 1 25-0 Fax +49 74 31 1 25-5 47	<input type="text"/> Calle/N°	<input type="text"/> Población	
	<input type="text"/> Teléfono	<input type="text"/> Telefax	
	<input type="text"/> Fecha	<input type="text"/> Firma	

Brocas
 p. aguj. prof: Brocas monolabio, MD E 100 Brocas monolabio, cabeza MD E 80 Brocas de dos labios Z 80

Forma U: _____ **Cantidad necesitada:** _____ unidades



Portabrocas: ninguno Código: _____ según plano adjunto

Recubrimiento: TiN Fire TiCN MolyGlide TiAlN AlTiN _____

Pieza: Prof. de tal.: _____ Toler. del taladro: _____ Material/denominación: _____

Tipo de máquina: Máquina de taladros prof. Máquina convencional
 Taladro piloto Casquillos de taladro

Lubrificante: Aceite p. taladro prof. Emulsión
 Presión _____ bar Cantidad _____ l/min



Formulario de pedido E 800

Pedido Consulta per Fax: +49 74 31 125 - 21547
or by e-mail to: info@hartner.de

Persona de contacto

Hartner GmbH
Apart. postal 10 04 27
D-72425 Albstadt
Tel. +49 74 31 1 25-0
Fax +49 74 31 1 25-5 47

N° cliente	Cliente nuevo	N° pedido
Empresa		Persona de contacto
Calle/N°		Población
Teléfono		Telefax
Fecha		Firma

Pieza	Material:	Diámetro de la broca:	Superficie requerida:
	Tipo de pieza:	Tolerancia del diámetro:	Canto vivo: No Si mm
	Número de piezas/año:	Prof. taladro:	Información adicional:

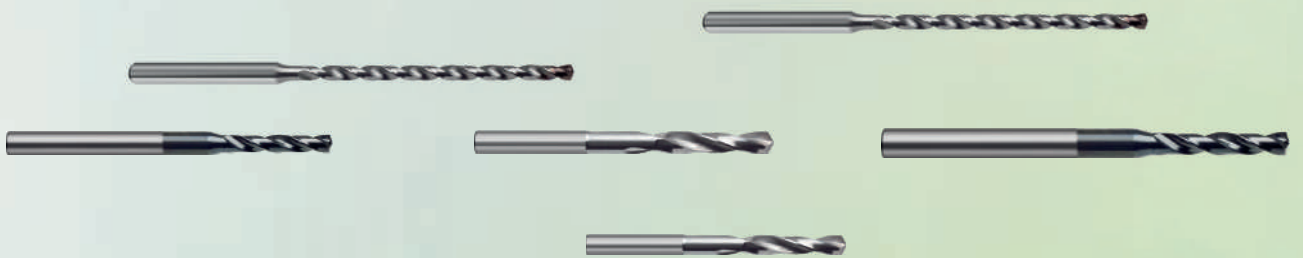
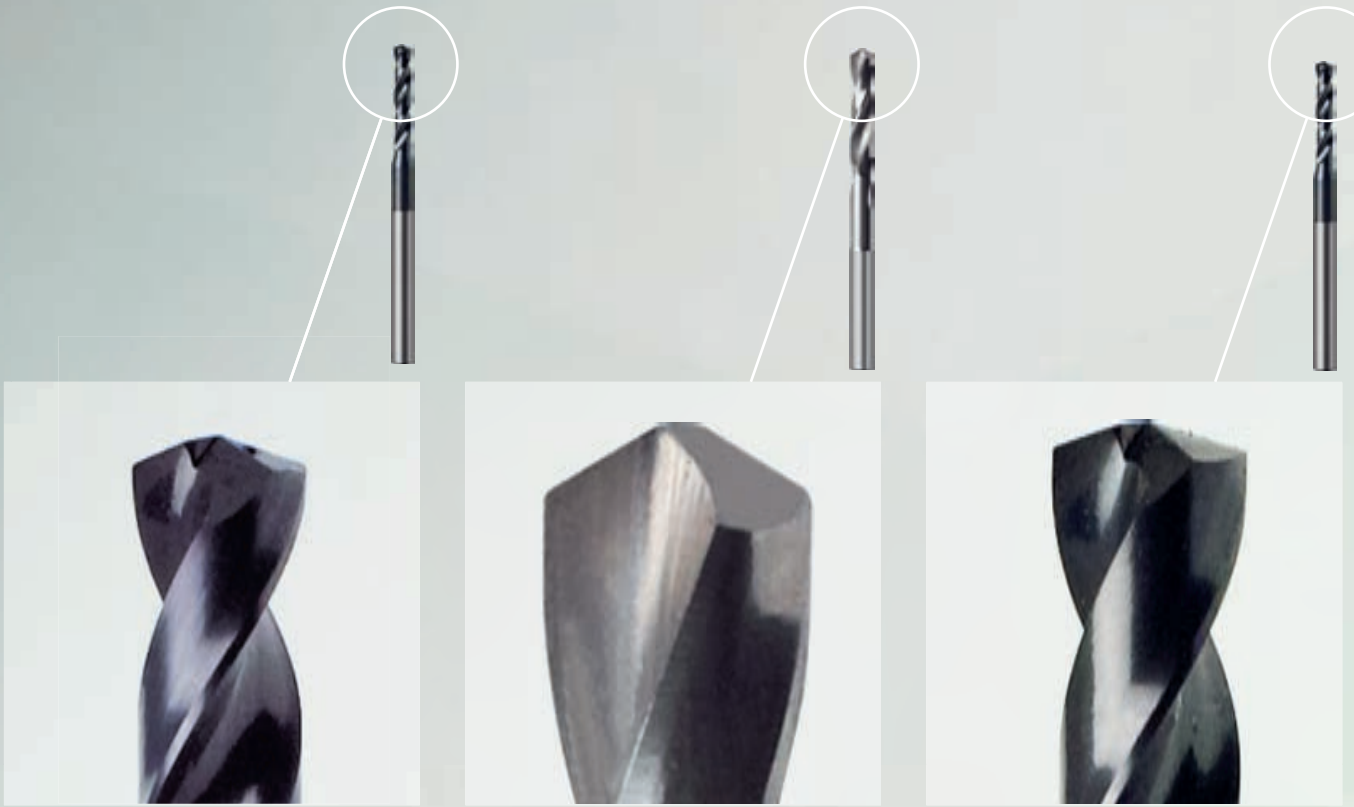
Máquina	Centros de producción:	Máquina para perforaciones prof.:	Lubrificante: Emulsión Aceite
	Elemento de sujeción:	Elemento de sujeción:	Presión: bar
	Número de usillos:	Número de usillos:	Cantidad: l/min

Brocas cañón c. plaquita de corte E 800 para su caso concreto

Atención: - como mínimo 15 x D de long. de corte
- Ø-tolerancia a conseguir IT9/IT10

Recibirá con la oferta un plano con los números de artículo y datos.

<p>Hartner GmbH Postfach 10 04 27 D-72425 Albstadt Tel. 0 74 31/1 25-0 Fax 0 74 31/1 25-5 47</p>	<p>Hta. para perforación prof. con plaquita de corte y patin guía cam-biable en la entrada del refrigerante Margen de brocas Ø 12 - Ø 40</p>
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HARTNER

Precision Cutting Tools

MICROBROCAS








fabricada en metal duro y HSS-E-PM
brillante y recubierta



Microbrocas

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Profundidad	d1/mm	Artículo N°	Progr. pág.
---	---	---	---	---	---	-------	------	-------------------	---------	--------------------	-----------------	-------------	-------	-------------	-------------

Microbrocas sin refrigeración interior

		DIN 1899	N	HSS-E-PM		derecha	cil.	~5xD	0,050 - 1,900	87011	289
		DIN 1899	N	HSS-E-PM		izquierda	cil.	~5xD	0,150 - 1,450	87016	291
		DIN 1899	N	HSS-E-PM		derecha	cil.	~5xD	0,200 - 1,500	84810	292
		Norma de fab.	N	Metal duro		derecha	cil.		0,100 - 3,000	86402	294
		Norma de fab.	N	Metal duro		derecha	cil.	4xD	0,500 - 3,000	86400	295
		Norma de fab.	N	Metal duro		derecha	cil.	~5xD	0,200 - 1,300	89281	293
		Norma de fab.	N	Metal duro		derecha	cil.	7xD	0,500 - 3,000	86401	296

Microbrocas con refrigeración interior

		Norma de fab.	N	Metal duro		derecha	cil.	5xD	1,400 - 3,000	86405	297
		Norma de fab.	N	Metal duro		derecha	cil.	8xD	1,400 - 3,000	86408	298
		Norma de fab.	N	Metal duro		derecha	cil.	15xD	1,400 - 3,000	86412	299



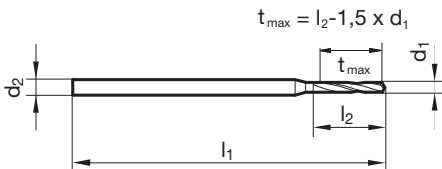
Microbrocas sin refrigeración interior

Artículo N° 87011

P	M	K	N	S	H
•	•	•	•	○	



afilado plano • $\varnothing 0,15\text{ mm}$ acero rápido al cobalto • con mango reforzado
aceros altamente aleados



d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,050	1,000	25,000	0,400	0,345	1,000	25,000	2,400
0,060	1,000	25,000	0,400	0,350	1,000	25,000	2,400
0,080	1,000	25,000	0,500	0,355	1,000	25,000	2,400
0,090	1,000	25,000	0,500	0,360	1,000	25,000	2,400
0,100	1,000	25,000	0,500	0,365	1,000	25,000	2,400
0,110	1,000	25,000	0,500	0,370	1,000	25,000	2,400
0,120	1,000	25,000	0,500	0,375	1,000	25,000	2,400
0,130	1,000	25,000	0,800	0,380	1,000	25,000	2,400
0,140	1,000	25,000	0,800	0,390	1,000	25,000	3,000
0,150	1,000	25,000	0,800	0,400	1,000	25,000	3,000
0,160	1,000	25,000	1,100	0,405	1,000	25,000	3,000
0,170	1,000	25,000	1,100	0,410	1,000	25,000	3,000
0,180	1,000	25,000	1,100	0,415	1,000	25,000	3,000
0,190	1,000	25,000	1,100	0,420	1,000	25,000	3,000
0,200	1,000	25,000	1,500	0,425	1,000	25,000	3,000
0,205	1,000	25,000	1,500	0,430	1,000	25,000	3,000
0,210	1,000	25,000	1,500	0,440	1,000	25,000	3,000
0,215	1,000	25,000	1,500	0,450	1,000	25,000	3,000
0,220	1,000	25,000	1,500	0,460	1,000	25,000	3,000
0,225	1,000	25,000	1,500	0,470	1,000	25,000	3,000
0,230	1,000	25,000	1,500	0,480	1,000	25,000	3,000
0,235	1,000	25,000	1,500	0,485	1,000	25,000	3,400
0,240	1,000	25,000	1,500	0,490	1,000	25,000	3,400
0,245	1,000	25,000	1,900	0,495	1,000	25,000	3,400
0,250	1,000	25,000	1,900	0,500	1,000	25,000	3,400
0,255	1,000	25,000	1,900	0,510	1,000	25,000	3,400
0,260	1,000	25,000	1,900	0,520	1,000	25,000	3,400
0,265	1,000	25,000	1,900	0,530	1,000	25,000	3,400
0,270	1,000	25,000	1,900	0,535	1,000	25,000	3,900
0,275	1,000	25,000	1,900	0,540	1,000	25,000	3,900
0,280	1,000	25,000	1,900	0,550	1,000	25,000	3,900
0,285	1,000	25,000	1,900	0,555	1,000	25,000	3,900
0,290	1,000	25,000	1,900	0,560	1,000	25,000	3,900
0,295	1,000	25,000	1,900	0,570	1,000	25,000	3,900
0,300	1,000	25,000	1,900	0,580	1,000	25,000	3,900
0,310	1,000	25,000	2,400	0,585	1,000	25,000	3,900
0,315	1,000	25,000	2,400	0,590	1,000	25,000	3,900
0,320	1,000	25,000	2,400	0,600	1,000	25,000	3,900
0,325	1,000	25,000	2,400	0,610	1,000	25,000	4,200
0,330	1,000	25,000	2,400	0,620	1,000	25,000	4,200
0,335	1,000	25,000	2,400	0,630	1,000	25,000	4,200
0,340	1,000	25,000	2,400	0,640	1,000	25,000	4,200



Microbrocas sin refrigeración interior

d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,650	1,000	25,000	4,200	1,060	1,500	25,000	6,800
0,660	1,000	25,000	4,200	1,070	1,500	25,000	7,600
0,665	1,000	25,000	4,200	1,080	1,500	25,000	7,600
0,670	1,000	25,000	4,200	1,100	1,500	25,000	7,600
0,680	1,000	25,000	4,800	1,110	1,500	25,000	7,600
0,690	1,000	25,000	4,800	1,120	1,500	25,000	7,600
0,700	1,000	25,000	4,800	1,140	1,500	25,000	7,600
0,710	1,000	25,000	4,800	1,150	1,500	25,000	7,600
0,720	1,000	25,000	4,800	1,160	1,500	25,000	7,600
0,730	1,000	25,000	4,800	1,180	1,500	25,000	7,600
0,740	1,000	25,000	4,800	1,190	1,500	25,000	8,500
0,750	1,000	25,000	4,800	1,200	1,500	25,000	8,500
0,760	1,000	25,000	5,300	1,210	1,500	25,000	8,500
0,770	1,000	25,000	5,300	1,230	1,500	25,000	8,500
0,780	1,000	25,000	5,300	1,240	1,500	25,000	8,500
0,790	1,000	25,000	5,300	1,250	1,500	25,000	8,500
0,800	1,500	25,000	5,300	1,260	1,500	25,000	8,500
0,810	1,500	25,000	5,300	1,270	1,500	25,000	8,500
0,820	1,500	25,000	5,300	1,280	1,500	25,000	8,500
0,830	1,500	25,000	5,300	1,300	1,500	25,000	8,500
0,840	1,500	25,000	5,300	1,310	1,500	25,000	8,500
0,850	1,500	25,000	5,300	1,320	1,500	25,000	8,500
0,860	1,500	25,000	6,000	1,340	1,500	25,000	9,500
0,870	1,500	25,000	6,000	1,350	1,500	25,000	9,500
0,880	1,500	25,000	6,000	1,380	1,500	25,000	9,500
0,890	1,500	25,000	6,000	1,390	1,500	25,000	9,500
0,900	1,500	25,000	6,000	1,400	1,500	25,000	9,500
0,910	1,500	25,000	6,000	1,410	1,500	25,000	9,500
0,920	1,500	25,000	6,000	1,420	1,500	25,000	9,500
0,930	1,500	25,000	6,000	1,430	1,500	25,000	9,500
0,940	1,500	25,000	6,000	1,440	1,500	25,000	9,500
0,950	1,500	25,000	6,000	1,450	1,500	25,000	9,500
0,960	1,500	25,000	6,800	1,500	2,000	30,000	9,500
0,970	1,500	25,000	6,800	1,600	2,000	30,000	10,600
0,980	1,500	25,000	6,800	1,630	2,000	30,000	10,600
0,990	1,500	25,000	6,800	1,800	2,000	30,000	11,800
1,000	1,500	25,000	6,800	1,850	2,000	30,000	11,800
1,010	1,500	25,000	6,800	1,900	2,000	30,000	11,800
1,020	1,500	25,000	6,800				
1,030	1,500	25,000	6,800				
1,040	1,500	25,000	6,800				
1,050	1,500	25,000	6,800				



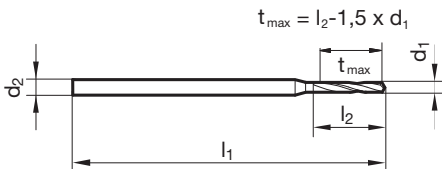
Microbrocas sin refrigeración interior

Artículo N° 87016

P	M	K	N	S	H
•	•	•	•	○	



afilado plano • $\varnothing 0,15\text{ mm}$ acero rápido al cobalto • con mango reforzado
aceros altamente aleados



d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,150	1,000	25,000	0,800	0,710	1,000	25,000	4,800
0,160	1,000	25,000	1,100	0,750	1,000	25,000	4,800
0,200	1,000	25,000	1,500	0,760	1,000	25,000	5,300
0,210	1,000	25,000	1,500	0,780	1,000	25,000	5,300
0,220	1,000	25,000	1,500	0,800	1,500	25,000	5,300
0,230	1,000	25,000	1,500	0,820	1,500	25,000	5,300
0,240	1,000	25,000	1,500	0,830	1,500	25,000	5,300
0,280	1,000	25,000	1,900	0,840	1,500	25,000	5,300
0,300	1,000	25,000	1,900	0,870	1,500	25,000	6,000
0,310	1,000	25,000	2,400	0,900	1,500	25,000	6,000
0,330	1,000	25,000	2,400	0,910	1,500	25,000	6,000
0,350	1,000	25,000	2,400	0,920	1,500	25,000	6,000
0,370	1,000	25,000	2,400	0,930	1,500	25,000	6,000
0,380	1,000	25,000	2,400	0,940	1,500	25,000	6,000
0,390	1,000	25,000	3,000	0,950	1,500	25,000	6,000
0,400	1,000	25,000	3,000	0,970	1,500	25,000	6,800
0,410	1,000	25,000	3,000	0,980	1,500	25,000	6,800
0,420	1,000	25,000	3,000	0,990	1,500	25,000	6,800
0,430	1,000	25,000	3,000	1,000	1,500	25,000	6,800
0,440	1,000	25,000	3,000	1,010	1,500	25,000	6,800
0,450	1,000	25,000	3,000	1,040	1,500	25,000	6,800
0,460	1,000	25,000	3,000	1,080	1,500	25,000	7,600
0,480	1,000	25,000	3,000	1,100	1,500	25,000	7,600
0,490	1,000	25,000	3,400	1,150	1,500	25,000	7,600
0,500	1,000	25,000	3,400	1,250	1,500	25,000	8,500
0,510	1,000	25,000	3,400	1,300	1,500	25,000	8,500
0,520	1,000	25,000	3,400	1,340	1,500	25,000	9,500
0,540	1,000	25,000	3,900	1,350	1,500	25,000	9,500
0,550	1,000	25,000	3,900	1,450	1,500	25,000	9,500
0,560	1,000	25,000	3,900				
0,570	1,000	25,000	3,900				
0,600	1,000	25,000	3,900				
0,610	1,000	25,000	4,200				
0,670	1,000	25,000	4,200				
0,680	1,000	25,000	4,800				
0,700	1,000	25,000	4,800				



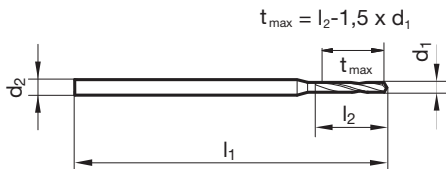
Microbrocas sin refrigeración interior

Artículo N° 84810

P	M	K	N	S	H
•	•	•	•	○	



afilado plano • con mango reforzado • más resistencia al desgaste
aceros altamente aleados



d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,200	1,000	25,000	1,500	1,050	1,500	25,000	6,800
0,300	1,000	25,000	1,900	1,100	1,500	25,000	7,600
0,450	1,000	25,000	3,000	1,150	1,500	25,000	7,600
0,490	1,000	25,000	3,400	1,180	1,500	25,000	7,600
0,500	1,000	25,000	3,400	1,200	1,500	25,000	8,500
0,510	1,000	25,000	3,400	1,250	1,500	25,000	8,500
0,520	1,000	25,000	3,400	1,400	1,500	25,000	9,500
0,590	1,000	25,000	3,900	1,450	1,500	25,000	9,500
0,600	1,000	25,000	3,900	1,500	2,000	30,000	9,500
0,700	1,000	25,000	4,800				
0,760	1,000	25,000	5,300				
0,800	1,500	25,000	5,300				
0,880	1,500	25,000	6,000				
0,900	1,500	25,000	6,000				
0,920	1,500	25,000	6,000				
0,950	1,500	25,000	6,000				
0,980	1,500	25,000	6,800				
1,000	1,500	25,000	6,800				



Microbrocas sin refrigeración interior

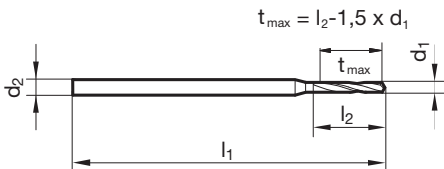
Artículo N° 89281



P	M	K	N	S	H
●	○	●	○	○	○



vaciado de punta $\geq \varnothing 0,800$ • afilado plano • forma recta del corte principal
 aceros de construcción y de cementación • fundición • bronce, latón • aluminio y sus aleaciones • magnesio y sus aleaciones
 • plásticos y plásticos con refuerzo de fibras



d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,200	1,000	25,000	1,500	0,700	1,000	25,000	4,800
0,300	1,000	25,000	1,900	0,800	1,500	25,000	5,300
0,350	1,000	25,000	2,400	1,000	1,500	25,000	6,800
0,400	1,000	25,000	3,000	1,100	1,500	25,000	7,600
0,500	1,000	25,000	3,400	1,250	1,500	25,000	8,500
0,600	1,000	25,000	3,900	1,300	1,500	25,000	8,500

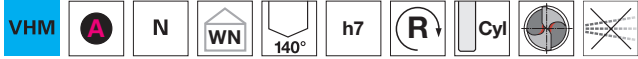


Microbrocas sin refrigeración interior

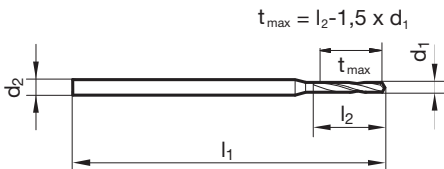
Artículo N° 86402



P	M	K	N	S	H
•		•			



vaciado de punta $\geq \varnothing 0,800$ • afilado plano • mango unificado de 3 mm • longitud unificada de 38 mm
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una resistencia de hasta a 1200 N/mm² • fundición • mecanizado de platinas



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm
0,100		3,000	38,000	1,200	0,980		3,000	38,000	10,000
0,150		3,000	38,000	2,000	0,990		3,000	38,000	10,000
0,200		3,000	38,000	2,500	1,000		3,000	38,000	10,000
0,250		3,000	38,000	3,000	1,100		3,000	38,000	10,000
0,300		3,000	38,000	5,000	1,110		3,000	38,000	10,000
0,310		3,000	38,000	5,000	1,150		3,000	38,000	10,000
0,350		3,000	38,000	6,000	1,200		3,000	38,000	10,000
0,370		3,000	38,000	6,000	1,210		3,000	38,000	10,000
0,400		3,000	38,000	7,000	1,400		3,000	38,000	10,000
0,450		3,000	38,000	7,000	1,450		3,000	38,000	10,000
0,500		3,000	38,000	7,000	1,500		3,000	38,000	10,000
0,550		3,000	38,000	7,000	1,510		3,000	38,000	10,000
0,600		3,000	38,000	7,000	1,520		3,000	38,000	10,000
0,640		3,000	38,000	7,000	1,550		3,000	38,000	10,000
0,650		3,000	38,000	7,000	1,600		3,000	38,000	12,000
0,700		3,000	38,000	8,000	1,650		3,000	38,000	12,000
0,710		3,000	38,000	8,000	1,700		3,000	38,000	12,000
0,720		3,000	38,000	8,000	1,800		3,000	38,000	12,000
0,740		3,000	38,000	8,000	1,810		3,000	38,000	12,000
0,750		3,000	38,000	8,000	1,830		3,000	38,000	12,000
0,760		3,000	38,000	8,000	1,850		3,000	38,000	12,000
0,770		3,000	38,000	8,000	1,900		3,000	38,000	12,000
0,780		3,000	38,000	8,000	1,920		3,000	38,000	12,000
0,790		3,000	38,000	8,000	1,950		3,000	38,000	12,000
0,800		3,000	38,000	10,000	1,980		3,000	38,000	12,000
0,810		3,000	38,000	10,000	2,000		3,000	38,000	12,000
0,820		3,000	38,000	10,000	2,050		3,000	38,000	12,000
0,830		3,000	38,000	10,000	2,100		3,000	38,000	12,000
0,840		3,000	38,000	10,000	2,400		3,000	38,000	12,000
0,850		3,000	38,000	10,000	2,500		3,000	38,000	12,000
0,860		3,000	38,000	10,000	2,600		3,000	38,000	12,000
0,870		3,000	38,000	10,000	2,750		3,000	38,000	12,000
0,880		3,000	38,000	10,000	2,950		3,000	38,000	12,000
0,890		3,000	38,000	10,000	3,000		3,000	38,000	12,000
0,900		3,000	38,000	10,000					
0,910		3,000	38,000	10,000					
0,920		3,000	38,000	10,000					
0,930		3,000	38,000	10,000					
0,940		3,000	38,000	10,000					
0,950		3,000	38,000	10,000					
0,960		3,000	38,000	10,000					
0,970		3,000	38,000	10,000					



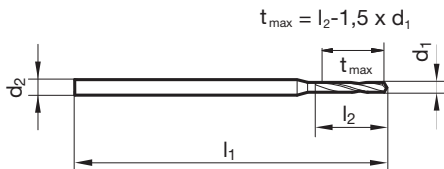
Microbrocas sin refrigeración interior

Artículo N° 86400

P	M	K	N	S	H
•	•	•	○	○	



vaciado de punta $\geq \varnothing 0,500$ • afilado plano • forma recta del corte principal • corrección de cantos rectificada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una
 resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1	inch	d2 h6	l1	l2	d1	inch	d2 h6	l1	l2
mm		mm	mm	mm	mm		mm	mm	mm
0,500		3,000	47,000	3,000	1,950		3,000	52,000	11,700
0,550		3,000	47,000	3,300	1,980		4,000	59,000	12,000
0,600		3,000	47,000	3,600	2,000		4,000	59,000	12,000
0,650		3,000	47,000	3,900	2,050		4,000	59,000	12,300
0,700		3,000	47,000	4,200	2,100		4,000	59,000	12,600
0,750		3,000	47,000	4,500	2,150		4,000	59,000	12,900
0,800		3,000	47,000	4,800	2,200		4,000	59,000	13,200
0,850		3,000	47,000	5,100	2,250		4,000	59,000	13,500
0,900		3,000	47,000	5,400	2,300		4,000	59,000	13,800
0,950		3,000	47,000	5,700	2,350		4,000	59,000	14,100
1,000		3,000	47,000	6,000	2,380		4,000	59,000	14,400
1,050		3,000	47,000	6,300	2,400		4,000	59,000	14,400
1,100		3,000	47,000	6,600	2,450		4,000	59,000	14,700
1,150		3,000	47,000	6,900	2,500		4,000	59,000	15,000
1,200		3,000	47,000	7,200	2,550		4,000	59,000	15,300
1,250		3,000	47,000	7,500	2,600		4,000	59,000	15,600
1,300		3,000	47,000	7,800	2,650		4,000	59,000	15,900
1,350		3,000	47,000	8,100	2,700		4,000	59,000	16,200
1,400		3,000	47,000	8,400	2,750		4,000	59,000	16,500
1,450		3,000	47,000	8,700	2,780		4,000	59,000	16,800
1,500		3,000	47,000	9,000	2,800		4,000	59,000	16,800
1,550		3,000	47,000	9,300	2,850		4,000	59,000	17,100
1,590		3,000	47,000	9,600	2,900		4,000	59,000	17,400
1,600		3,000	47,000	9,600	2,950		4,000	59,000	17,700
1,650		3,000	47,000	9,900	3,000		4,000	59,000	18,000
1,700		3,000	47,000	10,200					
1,750		3,000	47,000	10,500					
1,800		3,000	52,000	10,800					
1,850		3,000	52,000	11,100					
1,900		3,000	52,000	11,400					



Microbrocas sin refrigeración interior

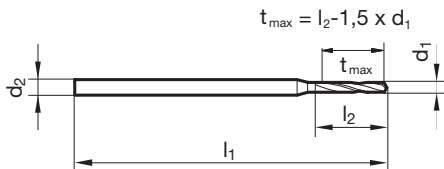
Artículo N° 86401



P	M	K	N	S	H
•	•	•	○	○	



vaciado de punta $\geq \varnothing 0,500$ • afilado plano • forma recta del corte principal • corrección de cantos rectificadas
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una
 resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1	inch	d2 h6	l1	l2	d1	inch	d2 h6	l1	l2
mm		mm	mm	mm	mm		mm	mm	mm
0,500		3,000	47,000	4,000	1,950		3,000	52,000	17,600
0,550		3,000	47,000	4,400	1,980		4,000	63,000	18,000
0,600		3,000	47,000	4,800	2,000		4,000	63,000	18,000
0,650		3,000	47,000	5,200	2,050		4,000	63,000	18,500
0,700		3,000	47,000	5,600	2,100		4,000	63,000	18,900
0,750		3,000	47,000	6,000	2,150		4,000	63,000	19,400
0,800		3,000	47,000	6,400	2,200		4,000	63,000	19,800
0,850		3,000	47,000	6,800	2,250		4,000	63,000	20,300
0,900		3,000	47,000	7,200	2,300		4,000	63,000	20,700
0,950		3,000	47,000	7,600	2,350		4,000	63,000	21,200
1,000		3,000	47,000	8,000	2,380		4,000	63,000	21,600
1,050		3,000	47,000	8,400	2,400		4,000	63,000	21,600
1,100		3,000	47,000	8,800	2,450		4,000	63,000	22,100
1,150		3,000	47,000	9,200	2,500		4,000	63,000	22,500
1,200		3,000	52,000	10,800	2,550		4,000	63,000	23,000
1,250		3,000	52,000	11,300	2,600		4,000	67,000	23,400
1,300		3,000	52,000	11,700	2,650		4,000	67,000	23,900
1,350		3,000	52,000	12,200	2,700		4,000	67,000	24,300
1,400		3,000	52,000	12,600	2,750		4,000	67,000	24,800
1,450		3,000	52,000	13,100	2,780		4,000	67,000	25,200
1,500		3,000	52,000	13,500	2,800		4,000	67,000	25,200
1,550		3,000	52,000	14,000	2,850		4,000	67,000	25,700
1,590		3,000	52,000	14,400	2,900		4,000	67,000	26,100
1,600		3,000	52,000	14,400	2,950		4,000	67,000	26,600
1,650		3,000	52,000	14,900	3,000		4,000	67,000	27,000
1,700		3,000	52,000	15,300					
1,750		3,000	52,000	15,800					
1,800		3,000	52,000	16,200					
1,850		3,000	52,000	16,700					
1,900		3,000	52,000	17,100					

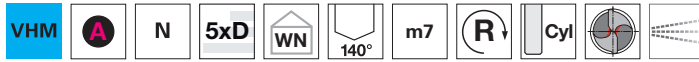


Microbrocas con refrigeración interior

Artículo N° 86405

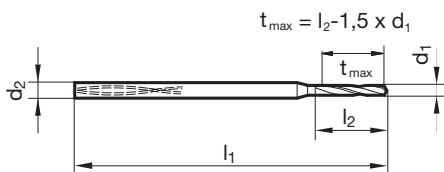


P	M	K	N	S	H
•	•	•	○	○	



vaciado de punta $\geq \varnothing 1,400$ • afilado plano • forma recta del corte principal • corrección de cantos rectificada

aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm
1,400		4,000	52,000	11,000	2,450		4,000	62,000	20,000
1,450		4,000	52,000	12,000	2,500		4,000	62,000	20,000
1,500		4,000	52,000	12,000	2,550		4,000	62,000	20,000
1,550		4,000	52,000	12,000	2,600		4,000	66,000	21,000
1,590		4,000	52,000	13,000	2,650		4,000	66,000	21,000
1,600		4,000	52,000	13,000	2,700		4,000	66,000	22,000
1,650		4,000	52,000	13,000	2,750		4,000	66,000	22,000
1,700		4,000	56,000	14,000	2,780		4,000	66,000	22,000
1,750		4,000	56,000	14,000	2,800		4,000	66,000	22,000
1,800		4,000	56,000	14,000	2,850		4,000	66,000	23,000
1,850		4,000	56,000	15,000	2,900		4,000	66,000	23,000
1,900		4,000	56,000	15,000	2,950		4,000	66,000	24,000
1,950		4,000	56,000	16,000	3,000		4,000	66,000	24,000
1,980		4,000	56,000	16,000					
2,000		4,000	56,000	16,000					
2,050		4,000	56,000	16,000					
2,100		4,000	62,000	17,000					
2,150		4,000	62,000	17,000					
2,200		4,000	62,000	18,000					
2,250		4,000	62,000	18,000					
2,300		4,000	62,000	18,000					
2,350		4,000	62,000	19,000					
2,380		4,000	62,000	19,000					
2,400		4,000	62,000	19,000					



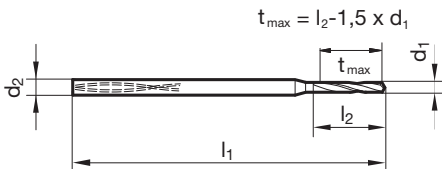
Microbrocas con refrigeración interior

Artículo N° 86408

P	M	K	N	S	H
•	•	•	○	○	



vaciado de punta $\geq \varnothing 1,400$ • afilado plano • forma recta del corte principal • corrección de cantos rectificada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una
 resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1 mm	d2 h6 mm	l1 mm	l2 mm	d1 mm	d2 h6 mm	l1 mm	l2 mm
1,400	4,000	52,000	15,000	2,600	4,000	66,000	29,000
1,500	4,000	52,000	17,000	2,700	4,000	66,000	30,000
1,600	4,000	52,000	18,000	2,800	4,000	66,000	31,000
1,700	4,000	56,000	19,000	2,900	4,000	66,000	32,000
1,800	4,000	56,000	20,000	3,000	4,000	66,000	33,000
1,900	4,000	56,000	21,000				
2,000	4,000	56,000	22,000				
2,100	4,000	62,000	23,000				
2,200	4,000	62,000	24,000				
2,300	4,000	62,000	25,000				
2,400	4,000	62,000	26,000				
2,500	4,000	62,000	28,000				

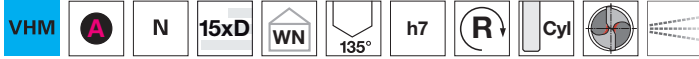


Microbrocas con refrigeración interior

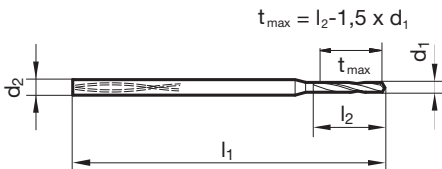
Artículo N° 86412



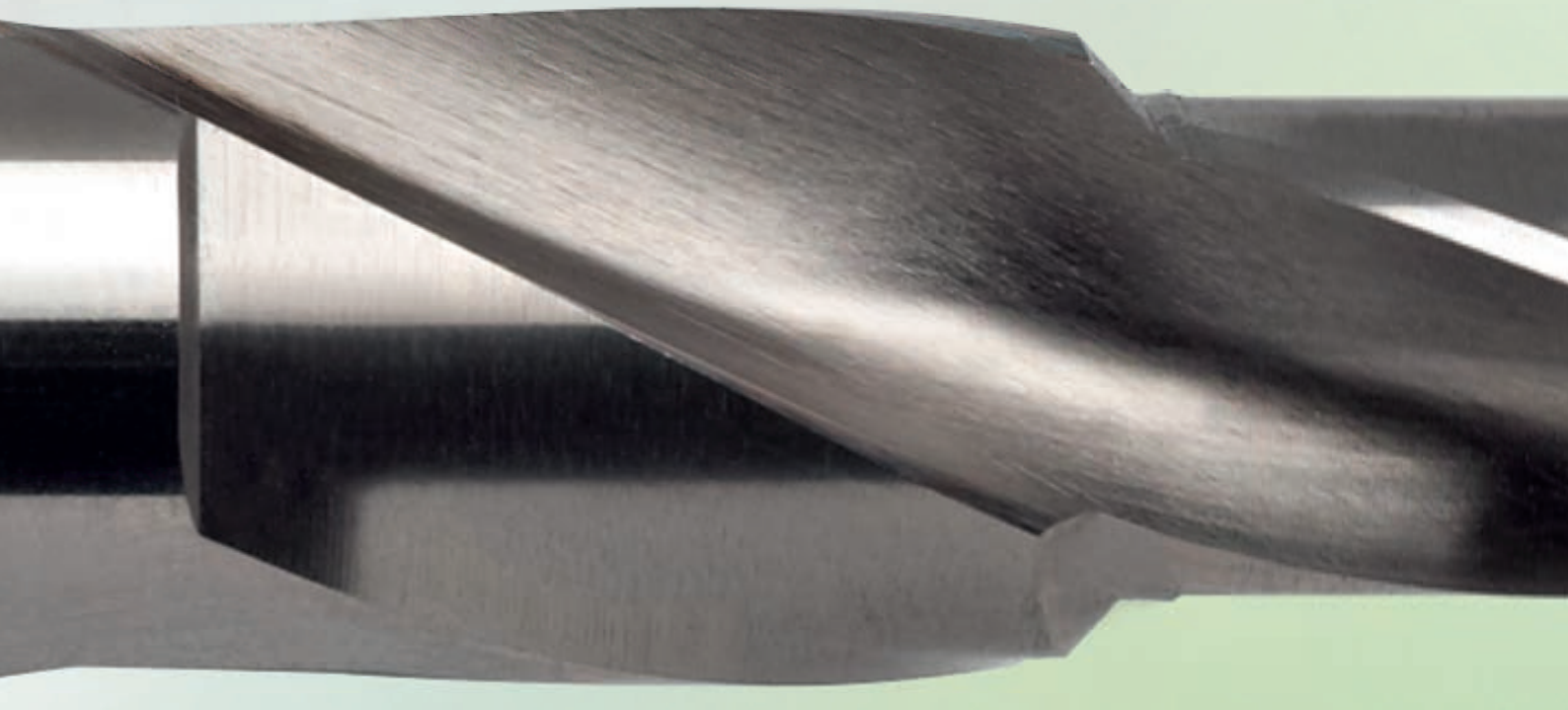
P	M	K	N	S	H
•	•	•	○	○	



vaciado de punta $\geq \varnothing 1,400$ • afilado plano • forma recta del corte principal • corrección de cantos rectificada
 aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una
 resistencia de hasta a 1200 N/mm² • aceros inoxidables • fundición



d1 mm	d2 h6 mm	l1 mm	l2 mm	d1 mm	d2 h6 mm	l1 mm	l2 mm
1,400	4,000	62,000	25,000	2,600	4,000	87,000	47,000
1,500	4,000	62,000	27,000	2,700	4,000	87,000	48,000
1,600	4,000	62,000	29,000	2,800	4,000	87,000	50,000
1,700	4,000	70,000	31,000	2,900	4,000	87,000	52,000
1,800	4,000	70,000	32,000	3,000	4,000	87,000	54,000
1,900	4,000	70,000	34,000				
2,000	4,000	70,000	36,000				
2,100	4,000	78,000	38,000				
2,200	4,000	78,000	40,000				
2,300	4,000	78,000	42,000				
2,400	4,000	78,000	44,000				
2,500	4,000	78,000	45,000				





HARTNER

Precision Cutting Tools

BROCAS ESCALONADAS / BROCAS DE CENTRAR / AVELLANADORES CÓNICOS

Brocas escalonadas cortas, brocas bidiametrales,
fabricada de HSS y metal duro, con mango cil. o CM

Brocas de centrar fabricada de HSS y HSS-E
brillante y recubierta





Avellanadores de HSS









Brocas escalonadas
Brocas de centrar

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Angulo / forma	d1/mm	Artículo N°	Progr. pág.
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Brocas escalonadas DIN 332

	•	○	•	•	•	Norma de fab.	N	HSS	●	derecha	cil.	90	8,000 - 40,000	85910	306
	•	○	•	•	•	Norma de fab.	N	HSS	●	derecha	cil.	90	8,000 - 40,000	85911	306
	•	○	•	•	•	Norma de fab.	N	HSS	●	derecha	cil.	90	8,000 - 20,000	85912	307
	•	○	•	•	•	Norma de fab.	N	HSS	●	derecha	MK	90	14,000 - 40,000	85914	308

Brocas escalonadas cortas con mango cil.






	•	○	•	•	•	Norma de fab.	N	HSS	Ⓣ	derecha	cil.	90	3,400 - 13,500	84445	313
	•	○	•	•	•	Norma de fab.	N	HSS	○	derecha	cil.	90	6,000 - 19,000	85916	310
	•	○	•	•	•	Norma de fab.	N	HSS	○	derecha	cil.	90	6,600 - 21,500	85917	311
	•	○	•	•	•	Norma de fab.	N	HSS	○	derecha	cil.	180	6,000 - 18,000	85918	312
	•	○	•	•	•	Norma de fab.	N	HSS	○	derecha	cil.	90	3,400 - 13,500	85920	314
	○	○	○	•	○	Norma de fab.	N	Metal duro	○	derecha	HE	90	5,500 - 9,000	89254	309

Brocas bidiametrales cil.






	•	○	•	○	•	DIN 8374	N	HSS	●	derecha	cil.	90	6,000 - 19,000	85010	315
	•	○	•	○	•	DIN 8374	N	HSS	●	derecha	cil.	90	7,500 - 19,000	85218	318

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Angulo / forma	d1/mm	Artículo N°	Progr. pág.
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Brocas bidiametrales cil.

	•	○	•	○		DIN 8376	N	HSS	●	derecha	cil.	180	6,000 - 18,000	85210	319
	•	○	•	○		DIN 8378	N	HSS	●	derecha	cil.	90	3,400 - 13,500	85310	317
	•	○	•	○		Norma de fab.	N	HSS	●	derecha	cil.	90	6,600 - 17,200	85110	316
	•	○	•	○		Norma de fab.	N	HSS	●	derecha	cil.	180	5,900 - 16,500	85216	320
	○	○	○	○	○		N	Metal duro	○	derecha	cil.	180	6,000 - 11,000	89252	321

Brocas bidiametrales, CM












	•	○	•	○		DIN 8375	N	HSS	●	derecha	MK	90	12,000 - 23,000	85619	326
	•	○	•	○		DIN 8377	N	HSS	●	derecha	MK	180	10,000 - 33,000	85610	324
	•	○	•	○		DIN 8379	N	HSS	●	derecha	MK	90	9,000 - 22,000	85710	323
	•	○	•	○		Norma de fab.	N	HSS	●	derecha	MK	90	11,000 - 21,500	85510	322
	•	○	•	○		Norma de fab.	N	HSS	●	derecha	MK	180	9,400 - 33,000	85616	325

Avellanadores cónicos 90°



	•	○	•	○		DIN 335		HSS	○	derecha	cil.	C	4,300 - 31,000	88200	327
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P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Angulo / forma	d1/mm	Artículo N°	Progr. pág.
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Brocas de centrar sin plano

		DIN 333	N	HSS	○	derecha	cil.	A	0,500 - 12,500	83100	328
		DIN 333	N	HSS	○	izquierda	cil.	A	0,500 - 4,000	83105	329
		DIN 333	N	HSS	○	derecha	cil.	A	1,000 - 10,000	83300	332
		DIN 333	N	HSS	ⓧ	derecha	cil.	A	0,500 - 12,500	84450	328
		DIN 333	N	HSS	○	derecha	cil.	B	1,000 - 10,000	83200	335
		DIN 333	N	HSS	○	derecha	cil.	R	0,500 - 10,000	83000	330
		DIN 333	N	HSS	○	izquierda	cil.	R	1,000 - 4,000	83005	331
		DIN 333	N	HSS	ⓧ	derecha	cil.	R	0,500 - 10,000	84448	330
		Norma de fab.	N	HSS	○	derecha	cil.	A	1,000 - 3,150	83110	334
		DIN 333	N	HSS-E	○	derecha	cil.	A	1,000 - 4,000	83101	333
		Norma de fab.	N	Metal duro	○	derecha	cil.	A	0,500 - 6,300	83370	336

Brocas de centrar con plano

		DIN 333	N	HSS	○	derecha	cil.	A	1,600 - 12,500	83600	337
		DIN 333	N	HSS	○	derecha	cil.	B	1,600 - 8,000	83700	338

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Forma del mango	Angulo / forma	d1/mm	Artículo N°	Progr. pág.
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Brocas de centrar con plano



•	○	•	•			DIN 333	N	HSS	○	derecha	cil.	R	1,600 - 12,500	83500	337
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Brocas escalonadas DIN 332

Artículo N° 85910



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 8,000$ • entrada cónica • con plano en el mango • ángulo 60° • según DIN 332, página 2, forma D • para maquinas de tronzar y centrar

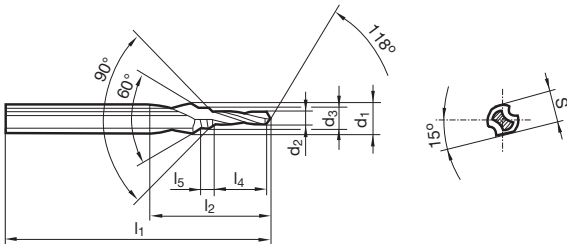
Artículo N° 85911



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 8,000$ • entrada cónica • con plano en el mango • ángulo 60° • según DIN 332, página 2, forma DR • para maquinas de tronzar y centrar



d1 h7 mm	d3 h11 mm	d2 h8 mm	S mm	l1 mm	l2 mm	l4 mm	l5 mm	para rosca
8,000	4,300	3,300	6,750	63,000	23,000	11,000	1,600	M 4
10,000	5,300	4,200	8,450	67,000	27,000	13,000	2,150	M 5
12,500	6,400	5,000	10,450	71,000	33,000	16,000	2,900	M 6
14,000	8,400	6,800	12,500	88,000	41,000	19,500	3,500	M 8
16,000	10,500	8,500	14,850	94,000	47,000	23,000	4,700	M10
20,000	13,000	10,200	18,450	105,000	59,000	28,000	6,500	M12
25,000	17,000	14,000	23,400	132,000	67,000	33,000	8,300	M16
31,500	21,000	17,500	29,350	145,000	76,500	38,000	10,350	M20
40,000	25,000	21,000	36,500	160,000	90,000	45,000	12,000	M24



Brocas escalonadas DIN 332

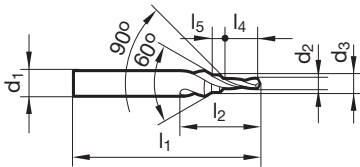
Artículo N° 85912



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 8,000$ • entrada cónica • ángulo 60° • según DIN 332, página 2, forma D



d1 h7 mm	d3 h11 mm	d2 h8 mm	l1 mm	l2 mm	l4 mm	l5 mm	para rosca
8,000	4,300	3,300	63,000	23,000	11,000	1,600	M 4
10,000	5,300	4,200	67,000	27,000	13,000	2,150	M 5
12,500	6,400	5,000	71,000	33,000	16,000	2,900	M 6
14,000	8,400	6,800	88,000	41,000	19,500	3,500	M 8
16,000	10,500	8,500	94,000	47,000	23,000	4,700	M10
20,000	13,000	10,200	105,000	59,000	28,000	6,500	M12



Brocas escalonadas DIN 332

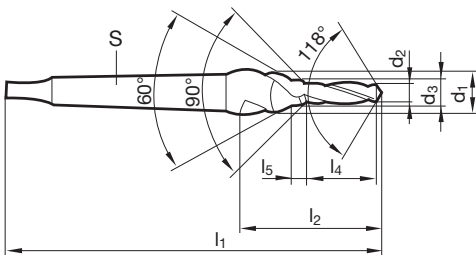
Artículo N° 85914



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 14,000$ • entrada cónica • ángulo 60° • según DIN 332, página 2, forma D



d1 h7 mm	d3 h11 mm	d2 h8 mm	S	l1 mm	l2 mm	l4 mm	l5 mm	para rosca
14,000	8,400	6,800	MK-1	110,000	41,000	19,500	3,500	M 8
16,000	10,500	8,500	MK-2	131,000	47,000	23,000	4,700	M10
20,000	13,000	10,200	MK-2	145,000	59,000	28,000	6,500	M12
25,000	17,000	14,000	MK-3	172,000	67,000	33,000	8,300	M16
31,500	21,000	17,500	MK-3	184,000	76,500	38,000	10,350	M20
40,000	25,000	21,000	MK-4	222,000	90,000	45,000	12,000	M24



Brocas escalonadas cortas con mango cil.

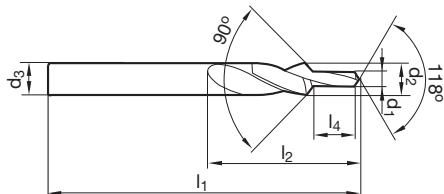
Artículo N° 89254



P	M	K	N	S	H
○	○	○	●	○	○



vaciado de punta $\geq \varnothing 3,400$ • afilado plano • muy resistente a la torsión • para máquinas CNC y NC • para pretaladros de roscar según DIN 336 • para avellanados de desalajo 90° • se rige por el dia. pequeño • vc se basa en el diámetro grande
 aceros fundidos, fundición gris, fundición endurecida superficialmente • aceros duros de manganeso, bronces • metales ligeros y metales no ferrosos • materiales abrasivos (aleaciones de AISi) • plásticos con refuerzo de fibras • placas de circ. impresos que pueden ocasionar un rápido desgaste en las superficies y bordes de corte de la broca



d1 h7 mm	d2 h9 mm	d3 mm	l1 mm	l2 mm	l4 mm	para rosca
5,500	4,200	6,000	66,000	28,000	13,600	M 5
6,600	5,000	8,000	70,000	31,000	16,500	M 6
9,000	6,800	10,000	84,000	40,000	21,000	M 8



Brocas escalonadas cortas con mango cil.

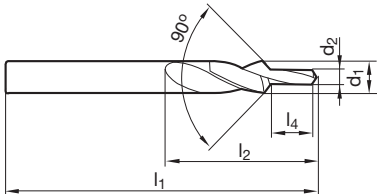
Artículo N° 85916



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 6,000$ • entrada cónica • muy resistente a la torsión • para máquinas CNC y NC • para taladros pasantes según DIN EN 20273, serie fino • para avell. para cabeza de tornillos 90° • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
6,000	3,200	66,000	28,000	9,000	M 3
8,000	4,300	79,000	37,000	11,000	M 4
10,000	5,300	89,000	43,000	13,000	M 5
11,500	6,400	95,000	47,000	15,000	M 6
15,000	8,400	111,000	56,000	19,000	M 8
19,000	10,500	127,000	64,000	23,000	M 10



Brocas escalonadas cortas con mango cil.

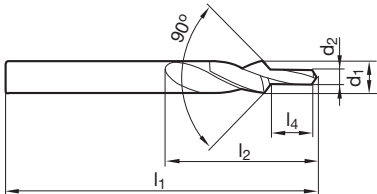
Artículo N° 85917



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 6,600$ • entrada cónica • muy resistente a la torsión • para máquinas CNC y NC • para taladros pasantes según DIN EN 20273, fila medio • para avellanados de ocultación de cabez de tornillo 90° según DIN 74, Forma A • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
6,600	3,400	70,000	31,000	9,000	M 3
9,000	4,500	84,000	40,000	11,000	M 4
11,000	5,500	95,000	47,000	13,000	M 5
13,000	6,600	102,000	51,000	15,000	M 6
17,200	9,000	123,000	62,000	19,000	M 8
21,500	11,000	141,000	70,000	23,000	M 10



Brocas escalonadas cortas con mango cil.

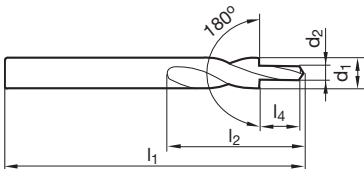
Artículo N° 85918



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 6,000$ • entrada cónica • muy resistente a la torsión • para máquinas CNC y NC • para taladros pasantes según DIN EN 20273, fila medio • para avell. para cabeza de tornillos 180° • para tornillos según DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
6,000	3,400	66,000	28,000	9,000	M 3
8,000	4,500	79,000	37,000	11,000	M 4
10,000	5,500	89,000	43,000	13,000	M 5
11,000	6,600	95,000	47,000	15,000	M 6
15,000	9,000	111,000	56,000	19,000	M 8
18,000	11,000	123,000	62,000	23,000	M 10



Brocas escalonadas cortas con mango cil.

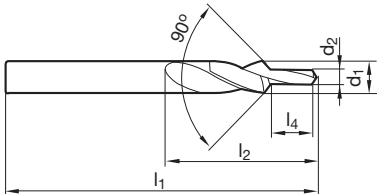
Artículo N° 84445



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 3,400$ • entrada cónica • muy resistente a la torsión • para máquinas CNC y NC • para pretaladros de roscar según DIN 336 • para avellanados de desalajo 90° • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
3,400	2,500	52,000	20,000	8,800	M 3
4,500	3,300	58,000	24,000	11,400	M 4
6,600	5,000	70,000	31,000	16,500	M 6
9,000	6,800	84,000	40,000	21,000	M 8
11,000	8,500	95,000	47,000	25,500	M 10
13,500	10,200	107,000	54,000	30,000	M 12



Brocas escalonadas cortas con mango cil.

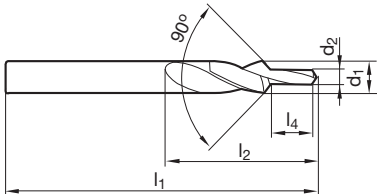
Artículo N° 85920



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 3,400$ • entrada cónica • muy resistente a la torsión • para máquinas CNC y NC • para pretaladros de roscar según DIN 336 • para avellanados de desalajo 90° • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
3,400	2,500	52,000	20,000	8,800	M 3
4,500	3,300	58,000	24,000	11,400	M 4
5,500	4,200	66,000	28,000	13,600	M 5
6,600	5,000	70,000	31,000	16,500	M 6
9,000	6,800	84,000	40,000	21,000	M 8
11,000	8,500	95,000	47,000	25,500	M 10
13,500	10,200	107,000	54,000	30,000	M 12

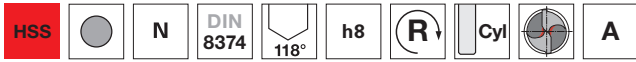


Brocas bidiametrales cil.

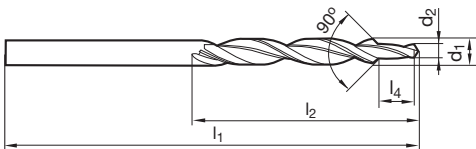
Artículo N° 85010



P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 6,000$ • entrada cónica • para taladros pasantes según DIN EN 20273, serie fino • para avell. para cabeza de tornillos 90° • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
6,000	3,200	93,000	57,000	9,000	M 3
8,000	4,300	117,000	75,000	11,000	M 4
10,000	5,300	133,000	87,000	13,000	M 5
11,500	6,400	142,000	94,000	15,000	M 6
15,000	8,400	169,000	114,000	19,000	M 8
19,000	10,500	198,000	135,000	23,000	M 10



Brocas bidiametrales cil.

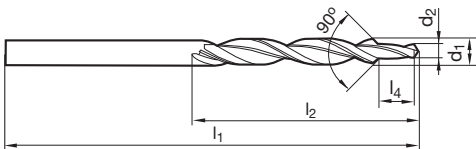
Artículo N° 85110



P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 6,600$ • entrada cónica • para taladros pasantes según DIN EN 20273, fila medio • para avellandos de cabeza de tornillo 90° según DIN 74 parte 1 (edición 12,1980 retrocedida), formas A y B, versión media • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
6,600	3,400	101,000	63,000	9,000	M 3
9,000	4,500	125,000	81,000	11,000	M 4
11,000	5,500	142,000	94,000	13,000	M 5
13,000	6,600	151,000	101,000	15,000	M 6
17,200	9,000	191,000	130,000	19,000	M 8



Brocas bidiametrales cil.

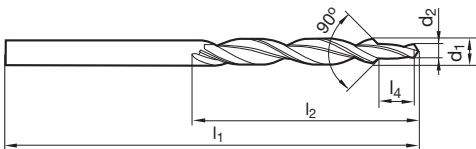
Artículo N° 85310



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 3,400$ • entrada cónica • para pretaladros de roscar según DIN 336 • para avellanados de desalajo 90° • se rige por el día. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
3,400	2,500	70,000	39,000	8,800	M 3
4,500	3,300	80,000	47,000	11,400	M 4
5,500	4,200	93,000	57,000	13,600	M 5
6,600	5,000	101,000	63,000	16,500	M 6
9,000	6,800	125,000	81,000	21,000	M 8
11,000	8,500	142,000	94,000	25,500	M 10
13,500	10,200	160,000	108,000	30,000	M 12

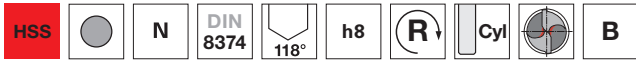


Brocas bidiametrales cil.

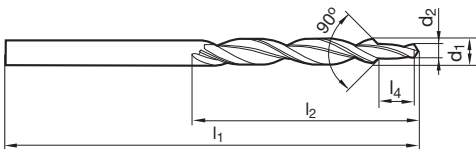
Artículo N° 85218



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 7,500$ • entrada cónica • para taladros pasantes según DIN EN 20273, fila medio • para avellandos de cabeza de tornillo 90° según DIN 74, formas A y F • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
7,500	3,400	109,000	69,000	9,000	M 3
9,700	4,500	133,000	87,000	11,000	M 4
12,000	5,500	151,000	101,000	13,000	M 5
14,500	6,600	169,000	114,000	15,000	M 6
19,000	9,000	198,000	135,000	19,000	M 8



Brocas bidiametrales cil.

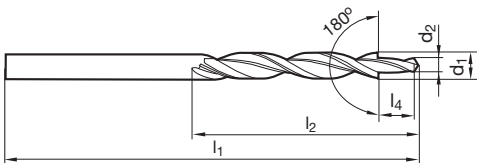
Artículo N° 85210



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 6,000$ • entrada cónica • para taladros pasantes según DIN EN 20273, fila medio • para avell. para cabeza de tornillos 180° • para tornillos según DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 y DIN 7513, 7516, 7500-1 • se rige por el día. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
6,000	3,400	93,000	57,000	9,000	M 3
8,000	4,500	117,000	75,000	11,000	M 4
10,000	5,500	133,000	87,000	13,000	M 5
11,000	6,600	142,000	94,000	15,000	M 6
15,000	9,000	169,000	114,000	19,000	M 8
18,000	11,000	191,000	130,000	23,000	M 10



Brocas bidiametrales cil.

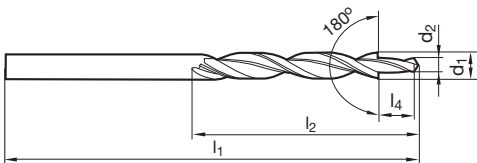
Artículo N° 85216



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 5,900$ • entrada cónica • para taladros pasantes con avellanados viejos forma H, J, K según DIN 75 Parte 2 (Edición 04, 1968 retrocedida), versión media y fina • para tornillos según DIN 84, 912, 6912 • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
5,900	3,200	93,000	57,000	11,000	M 3
7,400	4,300	109,000	69,000	13,000	M 4
9,400	5,300	125,000	81,000	16,000	M 5
10,000	5,800	133,000	87,000	16,000	M 5
10,400	6,400	133,000	87,000	19,000	M 6
11,000	7,000	142,000	94,000	19,000	M 6
13,500	8,400	160,000	108,000	22,000	M 8
16,500	10,500	184,000	125,000	25,000	M 10

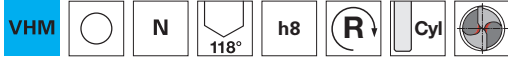


Brocas bidiametrales cil.

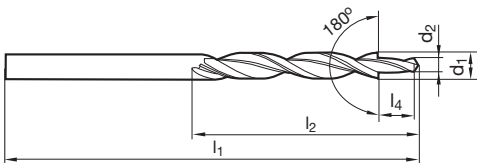
Artículo N° 89252



P	M	K	N	S	H
○	○	○	○	○	○



vaciado de punta $\geq \varnothing 8,000$ • entrada cónica • para taladros pasantes según DIN EN 20273, fila medio • para avell. para cabeza de tornillos 180° • para tornillos según DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 y DIN 7513, 7516, 7500-1 • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	para rosca
6,000	3,400	93,000	57,000	9,000	M 3
10,000	5,500	133,000	87,000	13,000	M 5
11,000	6,600	142,000	94,000	15,000	M 6



Brocas bidiametrales, CM

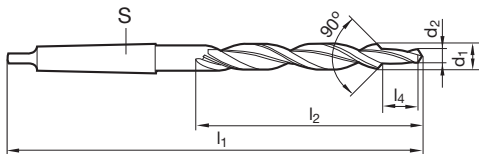
Artículo N° 85510



P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 11,000$ • entrada cónica • para taladros pasantes según DIN EN 20273, fila medio • para avellandos de cabeza de tornillo 90° según DIN 74 parte 1 (edición 12,1980 retrocedida), formas A y B, versión media • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	para rosca
11,000	5,500	MK-1	175,000	94,000	13,000	M 5
13,000	6,600	MK-1	182,000	101,000	15,000	M 6
17,200	9,000	MK-2	228,000	130,000	19,000	M 8
21,500	11,000	MK-2	248,000	150,000	23,000	M 10



Brocas bidiametrales, CM

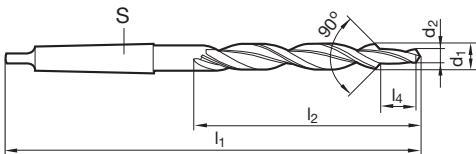
Artículo N° 85710



P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 9,000$ • entrada cónica • para pretaladros de roscar según DIN 336 • para avellanados de desalajo 90° • se rige por el día. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	para rosca
9,000	6,800	MK-1	162,000	81,000	21,000	M 8
11,000	8,500	MK-1	175,000	94,000	25,500	M 10
13,500	10,200	MK-1	189,000	108,000	30,000	M 12
15,500	12,000	MK-2	218,000	120,000	34,500	M 14
17,500	14,000	MK-2	228,000	130,000	38,500	M 16
20,000	15,500	MK-2	238,000	140,000	43,500	M 18
22,000	17,500	MK-2	248,000	150,000	47,500	M 20



Brocas bidiametrales, CM

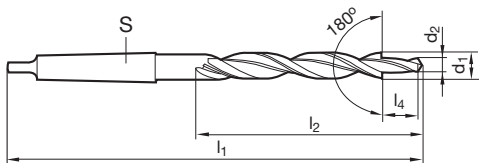
Artículo N° 85610



P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 10,000$ • entrada cónica • para taladros pasantes según DIN EN 20273, fila medio • para avell. para cabeza de tornillos 180° • para tornillos según DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 y DIN 7513, 7516, 7500-1 • se rige por el día. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	para rosca
10,000	5,500	MK-1	168,000	87,000	13,000	M 5
11,000	6,600	MK-1	175,000	94,000	15,000	M 6
15,000	9,000	MK-2	212,000	114,000	19,000	M 8
18,000	11,000	MK-2	228,000	130,000	23,000	M 10
20,000	13,500	MK-2	238,000	140,000	27,000	M 12
24,000	15,500	MK-3	281,000	160,000	31,000	M 14
26,000	17,500	MK-3	286,000	165,000	35,000	M 16
30,000	20,000	MK-3	296,000	175,000	39,000	M 18
33,000	22,000	MK-4	334,000	185,000	43,000	M 20



HARTNER

Brocas bidiametrales, CM

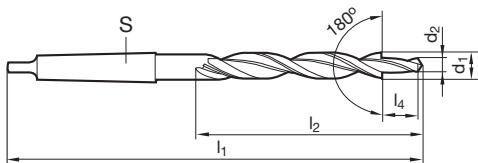
Artículo N° 85616



P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 9,400$ • entrada cónica • para taladros pasantes con avellanados viejos forma H, J, K según DIN 75 Parte 2 (Edición 04, 1968 retrocedida), versión media y fina • para tornillos según DIN 84, 912, 6912 • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	para rosca
9,400	5,300	MK-1	162,000	81,000	16,000	M 5
10,000	5,800	MK-1	168,000	87,000	16,000	M 5
10,400	6,400	MK-1	168,000	87,000	19,000	M 6
11,000	7,000	MK-1	175,000	94,000	19,000	M 6
14,500	9,500	MK-2	212,000	114,000	22,000	M 8
17,500	11,500	MK-2	228,000	130,000	25,000	M 10
19,000	13,000	MK-2	233,000	135,000	28,000	M 12
20,000	14,000	MK-2	238,000	140,000	28,000	M 12
23,000	15,000	MK-2	253,000	155,000	30,000	M 14
24,000	16,000	MK-3	281,000	160,000	30,000	M 14
25,000	17,000	MK-3	281,000	160,000	33,000	M 16
28,000	19,000	MK-3	291,000	170,000	36,000	M 18
29,000	20,000	MK-3	296,000	175,000	36,000	M 18
31,000	21,000	MK-3	301,000	180,000	39,000	M 20
33,000	23,000	MK-4	334,000	185,000	39,000	M 20



HARTNER

Brocas bidiametrales, CM

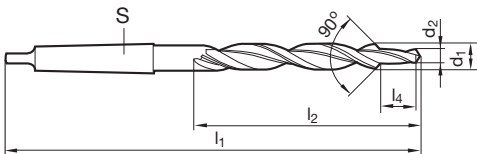
Artículo N° 85619



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 12,000$ • entrada cónica • para taladros pasantes según DIN EN 20273, serie fino • para avellandos de cabeza de tornillo 90° según DIN 74, formas A y F • se rige por el dia. pequeño • vc se basa en el diámetro grande



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	para rosca
12,000	5,500	MK-1	182,000	101,000	13,000	M 5
14,500	6,600	MK-2	212,000	114,000	15,000	M 6
19,000	9,000	MK-2	233,000	135,000	19,000	M 8
23,000	11,000	MK-2	253,000	155,000	23,000	M10



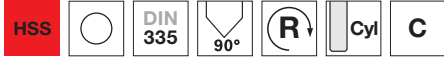
HARTNER

Avellanadores cónicos 90°

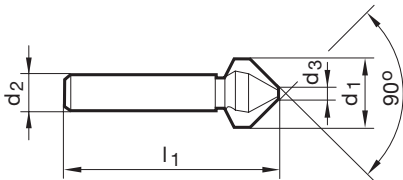
Artículo N° 88200



P	M	K	N	S	H
•	○	•	•		



destalonado radialmente • 3 cortes



d1 mm	d2 h9 mm	d3 mm	l1 mm	Z	Código N°
4,300	4,000	4,300	40,000	3	4,300
5,000	4,000	5,000	40,000	3	5,000
5,300	4,000	5,300	40,000	3	5,300
5,800	5,000	5,800	45,000	3	5,800
6,000	5,000	6,000	45,000	3	6,000
6,300	5,000	6,300	45,000	3	6,300
7,000	6,000	7,000	50,000	3	7,000
7,300	6,000	7,300	50,000	3	7,300
8,000	6,000	8,000	50,000	3	8,000
8,300	6,000	8,300	50,000	3	8,300
9,400	6,000	9,400	50,000	3	9,400
10,000	6,000	10,000	50,000	3	10,000
10,400	6,000	10,400	50,000	3	10,400
11,500	8,000	11,500	56,000	3	11,500
12,400	8,000	12,400	56,000	3	12,400
13,400	10,000	13,400	56,000	3	13,400
15,000	10,000	15,000	60,000	3	15,000
16,500	10,000	16,500	60,000	3	16,500
19,000	10,000	19,000	63,000	3	19,000
20,500	10,000	20,500	63,000	3	20,500
23,000	10,000	23,000	67,000	3	23,000
25,000	10,000	25,000	67,000	3	25,000
26,000	10,000	26,000	67,000	3	26,000
28,000	12,000	28,000	71,000	3	28,000
30,000	12,000	30,000	71,000	3	30,000
31,000	12,000	31,000	71,000	3	31,000



Brocas de centrar sin plano

Artículo N° 83100



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • sin avellanado de protección • para taladros de centrado según la norma DIN 332, hoja 1, forma A • $d1 \leq 0,8$ mm: con una punta

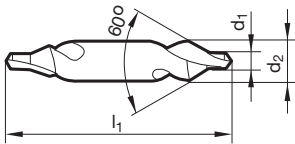
Artículo N° 84450



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • sin avellanado de protección • para taladros de centrado según la norma DIN 332, hoja 1, forma A • $d1 \leq 0,8$ mm: con una punta • más resistencia al desgaste



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
0,500	3,150	25,000	10,000	25,000	100,000
0,800	3,150	25,000	12,500	31,500	125,000
1,000	3,150	31,500			
1,250	3,150	31,500			
1,600	4,000	35,500			
2,000	5,000	40,000			
2,500	6,300	45,000			
3,150	8,000	50,000			
4,000	10,000	56,000			
5,000	12,500	63,000			
6,300	16,000	71,000			
8,000	20,000	80,000			



Brocas de centrar sin plano

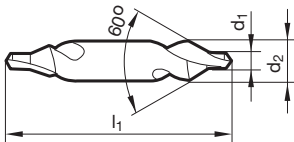
Artículo N° 83105



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • sin avellanado de protección • para taladros de centrado según la norma DIN 332, hoja 1, forma A • $d1 \leq 0,8$ mm: con una punta



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
0,500	3,150	25,000	2,500	6,300	45,000
0,800	3,150	25,000	3,150	8,000	50,000
1,000	3,150	31,500	4,000	10,000	56,000
1,250	3,150	31,500			
1,600	4,000	35,500			
2,000	5,000	40,000			

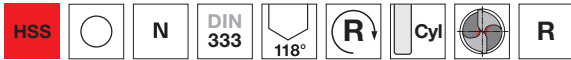


Brocas de centrar sin plano

Artículo N° 83000



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • alineación correcta de las puntas de los granos • para taladros de centrado según DIN 332 Parte 1, Forma R • $d1 \leq 0,8$ mm: con una punta

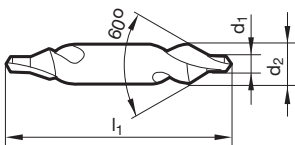
Artículo N° 84448



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • alineación correcta de las puntas de los granos • para taladros de centrado según DIN 332 Parte 1, Forma R • $d1 \leq 0,8$ mm: con una punta • más resistencia al desgaste



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
0,500	3,150	25,000	10,000	25,000	100,000
0,800	3,150	25,000			
1,000	3,150	31,500			
1,250	3,150	31,500			
1,600	4,000	35,500			
2,000	5,000	40,000			
2,500	6,300	45,000			
3,150	8,000	50,000			
4,000	10,000	56,000			
5,000	12,500	63,000			
6,300	16,000	71,000			
8,000	20,000	80,000			



Brocas de centrar sin plano

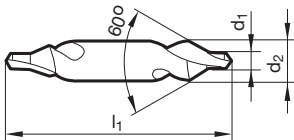
Artículo N° 83005



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • alineación correcta de las puntas de los granos • para taladros de centrado según DIN 332 Parte 1, Forma R • $d1 \leq 0,8$ mm: con una punta



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
1,000	3,150	31,500			
1,250	3,150	31,500			
1,600	4,000	35,500			
2,000	5,000	40,000			
3,150	8,000	50,000			
4,000	10,000	56,000			



Brocas de centrar sin plano

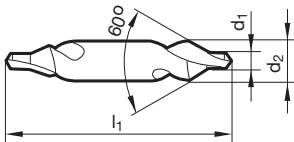
Artículo N° 83300



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • con refuerzo contra roturas • sin avellanado de protección • Hendidura en el paso de avellanado a taladrado para más alojamiento de lubricante • para taladros de centrado según la norma DIN 332, hoja 1, forma A



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
1,000	3,150	31,500	4,000	10,000	56,000
1,250	3,150	31,500	5,000	12,500	63,000
1,600	4,000	35,500	6,300	16,000	71,000
2,000	5,000	40,000	8,000	20,000	80,000
2,500	6,300	45,000	10,000	25,000	100,000
3,150	8,000	50,000			



Brocas de centrar sin plano

Artículo N° 83101

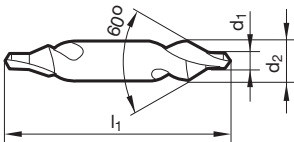


P	M	K	N	S	H
•	•	•	•	○	



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • sin avellanado de protección • más resistencia al desgaste • para taladros de centrado según la norma DIN 332, hoja 1, forma A

materiales con una dureza superior a 800 N/mm² • aceros inox y resistentes al ácido y al calor, aceros CrNi



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
1,000	3,150	31,500			
1,600	4,000	35,500			
2,000	5,000	40,000			
2,500	6,300	45,000			
3,150	8,000	50,000			
4,000	10,000	56,000			



Brocas de centrar sin plano

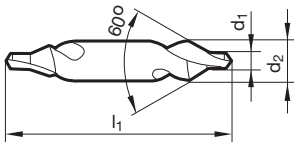
Artículo N° 83110



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • brocas de centrar, extra largas • sin avellanado de protección • para taladros de centrar similares DIN 332 Hoja 1, Forma A • para puntos de centrar situados más bajos



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
1,000	4,000	120,000			
1,600	5,000	120,000			
2,000	6,000	120,000			
2,500	8,000	120,000			
3,150	10,000	120,000			



Brocas de centrar sin plano

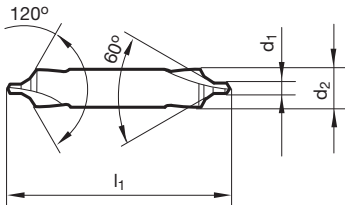
Artículo N° 83200



P	M	K	N	S	H
•	○	•	•	○	



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • según DIN 332, página 1, forma B • con avellanado de protección 120°



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
1,000	4,000	35,500	4,000	14,000	67,000
1,250	5,000	40,000	5,000	18,000	75,000
1,600	6,300	45,000	6,300	20,000	80,000
2,000	8,000	50,000	8,000	25,000	100,000
2,500	10,000	56,000	10,000	31,500	125,000
3,150	11,200	60,000			



Brocas de centrar sin plano

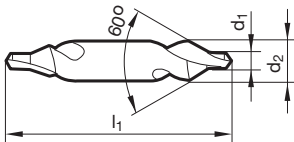
Artículo N° 83370



P	M	K	N	S	H
○	○	○	○	○	○



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • sin avellanado de protección • para taladros de centrado según la norma DIN 332, hoja 1, forma A • $d1 \leq 0,8$ mm: con una punta uso general



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
0,500	3,150	25,000	2,500	6,300	45,000
0,800	3,150	25,000	3,150	8,000	50,000
1,000	3,150	31,500	4,000	10,000	56,000
1,250	3,150	31,500	5,000	12,500	63,000
1,600	4,000	35,500	6,300	16,000	71,000
2,000	5,000	40,000			



Brocas de centrar con plano

Artículo N° 83600



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • para taladros de centrado según la norma DIN 332, hoja 1, forma A • sin avellanado de protección

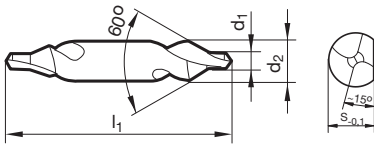
Artículo N° 83500



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • alineación correcta de las puntas de los granos • para taladros de centrado según DIN 332 Parte 1, Forma R



d1 mm	d2 h8 mm	l1 mm	S mm	d1 mm	d2 h8 mm	l1 mm	S mm
1,600	4,000	35,500	3,250	6,300	16,000	71,000	14,000
2,000	5,000	40,000	4,200	8,000	20,000	80,000	17,900
2,500	6,300	45,000	5,350	10,000	25,000	100,000	22,500
3,150	8,000	50,000	6,950	12,500	31,500	125,000	28,400
4,000	10,000	56,000	8,400				
5,000	12,500	63,000	10,950				



Brocas de centrar con plano

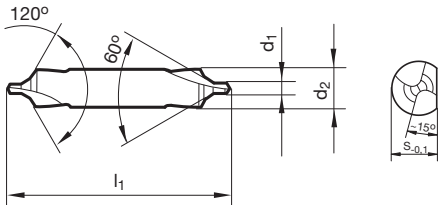
Artículo N° 83700



P	M	K	N	S	H
•	○	•	•		



vaciado de punta $\geq \varnothing 2,000$ • entrada cónica • según DIN 332, página 1, forma B • con avellanado de protección 120°



d1 mm	d2 h8 mm	l1 mm	S mm	d1 mm	d2 h8 mm	l1 mm	S mm
1,600	6,300	45,000	5,350	6,300	20,000	80,000	17,900
2,000	8,000	50,000	6,950	8,000	25,000	100,000	22,500
2,500	10,000	56,000	8,400				
3,150	11,200	60,000	10,000				
4,000	14,000	67,000	12,650				
5,000	18,000	75,000	16,400				

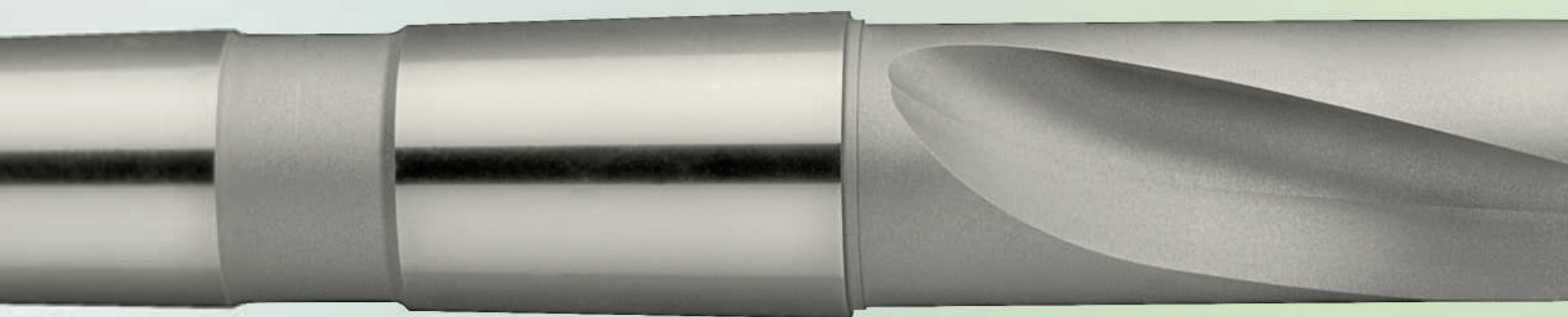
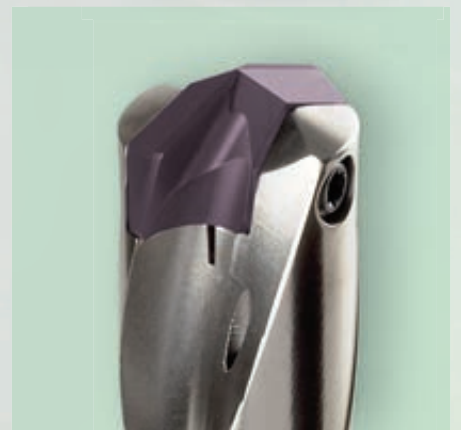
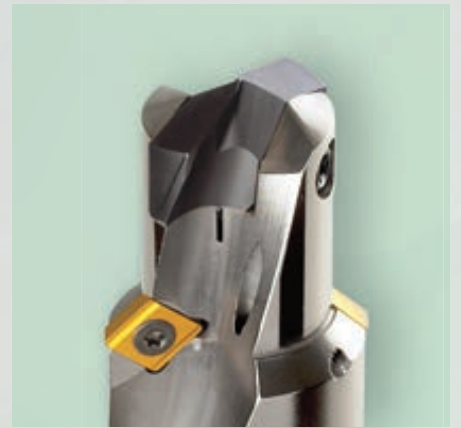


HARTNER

Precision Cutting Tools



TOOL MANAGEMENT



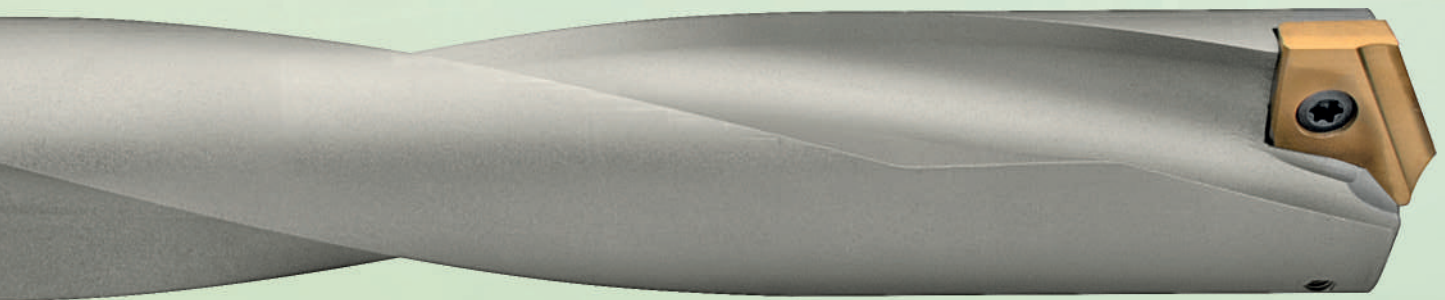


HARTNER

Precision Cutting Tools

MULTIPLEX MULTIPLEX HPC

Broca con placa intercambiable y canal de refrigeración interior
Placas intercambiables en HSS-E, HSS-E-PM,
metal duro, con recubrimiento



Multiplex
Multiplex HPC

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Con refrigeración interna	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Soporte Multiplex con mango cilíndrico



Norma de fab.



derecha

con

<3xD

86612

349



Norma de fab.



derecha

con

<5xD

86622

350



Norma de fab.



derecha

con

<7xD

86624

351

Soporte Multiplex con cono de compensación cónico



Norma de fab.



derecha

con

86630

352



Norma de fab.



derecha

con

86650

354



Norma de fab.



derecha

con

86670

353



Norma de fab.



derecha

con

86680

355

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Con refrigeración interna	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Gama especial de soportes Multiplex con mango cilíndrico



						Norma de fab.		Ni		derecha	con			86628	356
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Gama especial de soportes Multiplex con mango cónico



						Norma de fab.		Ni		derecha	con			86678	358
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Placas intercambiables



•	○	•	○			Norma de fab.	HSS-E-PM	T		derecha				86602	361
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•	○	•	○			Norma de fab.	HSS-E-PM	F		derecha				86608	362
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•	○	•	○			Norma de fab.	HSS-E-PM	A		derecha				86609	363
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•	○	•	○			Norma de fab.	Metal duro	F		derecha				86701	367
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•	○	•	○			Norma de fab.	Metal duro	F		derecha				86702	365
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P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Con refrigeración interna	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Placas intercambiables



•	○	•	○	○	○	Norma de fab.		Metal duro	Ⓟ	derecha				86708	364
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•	○	•	○	○	○	Norma de fab.		Metal duro	Ⓟ	derecha				86709	366
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Alimentadores de refrigeración



						Norma de fab.								86690	368
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Tubo alimentador para refrigerante



						Norma de fab.			●					82571	369
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Sistema de cambio rápido



						Norma de fab.								82578	370
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Atornillador Torx



						Norma de fab.								86842	371
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P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Con refrigeración interna	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Transportador de refrigerante para Multiplex



Norma de fab.

ⓑ

86691

372



Norma de fab.

ⓑ

86692

373



Norma de fab.

ⓑ

86693

374



Norma de fab.

ⓑ

86694

375

Union para mandril de refrigeracion



Norma de fab.

ⓑ

86699

376

P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Con refrigeración interna	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Soporte Multiplex HPC



						Norma de fab.	HPC	Ni		derecha	con	1xD		86681	378
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						Norma de fab.	HPC	Ni		derecha	con	1,5xD		86682	379
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						Norma de fab.	HPC	Ni		derecha	con	3xD		86683	381
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						Norma de fab.	HPC	Ni		derecha	con	5xD		86684	383
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						Norma de fab.	HPC	Ni		derecha	con	7xD		86685	385
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						Norma de fab.	HPC	Ni		derecha	con	10xD		86686	387
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Plaquitas intercambiables Multiplex HPC



○	○	○	○	○	○	Norma de fab.	HPC	Metal duro	a	derecha		11,000 - 40,000	86721	389
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●	○	○	○	○	○	Norma de fab.	HPC	Metal duro	F	derecha		11,000 - 40,000	86722	392
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P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Con refrigeración interna	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Plaquitas intercambiables Multiplex HPC



○	●	○	○	○	○	Norma de fab.	HPC	Metal duro	Ⓡ	derecha			11,000 - 40,000	86723	395
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○	○	○	●	○	○	Norma de fab.	HPC	Metal duro	○	derecha			11,000 - 40,000	86724	398
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○	●	○	○	○	○	Norma de fab.	HPC	Metal duro	Ⓡ	derecha			11,000 - 40,000	86725	401
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Plaquitas para avellanar Multiplex HPC



○	○	●	○	○	○	Norma de fab.		Metal duro	Ⓡ	neutral				86726	404
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○	○	○	●	○	○	Norma de fab.		Metal duro	○	derecha				86727	404
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●	○	○	○	○	○	Norma de fab.		Metal duro	Ⓡ	derecha				86728	405
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Tornillos tensores para porta Multiplex HPC 1,5-10xD



						Norma de fab.								86843	406
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P	M	K	N	S	H	Norma	Tipo	Material de corte	Acabado	Dirección de corte	Con refrigeración interna	Profundidad	d1/mm	Artículo N°	Progr. pág.
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Llave dinamométrica



Norma de fab.

86844

407

Adaptor exagonal



Norma de fab.

86845

408

Tornillos tensores para porta de avellanar Multiplex HPC



Norma de fab.

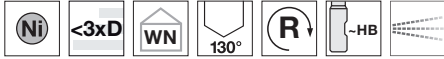
86846

409

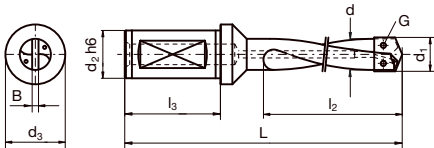


Soporte Multiplex con mango cilíndrico

Artículo N° 86612



niquelado • Portas para plaquitas intercambiables. El porta con mango cilíndrico tiene refrigeración interna. Amplias ranuras garantizan un desalojo de la viruta óptimo. Fácil cambio de las plaquitas por tornillos tensores. No es necesario ajustar las plaquitas. Con la broca de plaquitas básicamente se debe taladrar en directo. Para retaladrar taladros de fundición y para abrir agujeros pretaladrados, esta herramienta no es adecuada. Tornillos tensores Art.n°. 86807 incluidos.

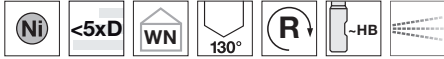


d1 mm	d mm	d2 h6 mm	d3 mm	L mm	l2 mm	l3 mm	B mm	G	Código N°
10,00-11,7	9,500	20,000	25,000	108,000	50,000	40,000	2,500	86807 2.000	9,500
11,71-13,4	11,500	20,000	25,000	109,000	53,000	40,000	2,500	86807 2.000	11,500
13,41-16,4	13,000	20,000	25,000	116,000	60,000	40,000	3,500	86807 2.500	13,000
16,41-18,9	16,000	20,000	25,000	118,000	65,000	40,000	3,500	86807 2.501	16,000
18,91-22,4	18,500	20,000	25,000	124,000	73,000	40,000	4,000	86807 3.000	18,500
22,41-25,4	22,000	20,000	25,000	127,000	78,000	40,000	4,000	86807 3.001	22,000
25,41-29,0	24,000	32,000	40,000	178,000	105,000	60,000	5,000	86807 3.500	24,000
29,01-35,0	28,000	32,000	40,000	178,000	108,000	60,000	5,000	86807 3.500	28,000
35,01-45,0	34,000	32,000	40,000	223,000	152,000	60,000	7,000	86807 4.001	34,000
45,01-55,0	44,000	40,000	50,000	233,000	152,000	70,000	7,000	86807 4.001	44,000
55,01-65,0	54,000	40,000	50,000	233,000	152,000	70,000	7,000	86807 4.001	54,000

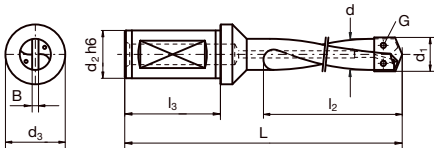


Soporte Multiplex con mango cilíndrico

Artículo N° 86622



niquelado • Portas para plaquitas intercambiables. El porta con mango cilíndrico tiene refrigeración interna. Amplias ranuras garantizan un desalojo de la viruta óptimo. Fácil cambio de las plaquitas por tornillos tensores. No es necesario ajustar las plaquitas. Con la broca de plaquitas básicamente se debe taladrar en directo. Para retaladrar taladros de fundición y para abrir agujeros pretaladrados, esta herramienta no es adecuada. Tornillos tensores Art.n°. 86807 incluidos.

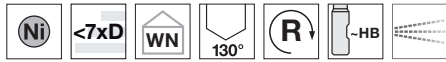


d1 mm	d mm	d2 h6 mm	d3 mm	L mm	l2 mm	l3 mm	B mm	G	Código N°
10,00-11,7	9,500	20,000	25,000	140,000	83,000	40,000	2,500	86807 2.000	9,500
11,71-13,4	11,500	20,000	25,000	150,000	94,000	40,000	2,500	86807 2.000	11,500
13,41-16,4	13,000	20,000	25,000	160,000	104,000	40,000	3,500	86807 2.500	13,000
16,41-18,9	16,000	20,000	25,000	170,000	117,000	40,000	3,500	86807 2.501	16,000
18,91-22,4	18,500	20,000	25,000	180,000	129,000	40,000	4,000	86807 3.000	18,500
22,41-25,4	22,000	20,000	25,000	180,000	131,000	40,000	4,000	86807 3.001	22,000
25,41-29,0	24,000	32,000	40,000	240,000	166,000	60,000	5,000	86807 3.500	24,000
29,01-35,0	28,000	32,000	40,000	240,000	170,000	60,000	5,000	86807 3.500	28,000
35,01-45,0	34,000	32,000	40,000	280,000	210,000	60,000	7,000	86807 4.001	34,000
45,01-55,0	44,000	40,000	50,000	290,000	210,000	70,000	7,000	86807 4.001	44,000
55,01-65,0	54,000	40,000	50,000	290,000	210,000	70,000	7,000	86807 4.001	54,000

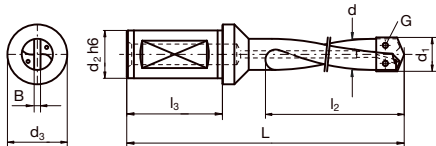


Soporte Multiplex con mango cilíndrico

Artículo N° 86624



niquelado • Portas para plaquitas intercambiables. El porta con mango cilíndrico tiene refrigeración interna. Amplias ranuras garantizan un desalajo de la viruta óptimo. Fácil cambio de las plaquitas por tornillos tensores. No es necesario ajustar las plaquitas. Con la broca de plaquitas básicamente se debe taladrar en directo. Para retaladrar taladros de fundición y para abrir agujeros pretaladrados, esta herramienta no es adecuada. Tornillos tensores Art.n°. 86807 incluidos.



d1 mm	d mm	d2 h6 mm	d3 mm	L mm	l2 mm	l3 mm	B mm	G	Código N°
10,00-11,7	9,500	20,000	25,000	180,000	123,000	40,000	2,500	86807 2.000	9,500
11,71-13,4	11,500	20,000	25,000	190,000	134,000	40,000	2,500	86807 2.000	11,500
13,41-16,4	13,000	20,000	25,000	210,000	155,000	40,000	3,500	86807 2.500	13,000
16,41-18,9	16,000	20,000	25,000	220,000	168,000	40,000	3,500	86807 2.501	16,000
18,91-22,4	18,500	20,000	25,000	250,000	199,000	40,000	4,000	86807 3.000	18,500
22,41-25,4	22,000	20,000	25,000	250,000	201,000	40,000	4,000	86807 3.001	22,000
25,41-29,0	24,000	32,000	40,000	320,000	246,000	60,000	5,000	86807 3.500	24,000
29,01-35,0	28,000	32,000	40,000	320,000	250,000	60,000	5,000	86807 3.500	28,000
35,01-45,0	34,000	32,000	40,000	380,000	310,000	60,000	7,000	86807 4.001	34,000
45,01-55,0	44,000	40,000	50,000	390,000	310,000	70,000	7,000	86807 4.001	44,000
55,01-65,0	54,000	40,000	50,000	390,000	310,000	70,000	7,000	86807 4.001	54,000



Soporte Multiplex con cono de compensación cónico

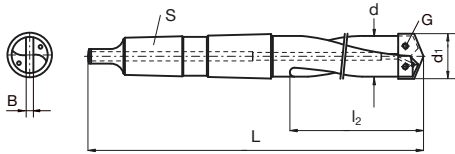
Artículo N° 86630



niquelado • Porta para plaquitas intercambiables en versión corta. El porta con mango cónico tiene refrigeración interna. Ranuras amplias garantizan un desalajo de viruta óptimo. Fácil cambio de las plaquitas por tornillos tensores. No es necesario ajustar las plaquitas intercambiables. Con la broca de plaquitas basicamente se debe taladrar en directo. Para retaladrar taladros de fundición y para abrir agujeros pretaladrados, esta herramienta no es adecuada.

Transmisión de refrigerante: axial (radial sobre oferta)

Tornillos tensores Art.n°. 86807 incluidos.



d1 mm	d mm	S	L mm	l ₂ mm	B mm	G	Código N°
10,00-11,7	9,500	MK-2	139,000	56,000	2,500	86807 2.000	9,500
11,71-13,4	11,500	MK-2	141,000	58,000	2,500	86807 2.000	11,500
13,41-16,4	13,000	MK-2	148,000	63,000	3,500	86807 2.500	13,000
16,41-18,9	16,000	MK-2	150,000	67,000	3,500	86807 2.501	16,000
18,91-22,4	18,500	MK-3	178,000	76,000	4,000	86807 3.000	18,500
22,41-25,4	22,000	MK-3	181,000	80,000	4,000	86807 3.001	22,000



Soporte Multiplex con cono de compensación cónico

Artículo N° 86670



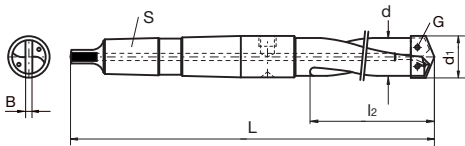
≤ dia. 28mm: niquelado, > dia. 28mm: pavonado • Portas para plaquitas intercambiables en versión corta con ranura para aro de refrigeración. El porta con mango cónico tiene refrigeración interna. Amplias ranuras garantizan un desalojo óptimo. Fácil cambio de las plaquitas por tornillos tensores. No es necesario ajustar las plaquitas intercambiables. Con la broca de plaquitas básicamente se debe taladrar en directo. Para retaladrar taladros de fundición esta herramienta no es adecuada.

Transmisión de refrigerante: radial (axial sobre oferta)

Desde porta-Ø 63,0 mm: con ranuras rectas

Tamaño del mango MK 5: con ranura transversal

Tornillos Art.n° 86807 incluidos



d1 mm	d mm	S	L mm	l2 mm	B mm	G	Código N°
25,01-29,0	24,000	MK-4	279,000	108,000	5,000	86807 3.500	24,000
29,01-35,0	28,000	MK-4	279,000	108,000	5,000	86807 3.500	28,000
35,01-45,0	34,000	MK-4	324,000	152,000	7,000	86807 4.001	34,000
45,01-55,0	44,000	MK-4	324,000	152,000	7,000	86807 4.001	44,000
55,01-65,0	54,000	MK-4	324,000	152,000	7,000	86807 4.001	54,000
65,01-78,0	63,000	MK-5	436,000	216,000	9,000	86807 5.000	63,000
78,01-90,0	77,000	MK-5	436,000	216,000	9,000	86807 5.000	77,000
90,01-102,0	89,000	MK-5	436,000	216,000	9,000	86807 5.000	89,000

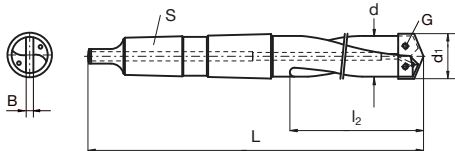


Soporte Multiplex con cono de compensación cónico

Artículo N° 86650



niquelado • Portas para plaquitas en versión extralarga. El porta con mango cónico tiene refrigeración interna. Ranuras amplias garantizan un de viruta óptimo. Fácil cambio de las plaquitas por tornillos tensores. No es necesario ajustar las plaquitas intercambiables. Con la broca de plaquitas se debe taladrar en directo. Para retaladrar taladros de fundición esta herramienta no es adecuada. Transmisión de refrigeración: axial (radial sobre oferta) Tornillos tensores Art.n° 86807 incluidos.



d1 mm	d mm	S	L mm	l ₂ mm	B mm	G	Código N°
10,00-11,7	9,500	MK-2	186,000	103,000	2,500	86807 2.000	9,500
11,71-13,4	11,500	MK-2	191,000	108,000	2,500	86807 2.000	11,500
13,41-16,4	13,000	MK-2	210,000	125,000	3,500	86807 2.500	13,000
16,41-18,9	16,000	MK-2	218,000	135,000	3,500	86807 2.501	16,000
18,91-22,4	18,500	MK-3	258,000	156,000	4,000	86807 3.000	18,500
22,41-25,4	22,000	MK-3	266,000	166,000	4,000	86807 3.001	22,000



Soporte Multiplex con cono de compensación cónico

Artículo N° 86680



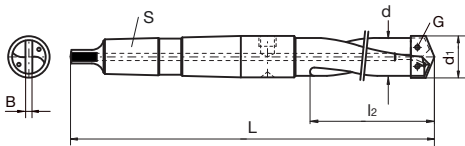
≤ dia. 28mm: niquelado, > dia. 28mm: pavonado • Portas para plaquitas intercambiables en versión extralarga con ranura para aro de refrigeración radial. El porta con mango cónico tiene refrigeración interna. Ranuras amplias garantizan un desalojo de viruta óptimo. Fácil cambio de las plaquitas por tornillos tensores. No es necesario ajustar las plaquitas. Con la broca de plaquitas básicamente se debe taladrar en directo. Para retaladrar taladros de fundición esta herramienta no es adecuada.

Refrigeración interna: radial (axial sobre oferta)

Desde porta-Ø 63,0 mm: ranuras rectas

Tamaño mango MK 5: con ranura transversal

Tornillos tensores Art.n°86807 incluidos.



d1 mm	d mm	S	L mm	l2 mm	B mm	G	Código N°
25,01-29,0	24,000	MK-4	379,000	208,000	5,000	86807 3.500	24,000
29,01-35,0	28,000	MK-4	379,000	208,000	5,000	86807 3.500	28,000
35,01-45,0	34,000	MK-4	429,000	257,000	7,000	86807 4.001	34,000
45,01-55,0	44,000	MK-4	429,000	257,000	7,000	86807 4.001	44,000
55,01-65,0	54,000	MK-4	429,000	257,000	7,000	86807 4.001	54,000
65,01-78,0	63,000	MK-5	536,000	316,000	9,000	86807 5.000	63,000
78,01-90,0	77,000	MK-5	536,000	316,000	9,000	86807 5.000	77,000
90,01-102,0	89,000	MK-5	536,000	316,000	9,000	86807 5.000	89,000

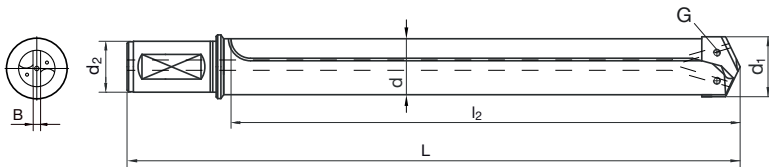


Gama especial de soportes Multiplex con mango cilíndrico

Artículo N° 86628



niquelado • Porta para plaquitas intercambiables. El porta extralargo con mango cilíndrico tiene refrigeración interna. Mas ranuras aseguran una evacuación de viruta óptima. Cambio fácil de las plaquitas con tornillos de tensión.No es necesario ajustar las plaquitas. con la broca de plaquitas intercambiables basicamente se debe taladrar en directo. Para abrir taladros de fundición y pretaladrados esta herramienta no es apropiada. Tornillos tensores Art-N°. 86807 incluido



d1 mm	d mm	d2 h6 mm	L mm	l2 mm	B mm	G	Código N°
13,41-16,4	13,000	20,000	198,500	156,500	3,500	86807 2.500	13,157
13,41-16,4	13,000	20,000	238,500	196,500	3,500	86807 2.500	13,197
13,41-16,4	13,000	20,000	318,500	276,500	3,500	86807 2.500	13,277
15,00-16,4	14,500	20,000	95,000	52,000	3,500	86807 2.500	14,052
15,00-16,4	14,500	20,000	125,000	82,000	3,500	86807 2.500	14,082
15,00-16,4	14,500	20,000	178,500	136,500	3,500	86807 2.500	14,137
15,00-16,4	14,500	20,000	198,500	156,500	3,500	86807 2.500	14,157
15,00-16,4	14,500	20,000	238,500	196,500	3,500	86807 2.500	14,197
15,00-16,4	14,500	20,000	268,500	226,500	3,500	86807 2.500	14,227
15,00-16,4	14,500	20,000	398,500	356,500	3,500	86807 2.500	14,357
16,41-18,9	16,000	20,000	260,500	218,500	3,500	86807 2.500	16,219
16,41-18,9	16,000	20,000	295,500	253,500	3,500	86807 2.500	16,254
16,41-18,9	16,000	20,000	410,500	368,500	3,500	86807 2.501	16,369
18,91-22,4	18,500	20,000	304,000	262,000	4,000	86807 3.000	18,262
18,91-22,4	18,500	20,000	344,000	302,000	4,000	86807 3.000	18,302
18,91-22,4	18,500	20,000	464,000	422,000	4,000	86807 3.000	18,422
22,41-25,4	22,000	20,000	285,000	243,000	4,000	86807 3.001	22,243
22,41-25,4	22,000	20,000	345,000	303,000	4,000	86807 3.001	22,303
22,41-25,4	22,000	20,000	385,000	343,000	4,000	86807 3.001	22,343
22,41-25,4	22,000	20,000	535,000	493,000	4,000	86807 3.001	22,493
25,41-29,0	23,000	32,000	138,000	63,000	5,000	86807 3.001	23,063
25,41-29,0	23,000	32,000	173,000	98,000	5,000	86807 3.001	23,098
25,41-29,0	23,000	32,000	225,000	150,000	5,000	86807 3.001	23,150
25,41-29,0	23,000	32,000	273,000	198,000	5,000	86807 3.001	23,198
25,41-29,0	23,000	32,000	343,000	268,000	5,000	86807 3.001	23,268
25,41-29,0	23,000	32,000	433,000	358,000	5,000	86807 3.001	23,358
25,41-29,0	23,000	32,000	503,000	428,000	5,000	86807 3.001	23,428
25,41-29,0	23,000	32,000	683,000	608,000	5,000	86807 3.001	23,608
29,01-35,0	28,000	32,000	393,000	321,500	5,000	86807 3.500	28,322
29,01-35,0	28,000	32,000	473,000	401,500	5,000	86807 3.500	28,402
29,01-35,0	28,000	32,000	553,000	481,500	5,000	86807 3.500	28,482
29,01-35,0	28,000	32,000	763,000	691,500	5,000	86807 3.500	28,692
33,20-36,0	33,000	32,000	148,000	80,500	5,000	86807 3.500	33,081
33,20-36,0	33,000	32,000	173,000	105,500	5,000	86807 3.500	33,106
33,20-36,0	33,000	32,000	223,000	155,500	5,000	86807 3.500	33,156
33,20-36,0	33,000	32,000	273,000	205,500	5,000	86807 3.500	33,206
33,20-36,0	33,000	32,000	393,000	325,500	5,000	86807 3.500	33,326
33,20-36,0	33,000	32,000	503,000	435,500	5,000	86807 3.500	33,436
33,20-36,0	33,000	32,000	603,000	535,500	5,000	86807 3.500	33,536
33,20-36,0	33,000	32,000	823,000	755,500	5,000	86807 3.500	33,756
35,01-45,0	34,000	32,000	457,000	388,000	7,000	86807 4.001	34,388
35,01-45,0	34,000	32,000	607,000	538,000	7,000	86807 4.001	34,538



Gama especial de soportes Multiplex con mango cilíndrico

d1 mm	d mm	d2 h6 mm	L mm	l2 mm	B mm	G	Código N°
35,01-45,0	34,000	32,000	907,000	838,000	7,000	86807 4.001	34,838
45,01-55,0	44,000	40,000	467,000	394,000	7,000	86807 4.001	44,394
45,01-55,0	44,000	40,000	617,000	544,000	7,000	86807 4.001	44,544
45,01-55,0	44,000	40,000	917,000	844,000	7,000	86807 4.001	44,844
55,01-65,0	54,000	40,000	467,000	393,000	7,000	86807 4.001	54,393
55,01-65,0	54,000	40,000	617,000	543,000	7,000	86807 4.001	54,543
55,01-65,0	54,000	40,000	917,000	843,000	7,000	86807 4.001	54,843
65,01-78,0	63,000	40,000	230,000	155,000	9,000	86807 5.000	63,155
65,01-78,0	63,000	40,000	340,000	265,000	9,000	86807 5.000	63,265
65,01-78,0	63,000	40,000	470,000	395,000	9,000	86807 5.000	63,395
65,01-78,0	63,000	40,000	620,000	545,000	9,000	86807 5.000	63,545
65,01-78,0	63,000	40,000	920,000	845,000	9,000	86807 5.000	63,845
78,01-90,0	77,000	50,000	240,000	155,000	9,000	86807 5.000	77,155
78,01-90,0	77,000	50,000	350,000	265,000	9,000	86807 5.000	77,265
78,01-90,0	77,000	50,000	480,000	395,000	9,000	86807 5.000	77,395
78,01-90,0	77,000	50,000	630,000	545,000	9,000	86807 5.000	77,545
78,01-90,0	77,000	50,000	930,000	845,000	9,000	86807 5.000	77,845
90,01-102,0	89,000	50,000	240,000	155,000	9,000	86807 5.000	89,155
90,01-102,0	89,000	50,000	350,000	265,000	9,000	86807 5.000	89,265
90,01-102,0	89,000	50,000	480,000	395,000	9,000	86807 5.000	89,395
90,01-102,0	89,000	50,000	630,000	545,000	9,000	86807 5.000	89,545
90,01-102,0	89,000	50,000	930,000	845,000	9,000	86807 5.000	89,845



Gama especial de soportes Multiplex con mango cónico

Artículo N° 86678



superficie $\leq 1000\text{mm}$ de longitud total niquelado, $> 1000\text{mm}$ pavonado • Portas para plaquitas versión extralarga. El porta con mango cónico tiene refrigeración interna. Ranuras amplias garantizan un desalajo de viruta óptimo. Fácil cambio de plaquitas por tornillos tensores. No es necesario ajustar las plaquitas intercambiables. Con la broca de plaquitas básicamente se debe taladrar en directo. Para abrir taladros pretaladrados de fundición esta herramienta no es adecuada.
Refrigeración interna: radial (axial sobre oferta)
Tornillos tensores art.n° 86807 incluidos



d1 mm	d mm	S	L mm	l2 mm	B mm	G	Código N°
35,01-45,0	34,000	MK-4	566,000	393,000	7,000	86807 4.001	34,393
35,01-45,0	34,000	MK-4	716,000	543,000	7,000	86807 4.001	34,543
35,01-45,0	34,000	MK-4	1016,000	843,000	7,000	86807 4.001	34,843
45,01-55,0	44,000	MK-4	716,000	544,500	7,000	86807 4.001	44,545
45,01-55,0	44,000	MK-4	1016,000	844,500	7,000	86807 4.001	44,845
55,01-65,0	54,000	MK-4	560,000	387,000	7,000	86807 4.001	54,387
55,01-65,0	54,000	MK-4	716,000	543,000	7,000	86807 4.001	54,543
55,01-65,0	54,000	MK-4	1016,000	843,000	7,000	86807 4.001	54,843
65,01-78,0	63,000	MK-5	766,000	547,000	9,000	86807 5.000	63,547
65,01-78,0	63,000	MK-5	1066,000	847,000	9,000	86807 5.000	63,847
78,01-90,0	77,000	MK-5	766,000	544,000	9,000	86807 5.000	77,544
78,01-90,0	77,000	MK-5	1066,000	844,000	9,000	86807 5.000	77,844
90,01-102,0	89,000	MK-5	766,000	544,000	9,000	86807 5.000	89,544
90,01-102,0	89,000	MK-5	1066,000	844,000	9,000	86807 5.000	89,844



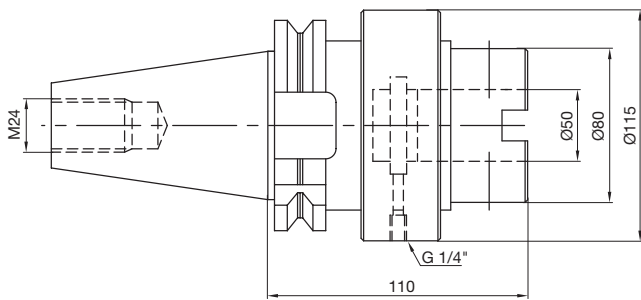
Gama especial del sistema modular Multiplex Ø 97 mm hasta 210 mm



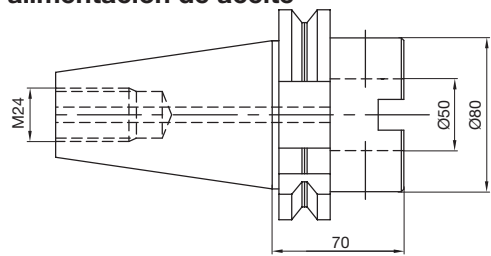
Adaptadores

Las siguientes versiones están disponibles bajo demanda:

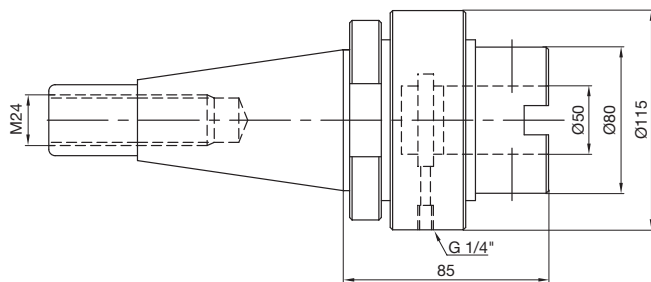
- SK50 DIN 69871 con adaptadores de alimentación de aceite



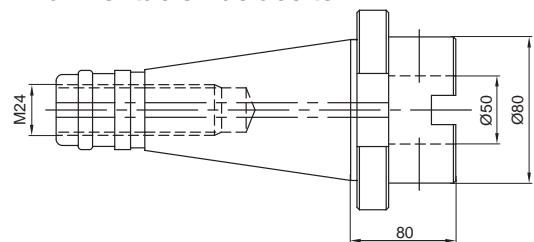
- SK50 DIN 69871 sin adaptadores de alimentación de aceite



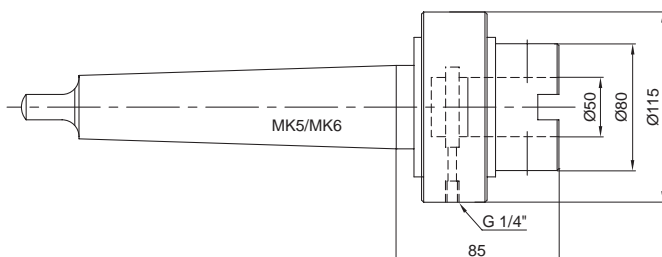
- SK50 DIN 2080 con adaptadores de alimentación de aceite



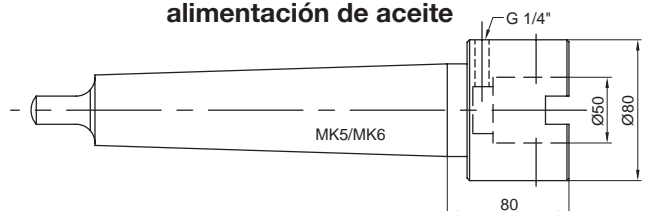
- SK50 DIN 2080 sin adaptadores de alimentación de aceite



- MT 5 /MT 6 con adaptadores de alimentación de aceite



- MT 5 /MT 6 sin adaptadores de alimentación de aceite



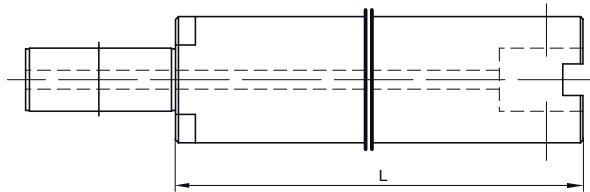


Gama especial del sistema modular Multiplex Ø 97 mm hasta 210 mm

Alargo para cabezal de taladrar



Alargo para cabezal de taladrar
 Ø 97 mm - Ø 130 mm
 L = 186 mm
 L = 300 mm



Alargo para cabezal de taladrar
 Ø 131 mm - Ø 165 mm y Ø 164 mm - Ø 210 mm
 L = 204 mm
 L = 300 mm
 L = 500 mm

Arrastres

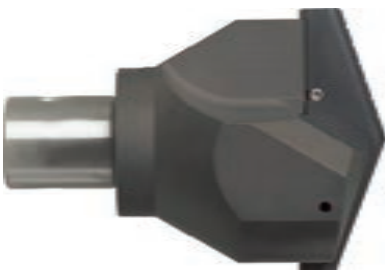


pequeño, para cabezal de taladrar
 dia. 97 mm - dia. 130 mm,
 ancho 14 mm



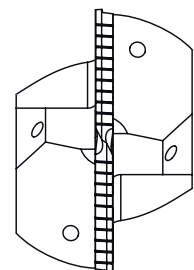
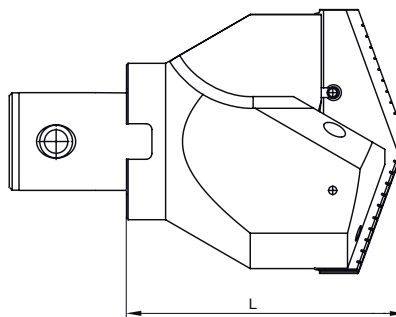
grande, para cabezal de taladrar
 dia. 131 mm - dia. 165 mm y
 dia. 164 mm - dia. 210 mm,
 ancho 16 mm

Cabezas de taladrar



Las siguientes medidas se suministran sobre
 petición de oferta:

- Ø 97 mm hasta Ø 130 mm, L = 118,5 mm
- Ø 131 mm hasta Ø 165 mm, L = 142,5 mm
- Ø 164 mm hasta Ø 210 mm, L = 142,5 mm





Placas intercambiables

Artículo N° 86602

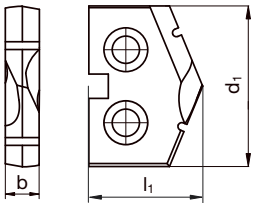


P	M	K	N	S	H
●	○	●	○		

HSS-E-PM



vaciado de punta $\geq \varnothing 9,800$ • Plaquita con ranuras de división. Ángulo de la punta 135°. Para aplicación universal.



d1 mm	l1 mm	b mm	Código N°	d1 mm	l1 mm	b mm	Código N°
10,000	8,700	2,500	10,000	18,000	11,700	3,500	18,000
10,200	8,700	2,500	10,200	18,250	11,700	3,500	18,250
10,500	8,700	2,500	10,500	18,500	11,700	3,500	18,500
11,000	8,700	2,500	11,000	18,750	11,700	3,500	18,750
11,110	8,700	2,500	11,110	19,000	13,700	4,000	19,000
11,500	8,700	2,500	11,500	19,500	13,700	4,000	19,500
11,750	8,700	2,500	11,750	19,750	13,700	4,000	19,750
12,000	8,700	2,500	12,000	20,000	13,700	4,000	20,000
12,300	8,700	2,500	12,300	20,250	13,700	4,000	20,250
12,500	8,700	2,500	12,500	20,500	13,700	4,000	20,500
12,750	8,700	2,500	12,750	21,000	13,700	4,000	21,000
13,000	8,700	2,500	13,000	21,250	13,700	4,000	21,250
13,250	8,700	2,500	13,250	21,500	13,700	4,000	21,500
13,500	11,700	3,500	13,500	21,750	13,700	4,000	21,750
13,750	11,700	3,500	13,750	22,000	13,700	4,000	22,000
14,000	11,700	3,500	14,000	22,500	13,700	4,000	22,500
14,250	11,700	3,500	14,250	23,000	13,700	4,000	23,000
14,500	11,700	3,500	14,500	23,500	13,700	4,000	23,500
14,750	11,700	3,500	14,750	24,000	13,700	4,000	24,000
15,000	11,700	3,500	15,000	24,500	13,700	4,000	24,500
15,250	11,700	3,500	15,250	24,750	13,700	4,000	24,750
15,500	11,700	3,500	15,500	25,000	13,700	4,000	25,000
15,750	11,700	3,500	15,750				
16,000	11,700	3,500	16,000				
16,500	11,700	3,500	16,500				
16,750	11,700	3,500	16,750				
17,000	11,700	3,500	17,000				
17,250	11,700	3,500	17,250				
17,500	11,700	3,500	17,500				
17,750	11,700	3,500	17,750				



Placas intercambiables

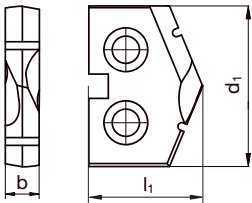
Artículo N° 86608



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 10,000$ • Plaquita con ranuras de división. Ángulo de la punta 135°. Para aplicación universal.



d1 mm	l1 mm	b mm	Código N°	d1 mm	l1 mm	b mm	Código N°
10,000	8,700	2,500	10,000	17,750	11,700	3,500	17,750
10,500	8,700	2,500	10,500	18,000	11,700	3,500	18,000
11,000	8,700	2,500	11,000	18,250	11,700	3,500	18,250
11,500	8,700	2,500	11,500	18,500	11,700	3,500	18,500
11,750	8,700	2,500	11,750	18,750	11,700	3,500	18,750
12,000	8,700	2,500	12,000	19,000	13,700	4,000	19,000
12,500	8,700	2,500	12,500	19,500	13,700	4,000	19,500
12,750	8,700	2,500	12,750	19,750	13,700	4,000	19,750
13,000	8,700	2,500	13,000	20,000	13,700	4,000	20,000
13,250	8,700	2,500	13,250	20,250	13,700	4,000	20,250
13,500	11,700	3,500	13,500	20,500	13,700	4,000	20,500
13,750	11,700	3,500	13,750	21,000	13,700	4,000	21,000
14,000	11,700	3,500	14,000	21,250	13,700	4,000	21,250
14,250	11,700	3,500	14,250	21,500	13,700	4,000	21,500
14,500	11,700	3,500	14,500	21,750	13,700	4,000	21,750
14,750	11,700	3,500	14,750	22,000	13,700	4,000	22,000
15,000	11,700	3,500	15,000	22,500	13,700	4,000	22,500
15,250	11,700	3,500	15,250	23,000	13,700	4,000	23,000
15,500	11,700	3,500	15,500	23,500	13,700	4,000	23,500
15,750	11,700	3,500	15,750	24,000	13,700	4,000	24,000
16,000	11,700	3,500	16,000	24,500	13,700	4,000	24,500
16,500	11,700	3,500	16,500	24,750	13,700	4,000	24,750
17,000	11,700	3,500	17,000	25,000	13,700	4,000	25,000
17,500	11,700	3,500	17,500				



Placas intercambiables

Artículo N° 86609



P	M	K	N	S	H
●	○	●	○		



vaciado de punta $\geq \varnothing 25,000$ • Plaquita con ranuras de división de viruta. Para aplicación universal.

Ángulo de la punta:

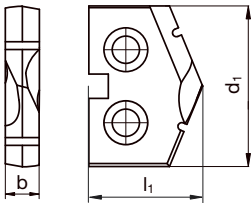
$\geq \varnothing 25,0$ mm = 132°

$> \varnothing 66,0$ mm = 140°

Material de corte:

$\leq \varnothing 66,0$ mm HSS-E-PM

$> \varnothing 66,0$ mm HSS-E



d1 mm	inch	l1 mm	b mm	Código N°	d1 mm	inch	l1 mm	b mm	Código N°
25,000		18,000	5,000	25,000	66,000		37,000	9,000	66,000
25,500		18,000	5,000	25,500	68,000		37,000	9,000	68,000
26,000		18,000	5,000	26,000	70,000		37,000	9,000	70,000
26,500		18,000	5,000	26,500	74,000		37,000	9,000	74,000
27,000		18,000	5,000	27,000	75,000		37,000	9,000	75,000
28,000		18,000	5,000	28,000	78,000		37,000	9,000	78,000
29,000		18,000	5,000	29,000	80,000		37,000	9,000	80,000
29,500		18,000	5,000	29,500	82,000		37,000	9,000	82,000
30,000		18,000	5,000	30,000	84,000		37,000	9,000	84,000
31,000		18,000	5,000	31,000	85,000		37,000	9,000	85,000
32,000		18,000	5,000	32,000	88,000		37,000	9,000	88,000
33,000		18,000	5,000	33,000	90,000		37,000	9,000	90,000
34,000		18,000	5,000	34,000	93,000		37,000	9,000	93,000
35,000		18,000	5,000	35,000	95,000		37,000	9,000	95,000
36,000		25,000	7,000	36,000	96,000		37,000	9,000	96,000
37,000		25,000	7,000	37,000	98,000		37,000	9,000	98,000
38,000		25,000	7,000	38,000	100,000		37,000	9,000	100,000
39,000		25,000	7,000	39,000	102,000		37,000	9,000	102,000
40,000		25,000	7,000	40,000	103,000		37,000	9,000	103,000
41,000		25,000	7,000	41,000	105,000		37,000	9,000	105,000
42,000		25,000	7,000	42,000	110,000		37,000	9,000	110,000
43,000		25,000	7,000	43,000	115,000		37,000	9,000	115,000
44,000		25,000	7,000	44,000	120,000		37,000	9,000	120,000
45,000		25,000	7,000	45,000	125,000		37,000	9,000	125,000
46,000		25,000	7,000	46,000	130,000		37,000	9,000	130,000
47,000		25,000	7,000	47,000	135,000		47,000	9,000	135,000
48,000		25,000	7,000	48,000	140,000		47,000	9,000	140,000
49,000		25,000	7,000	49,000	145,000		47,000	9,000	145,000
50,000		25,000	7,000	50,000	150,000		47,000	9,000	150,000
51,000		25,000	7,000	51,000	155,000		47,000	9,000	155,000
52,000		25,000	7,000	52,000	160,000		47,000	9,000	160,000
53,000		25,000	7,000	53,000	165,000		47,000	9,000	165,000
54,000		25,000	7,000	54,000	170,000		47,000	9,000	170,000
55,000		25,000	7,000	55,000	175,000		47,000	9,000	175,000
56,000		25,000	7,000	56,000	180,000		47,000	9,000	180,000
57,000		25,000	7,000	57,000	185,000		47,000	9,000	185,000
58,000		25,000	7,000	58,000	190,000		47,000	9,000	190,000
59,000		25,000	7,000	59,000	195,000		47,000	9,000	195,000
60,000		25,000	7,000	60,000	200,000		47,000	9,000	200,000
62,000		25,000	7,000	62,000	205,000		47,000	9,000	205,000
64,000		25,000	7,000	64,000	210,000		47,000	9,000	210,000
65,000		25,000	7,000	65,000					



Placas intercambiales

Artículo N° 86708



P	M	K	N	S	H
•	○	•	○		



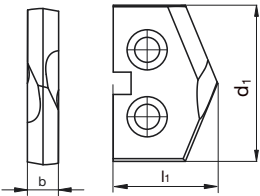
vaciado de punta $\geq \varnothing 9,800$ • Plaquetas sin divisor de virutas. Para materiales de mas de 600 N/mm². Para aplicaciones universales.

Ángulo de la punta:

$\leq \varnothing 25,4 \text{ mm} = 135^\circ$

$> \varnothing 25,4 \text{ mm} = 132^\circ$

Con fase (ver "Condiciones recomendadas Multiplex"/ Parte técnica)



d1 mm	l1 mm	b mm	Código N°	d1 mm	l1 mm	b mm	Código N°
10,000	8,700	2,500	10,000	19,500	13,700	4,000	19,500
10,200	8,700	2,500	10,200	19,750	13,700	4,000	19,750
10,500	8,700	2,500	10,500	20,000	13,700	4,000	20,000
11,000	8,700	2,500	11,000	20,500	13,700	4,000	20,500
11,500	8,700	2,500	11,500	21,000	13,700	4,000	21,000
12,000	8,700	2,500	12,000	21,500	13,700	4,000	21,500
12,250	8,700	2,500	12,250	22,000	13,700	4,000	22,000
12,500	8,700	2,500	12,500	22,500	13,700	4,000	22,500
12,750	8,700	2,500	12,750	22,750	13,700	4,000	22,750
13,000	8,700	2,500	13,000	23,000	13,700	4,000	23,000
13,500	11,700	3,500	13,500	23,500	13,700	4,000	23,500
13,750	11,700	3,500	13,750	24,000	13,700	4,000	24,000
14,000	11,700	3,500	14,000	24,250	13,700	4,000	24,250
14,250	11,700	3,500	14,250	24,500	13,700	4,000	24,500
14,500	11,700	3,500	14,500	25,000	13,700	4,000	25,000
14,750	11,700	3,500	14,750	26,000	17,300	5,000	26,000
15,000	11,700	3,500	15,000	27,000	17,300	5,000	27,000
15,500	11,700	3,500	15,500	28,000	17,300	5,000	28,000
15,750	11,700	3,500	15,750	29,000	17,300	5,000	29,000
16,000	11,700	3,500	16,000	30,000	17,300	5,000	30,000
16,250	11,700	3,500	16,250	31,000	17,300	5,000	31,000
16,500	11,700	3,500	16,500	32,000	17,300	5,000	32,000
16,750	11,700	3,500	16,750	34,000	17,300	5,000	34,000
17,000	11,700	3,500	17,000	35,000	17,300	5,000	35,000
17,500	11,700	3,500	17,500				
17,750	11,700	3,500	17,750				
18,000	11,700	3,500	18,000				
18,250	11,700	3,500	18,250				
18,500	11,700	3,500	18,500				
19,000	13,700	4,000	19,000				



Placas intercambiables

Artículo N° 86702



P	M	K	N	S	H
●	○	●	○		



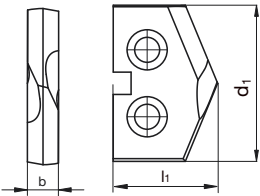
vaciado de punta $\geq \varnothing 10,000$ • Plaquetas sin divisor de virutas. Para materiales de mas de 600 N/mm². Para aplicaciones universales.

Ángulo de la punta:

$\leq \varnothing 25,4 \text{ mm} = 135^\circ$

$> \varnothing 25,4 \text{ mm} = 132^\circ$

Con fase (ver "Condiciones recomendadas Multiplex"/ Parte técnica)



d1 mm	l1 mm	b mm	Código N°	d1 mm	l1 mm	b mm	Código N°
10,000	8,700	2,500	10,000	20,500	13,700	4,000	20,500
10,200	8,700	2,500	10,200	21,000	13,700	4,000	21,000
10,500	8,700	2,500	10,500	21,500	13,700	4,000	21,500
11,000	8,700	2,500	11,000	22,000	13,700	4,000	22,000
12,000	8,700	2,500	12,000	22,300	13,700	4,000	22,300
12,500	8,700	2,500	12,500	22,750	13,700	4,000	22,750
12,750	8,700	2,500	12,750	23,000	13,700	4,000	23,000
13,000	8,700	2,500	13,000	24,250	13,700	4,000	24,250
13,500	11,700	3,500	13,500	24,500	13,700	4,000	24,500
13,750	11,700	3,500	13,750	25,000	13,700	4,000	25,000
14,000	11,700	3,500	14,000	26,000	17,300	5,000	26,000
14,100	11,700	3,500	14,100	26,500	17,300	5,000	26,500
14,500	11,700	3,500	14,500	27,000	17,300	5,000	27,000
14,750	11,700	3,500	14,750	28,000	17,300	5,000	28,000
15,000	11,700	3,500	15,000	29,000	17,300	5,000	29,000
15,500	11,700	3,500	15,500	29,800	17,300	5,000	29,800
16,000	11,700	3,500	16,000	30,000	17,300	5,000	30,000
16,250	11,700	3,500	16,250	32,000	17,300	5,000	32,000
16,500	11,700	3,500	16,500	33,000	17,300	5,000	33,000
16,750	11,700	3,500	16,750	34,000	17,300	5,000	34,000
17,000	11,700	3,500	17,000	35,000	17,300	5,000	35,000
17,500	11,700	3,500	17,500				
17,750	11,700	3,500	17,750				
18,000	11,700	3,500	18,000				
18,250	11,700	3,500	18,250				
18,500	11,700	3,500	18,500				
19,000	13,700	4,000	19,000				
19,500	13,700	4,000	19,500				
19,750	13,700	4,000	19,750				
20,000	13,700	4,000	20,000				



Placas intercambiables

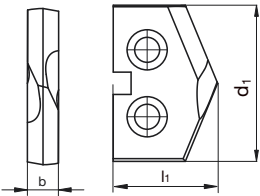
Artículo N° 86709



P	M	K	N	S	H
•	○	•	○		



vaciado de punta $\geq \varnothing 9,800$ • Plaquita intercambiable sin ranuras divisorias. Para materiales hasta 600 N/mm². Para aplicación universal.
 ángulo de la punta:
 $\leq \varnothing 25,4 \text{ mm} = 135^\circ$
 $> \varnothing 25,4 \text{ mm} = 132^\circ$
 Sin faceta (ver "recomendación aplicación Multiplex"/ (Parte técnica).



d1 mm	l1 mm	b mm	Código N°	d1 mm	l1 mm	b mm	Código N°
10,000	8,700	2,500	10,000	18,250	11,700	3,500	18,250
10,200	8,700	2,500	10,200	18,500	11,700	3,500	18,500
10,500	8,700	2,500	10,500	19,000	13,700	4,000	19,000
11,000	8,700	2,500	11,000	19,500	13,700	4,000	19,500
11,110	8,700	2,500	11,110	20,000	13,700	4,000	20,000
12,000	8,700	2,500	12,000	20,500	13,700	4,000	20,500
12,500	8,700	2,500	12,500	20,640	13,700	4,000	20,640
12,700	8,700	2,500	12,700	21,000	13,700	4,000	21,000
12,750	8,700	2,500	12,750	21,500	13,700	4,000	21,500
13,000	8,700	2,500	13,000	22,000	13,700	4,000	22,000
13,500	11,700	3,500	13,500	23,000	13,700	4,000	23,000
14,000	11,700	3,500	14,000	23,250	13,700	4,000	23,250
14,500	11,700	3,500	14,500	24,500	13,700	4,000	24,500
14,750	11,700	3,500	14,750	25,000	13,700	4,000	25,000
15,000	11,700	3,500	15,000	26,000	17,300	5,000	26,000
15,880	11,700	3,500	15,880	27,000	17,300	5,000	27,000
16,250	11,700	3,500	16,250	28,000	17,300	5,000	28,000
16,500	11,700	3,500	16,500	29,000	17,300	5,000	29,000
16,670	11,700	3,500	16,670	30,000	17,300	5,000	30,000
16,750	11,700	3,500	16,750	33,000	17,300	5,000	33,000
17,000	11,700	3,500	17,000	34,000	17,300	5,000	34,000
17,500	11,700	3,500	17,500	35,000	17,300	5,000	35,000
17,750	11,700	3,500	17,750				
18,000	11,700	3,500	18,000				



Placas intercambiales

Artículo N° 86701



P	M	K	N	S	H
•	○	•	○		



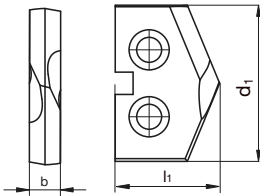
vaciado de punta $\geq \varnothing 10,000$ • Plaquita intercambiable sin ranuras divisorias. Para materiales hasta 600 N/mm^2 . Para aplicación universal.

ángulo de la punta:

$\leq \varnothing 25,4 \text{ mm} = 135^\circ$

$> \varnothing 25,4 \text{ mm} = 132^\circ$

Sin faceta (ver "recomendación aplicación Multiplex"/ (Parte técnica).



d1 mm	l1 mm	b mm	Código N°	d1 mm	l1 mm	b mm	Código N°
10,000	8,700	2,500	10,000	17,750	11,700	3,500	17,750
10,200	8,700	2,500	10,200	18,000	11,700	3,500	18,000
10,500	8,700	2,500	10,500	18,500	11,700	3,500	18,500
11,000	8,700	2,500	11,000	19,000	13,700	4,000	19,000
11,500	8,700	2,500	11,500	19,500	13,700	4,000	19,500
12,000	8,700	2,500	12,000	20,000	13,700	4,000	20,000
12,500	8,700	2,500	12,500	20,500	13,700	4,000	20,500
12,750	8,700	2,500	12,750	21,000	13,700	4,000	21,000
13,000	8,700	2,500	13,000	21,500	13,700	4,000	21,500
13,500	11,700	3,500	13,500	22,000	13,700	4,000	22,000
13,750	11,700	3,500	13,750	23,000	13,700	4,000	23,000
14,000	11,700	3,500	14,000	24,000	13,700	4,000	24,000
14,250	11,700	3,500	14,250	24,500	13,700	4,000	24,500
14,500	11,700	3,500	14,500	25,000	13,700	4,000	25,000
14,750	11,700	3,500	14,750	26,000	17,300	5,000	26,000
15,000	11,700	3,500	15,000	27,000	17,300	5,000	27,000
15,500	11,700	3,500	15,500	28,000	17,300	5,000	28,000
15,750	11,700	3,500	15,750	29,000	17,300	5,000	29,000
16,000	11,700	3,500	16,000	30,000	17,300	5,000	30,000
16,250	11,700	3,500	16,250	31,000	17,300	5,000	31,000
16,500	11,700	3,500	16,500	32,000	17,300	5,000	32,000
16,750	11,700	3,500	16,750	33,000	17,300	5,000	33,000
17,000	11,700	3,500	17,000	34,000	17,300	5,000	34,000
17,500	11,700	3,500	17,500	35,000	17,300	5,000	35,000

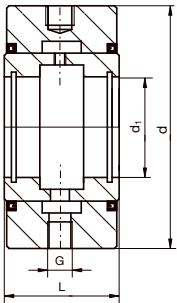


Alimentadores de refrigeración

Artículo N° 86690



Aro transmisor de refrigerante para portas con mango cónico y ranura para Art.n°. 86670 und 86680 (Sin set de atornillado).



para	d1 mm	d mm	G	L mm	Código N°
MK 4	31,750	80,000	G 1/4	45,000	31,750
MK 5	63,500	127,000	G 1/2	60,000	63,500

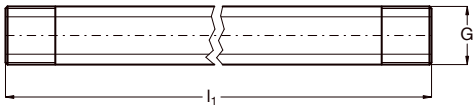


Tubo alimentador para refrigerante

Artículo N° 82571



Tubo transmisor de refrigerante para aros de transmisión de refrigerante Art.n°. 86690



G	l1 mm	Código N°	G	l1 mm	Código N°
G 1/4	200,000	13,160			
G 1/2	200,000	20,960			





HARTNER

Sistema de cambio rápido

Artículo N° 82578



G	d mm	l1 mm	Código N°	G	d mm	l1 mm	Código N°
G 1/4	9,000	118,000	9,000				
G 1/2	13,000	118,000	13,000				



HARTNER

Atornillador Torx

Artículo N° 86842



Torx	l1 mm	Código N°	Torx	l1 mm	Código N°
T6	150,000	6,001	T20	205,000	20,001
T7	150,000	7,001	T25	207,000	25,001
T8	150,000	8,001			
T9	150,000	9,001			
T10	170,000	10,001			
T15	190,000	15,001			

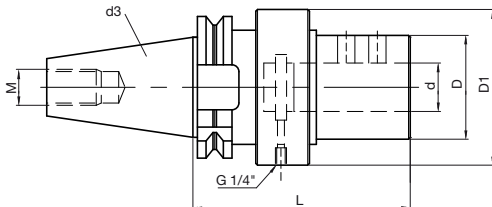


Transportador de refrigerante para Multiplex

Artículo N° 86691



Tuerca transmisora de refrigerante SK según DIN ISO 7388-1 y taladro cilíndrico. En diámetros más pequeños de mango utilizar casquillo reductor.



d3	d mm	D mm	D1 mm	L mm	M	kg	Código N°
SK 40	32,000	65,000	88,000	130,000	M16	0,909	32,040
SK 50	40,000	65,000	98,000	135,000	M24	1,694	40,050
SK 50	50,000	90,000	123,000	165,000	M24	2,981	50,050

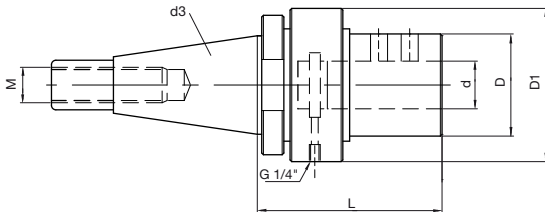


Transportador de refrigerante para Multiplex

Artículo N° 86692



Tuerca transmisora de refrigerante SK según DIN 2080 y taladro cilíndrico. En diámetros más pequeños de mango utilizar casquillo reductor.



d3	d mm	D mm	D1 mm	L mm	M	kg	Código N°
SK 40	32,000	65,000	88,000	110,000	M16	0,931	32,040
SK 50	40,000	65,000	98,000	120,000	M24	5,825	40,050
SK 50	50,000	90,000	123,000	145,000	M24	3,037	50,050

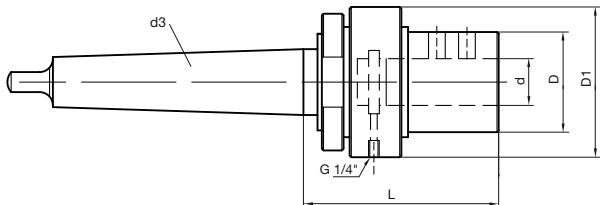


Transportador de refrigerante para Multiplex

Artículo N° 86693



Tuerca transmisora de refrigerante con mango cónico según DIN 228 B y taladro cilíndrico. En diámetros más pequeños de mango utilizar con casquillo reductor.



d3	d mm	D mm	D1 mm	L mm	M	kg	Código N°
MK-4	32,000	65,000	88,000	100,000	M14	1,019	32,400
MK-5	40,000	75,000	98,000	110,000	M16	1,899	40,500
MK-6	40,000	75,000	98,000	120,000	M16	2,427	40,600
MK-5	50,000	90,000	123,000	140,000	M20	3,293	50,500
MK-6	50,000	90,000	123,000	140,000	M20	3,997	50,600

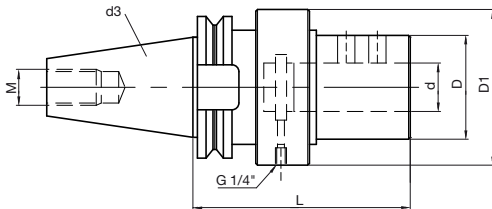


Transportador de refrigerante para Multiplex

Artículo N° 86694



Tuerca transmisora de refrigerante con MAS BT según DIN ISO 7388-2 y taladro cilíndrico. En diámetros más pequeños de mango utilizar con casquillo reductor.



d3	d mm	D mm	D1 mm	L mm	M	kg	Código N°
BT 40	32,000	65,000	88,000	125,000	M16	0,872	32,040
BT 50	40,000	65,000	98,000	145,000	M24	1,766	40,050
BT 50	50,000	90,000	123,000	170,000	M24	3,037	50,050

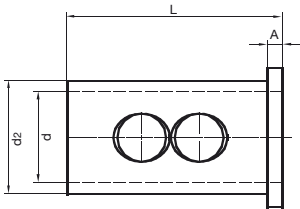


Union para mandril de refrigeracion

Artículo N° 86699



Casquillo reductor para transmisión de refrigerante con taladro de sujeción cilíndrico



d mm	d2 mm	L mm	A mm	Código N°
20,000	32,000	65,000	5,000	20,032
20,000	40,000	75,000	5,000	20,040
25,000	32,000	65,000	5,000	25,032
25,000	40,000	75,000	5,000	25,040
32,000	40,000	75,000	5,000	32,040



HARTNER

Precision Cutting Tools



MULTI-PLEX HPC



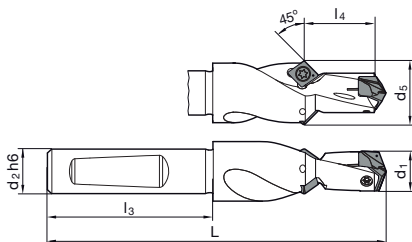
HARTNER

Soporte Multiplex HPC

Artículo N° 86681



alta resistencia al desgaste • sección de ranura optimizada • salida de refrigerante optimizada • tornillos tensores Art.n°. 86843 y 86846 incluidos • atornillador Art.n° 86842 incluidos para pilotar y avellanar 45°



Tamaño	d1 mm	d2 h6 mm	d5 mm	L mm	l3 mm	l4 mm	Código N°
110	11,00-11,99	12,000	17,000	81,000	45,000	12,000	11,000
110	11,00-11,99	12,700	17,000	81,000	45,000	12,000	11,005
120	12,00-12,99	12,000	18,000	84,000	45,000	13,000	12,000
120	12,00-12,99	12,700	18,000	84,000	45,000	13,000	12,005
130	13,00-13,99	14,000	18,000	86,000	45,000	14,000	13,000
130	13,00-13,99	15,875	18,000	86,000	45,000	14,000	13,005
140	14,00-15,99	16,000	18,000	93,000	48,000	16,000	14,000
140	14,00-15,99	15,875	18,000	93,000	48,000	16,000	14,005
160	16,00-17,99	18,000	20,000	99,000	48,000	18,000	16,000
160	16,00-17,99	19,050	20,000	99,000	48,000	18,000	16,005
180	18,00-19,99	20,000	22,000	106,000	50,000	20,000	18,000
180	18,00-19,99	19,050	22,000	106,000	50,000	20,000	18,005
200	20,00-21,99	25,000	25,000	117,000	56,000	22,000	20,000
200	20,00-21,99	25,400	25,400	117,000	56,000	22,000	20,005
220	22,00-23,99	25,000	26,000	122,000	56,000	24,000	22,000
220	22,00-23,99	25,400	26,000	122,000	56,000	24,000	22,005
240	24,00-25,99	25,000	28,000	128,000	56,000	26,000	24,000
240	24,00-25,99	25,400	28,000	128,000	56,000	26,000	24,005
260	26,00-27,99	32,000	32,000	142,000	60,000	28,000	26,000
260	26,00-27,99	31,750	32,000	142,000	60,000	28,000	26,005
280	28,00-29,99	32,000	34,000	147,000	60,000	30,000	28,000
280	28,00-29,99	31,750	34,000	147,000	60,000	30,000	28,005
300	30,00-31,99	32,000	38,000	152,000	60,000	32,000	30,000
300	30,00-31,99	31,750	38,000	152,000	60,000	32,000	30,005
320	32,00-35,99	32,000	42,000	163,000	60,000	36,000	32,000
320	32,00-35,99	31,750	42,000	163,000	60,000	36,000	32,005
360	36,00-40,00	32,000	46,000	173,000	60,000	40,000	36,000
360	36,00-40,00	31,750	46,000	173,000	60,000	40,000	36,005

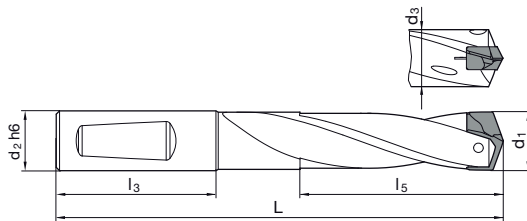


Soporte Multiplex HPC

Artículo N° 86682



alta resistencia al desgaste • sección de ranura optimizada • salida de refrigerante optimizada • tornillos tensores Art.n°. 86843 incluidos
 • atornillador Art.N° 86842 incluidos



Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
110	11,00-11,49	12,000	10,700	84,000	45,000	19,300	11,000
110	11,00-11,49	12,700	10,700	84,000	45,000	19,300	11,005
115	11,50-11,99	12,000	11,200	85,000	45,000	20,100	11,500
115	11,50-11,99	12,700	11,200	85,000	45,000	20,100	11,505
120	12,00-12,49	12,000	11,700	87,000	45,000	21,000	12,000
120	12,00-12,49	12,700	11,700	87,000	45,000	21,000	12,005
125	12,50-12,99	14,000	12,200	89,000	45,000	21,900	12,500
125	12,50-12,99	15,875	12,200	89,000	45,000	21,900	12,505
130	13,00-13,49	14,000	12,700	90,000	45,000	22,600	13,000
130	13,00-13,49	15,875	12,700	90,000	45,000	22,600	13,005
135	13,50-13,99	14,000	13,200	92,000	45,000	23,600	13,500
135	13,50-13,99	15,875	13,200	92,000	45,000	23,600	13,505
140	14,00-14,49	14,000	13,700	93,000	45,000	24,500	14,000
140	14,00-14,49	15,875	13,700	93,000	45,000	24,500	14,005
145	14,50-14,99	16,000	14,200	98,000	48,000	25,300	14,500
145	14,50-14,99	15,875	14,200	98,000	48,000	25,300	14,505
150	15,00-15,49	16,000	14,700	100,000	48,000	26,100	15,000
150	15,00-15,49	15,875	14,700	100,000	48,000	26,100	15,005
155	15,50-15,99	16,000	15,200	101,000	48,000	27,000	15,500
155	15,50-15,99	15,875	15,200	101,000	48,000	27,000	15,505
160	16,00-16,49	16,000	15,700	102,000	48,000	27,800	16,000
160	16,00-16,49	15,875	15,700	102,000	48,000	27,800	16,005
165	16,50-16,99	18,000	16,200	105,000	48,000	28,700	16,500
165	16,50-16,99	19,050	16,200	105,000	48,000	28,700	16,505
170	17,00-17,49	18,000	16,700	106,000	48,000	29,600	17,000
170	17,00-17,49	19,050	16,700	106,000	48,000	29,600	17,005
175	17,50-17,99	18,000	17,200	107,000	48,000	30,400	17,500
175	17,50-17,99	19,050	17,200	107,000	48,000	30,400	17,505
180	18,00-18,49	18,000	17,700	109,000	48,000	31,200	18,000
180	18,00-18,49	19,050	17,700	109,000	48,000	31,200	18,005
185	18,50-18,99	20,000	18,200	113,000	50,000	32,100	18,500
185	18,50-18,99	19,050	18,200	113,000	50,000	32,100	18,505
190	19,00-19,49	20,000	18,700	114,000	50,000	32,900	19,000
190	19,00-19,49	19,050	18,700	114,000	50,000	32,900	19,005
195	19,50-19,99	20,000	19,200	116,000	50,000	33,700	19,500
195	19,50-19,99	19,050	19,200	116,000	50,000	33,700	19,505
200	20,00-20,49	20,000	19,700	117,000	50,000	34,600	20,000
200	20,00-20,49	19,050	19,700	117,000	50,000	34,600	20,005
205	20,50-20,99	25,000	20,200	128,000	56,000	35,500	20,500
205	20,50-20,99	25,400	20,200	128,000	56,000	35,500	20,505
210	21,00-21,49	25,000	20,700	129,000	56,000	36,400	21,000
210	21,00-21,49	25,400	20,700	129,000	56,000	36,400	21,005



Soporte Multiplex HPC

Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
215	21,50-21,99	25,000	21,200	130,000	56,000	37,200	21,500
215	21,50-21,99	25,400	21,200	130,000	56,000	37,200	21,505
220	22,00-22,49	25,000	21,700	131,000	56,000	38,000	22,000
220	22,00-22,49	25,400	21,700	131,000	56,000	38,000	22,005
225	22,50-22,99	25,000	22,200	134,000	56,000	38,900	22,500
225	22,50-22,99	25,400	22,200	134,000	56,000	38,900	22,505
230	23,00-23,49	25,000	22,700	135,000	56,000	39,800	23,000
230	23,00-23,49	25,400	22,700	135,000	56,000	39,800	23,005
235	23,50-23,99	25,000	23,200	137,000	56,000	40,600	23,500
235	23,50-23,99	25,400	23,200	137,000	56,000	40,600	23,505
240	24,00-24,49	25,000	23,700	138,000	56,000	41,500	24,000
240	24,00-24,49	25,400	23,700	138,000	56,000	41,500	24,005
245	24,50-24,99	25,000	24,200	140,000	56,000	42,300	24,500
245	24,50-24,99	25,400	24,200	140,000	56,000	42,300	24,505
250	25,00-25,49	25,000	24,700	142,000	56,000	43,200	25,000
250	25,00-25,49	25,400	24,700	142,000	56,000	43,200	25,005
255	25,50-25,99	32,000	25,200	148,000	60,000	44,000	25,500
255	25,50-25,99	31,750	25,200	148,000	60,000	44,000	25,505
260	26,00-26,49	32,000	25,700	151,000	60,000	44,300	26,000
260	26,00-26,49	31,750	25,700	151,000	60,000	44,300	26,005
265	26,50-26,99	32,000	26,200	153,000	60,000	45,100	26,500
265	26,50-26,99	31,750	26,200	153,000	60,000	45,100	26,505
270	27,00-27,49	32,000	26,700	155,000	60,000	46,000	27,000
270	27,00-27,49	31,750	26,700	155,000	60,000	46,000	27,005
275	27,50-27,99	32,000	27,200	156,000	60,000	46,800	27,500
275	27,50-27,99	31,750	27,200	156,000	60,000	46,800	27,505
280	28,00-28,49	32,000	27,700	157,000	60,000	47,700	28,000
280	28,00-28,49	31,750	27,700	157,000	60,000	47,700	28,005
285	28,50-28,99	32,000	28,200	159,000	60,000	48,500	28,500
285	28,50-28,99	31,750	28,200	159,000	60,000	48,500	28,505
290	29,00-29,49	32,000	28,700	161,000	60,000	49,400	29,000
290	29,00-29,49	31,750	28,700	161,000	60,000	49,400	29,005
295	29,50-29,99	32,000	29,200	162,000	60,000	50,200	29,500
295	29,50-29,99	31,750	29,200	162,000	60,000	50,200	29,505
300	30,00-30,49	32,000	29,700	164,000	60,000	50,900	30,000
300	30,00-30,49	31,750	29,700	164,000	60,000	50,900	30,005
305	30,50-30,99	32,000	30,200	166,000	60,000	51,700	30,500
305	30,50-30,99	31,750	30,200	166,000	60,000	51,700	30,505
310	31,00-31,49	32,000	30,700	167,000	60,000	52,600	31,000
310	31,00-31,49	31,750	30,700	167,000	60,000	52,600	31,005
315	31,50-31,99	32,000	31,200	168,000	60,000	53,400	31,500
315	31,50-31,99	31,750	31,200	168,000	60,000	53,400	31,505
320	32,00-32,99	32,000	31,700	172,000	60,000	55,100	32,000
320	32,00-32,99	31,750	31,700	172,000	60,000	55,100	32,005
330	33,00-33,99	32,000	32,700	175,000	60,000	56,800	33,000
330	33,00-33,99	31,750	32,700	175,000	60,000	56,800	33,005
340	34,00-34,99	32,000	33,700	178,000	60,000	58,500	34,000
340	34,00-34,99	31,750	33,700	178,000	60,000	58,500	34,005
350	35,00-35,99	32,000	34,700	181,000	60,000	60,200	35,000
350	35,00-35,99	31,750	34,700	181,000	60,000	60,200	35,005
360	36,00-36,99	32,000	35,700	184,000	60,000	61,800	36,000
360	36,00-36,99	31,750	35,700	184,000	60,000	61,800	36,005
370	37,00-37,99	32,000	36,700	188,000	60,000	63,500	37,000
370	37,00-37,99	31,750	36,700	188,000	60,000	63,500	37,005
380	38,00-38,99	32,000	37,700	191,000	60,000	65,200	38,000
380	38,00-38,99	31,750	37,700	191,000	60,000	65,200	38,005
390	39,00-40,00	32,000	38,700	194,000	60,000	66,900	39,000
390	39,00-40,00	31,750	38,700	194,000	60,000	66,900	39,005

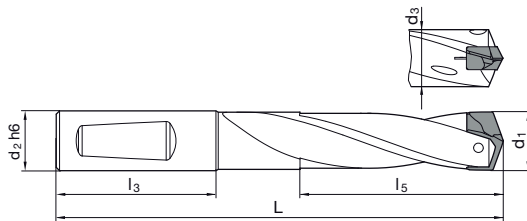


Soporte Multiplex HPC

Artículo N° 86683



alta resistencia al desgaste • sección de ranura optimizada • estabilidad muy buena • tornillos tensores Art.n°. 86843 incluidos
 • atornillador Art.N° 86842 incluidos



Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
110	11,00-11,49	12,000	10,700	101,000	45,000	36,600	11,000
110	11,00-11,49	12,700	10,700	101,000	45,000	36,600	11,005
115	11,50-11,99	12,000	11,200	103,000	45,000	38,100	11,500
115	11,50-11,99	12,700	11,200	103,000	45,000	38,100	11,505
120	12,00-12,49	12,000	11,700	106,000	45,000	39,700	12,000
120	12,00-12,49	12,700	11,700	106,000	45,000	39,700	12,005
125	12,50-12,99	14,000	12,200	108,000	45,000	41,300	12,500
125	12,50-12,99	15,875	12,200	108,000	45,000	41,300	12,505
130	13,00-13,49	14,000	12,700	110,000	45,000	42,900	13,000
130	13,00-13,49	15,875	12,700	110,000	45,000	42,900	13,005
135	13,50-13,99	14,000	13,200	113,000	45,000	44,600	13,500
135	13,50-13,99	15,875	13,200	113,000	45,000	44,600	13,505
140	14,00-14,49	14,000	13,700	115,000	45,000	46,200	14,000
140	14,00-14,49	15,875	13,700	115,000	45,000	46,200	14,005
145	14,50-14,99	16,000	14,200	120,000	48,000	47,800	14,500
145	14,50-14,99	15,875	14,200	120,000	48,000	47,800	14,505
150	15,00-15,49	16,000	14,700	123,000	48,000	49,300	15,000
150	15,00-15,49	15,875	14,700	123,000	48,000	49,300	15,005
155	15,50-15,99	16,000	15,200	125,000	48,000	50,900	15,500
155	15,50-15,99	15,875	15,200	125,000	48,000	50,900	15,505
160	16,00-16,49	16,000	15,700	127,000	48,000	52,900	16,000
160	16,00-16,49	15,875	15,700	127,000	48,000	52,900	16,005
165	16,50-16,99	18,000	16,200	130,000	48,000	54,100	16,500
165	16,50-16,99	19,050	16,200	130,000	48,000	54,100	16,505
170	17,00-17,49	18,000	16,700	132,000	48,000	55,800	17,000
170	17,00-17,49	19,050	16,700	132,000	48,000	55,800	17,005
175	17,50-17,99	18,000	17,200	134,000	48,000	57,400	17,500
175	17,50-17,99	19,050	17,200	134,000	48,000	57,400	17,505
180	18,00-18,49	18,000	17,700	137,000	48,000	58,900	18,000
180	18,00-18,49	19,050	17,700	137,000	48,000	58,900	18,005
185	18,50-18,99	20,000	18,200	141,000	50,000	60,500	18,500
185	18,50-18,99	19,050	18,200	141,000	50,000	60,500	18,505
190	19,00-19,49	20,000	18,700	143,000	50,000	62,100	19,000
190	19,00-19,49	19,050	18,700	143,000	50,000	62,100	19,005
195	19,50-19,99	20,000	19,200	146,000	50,000	63,700	19,500
195	19,50-19,99	19,050	19,200	146,000	50,000	63,700	19,505
200	20,00-20,49	20,000	19,700	148,000	50,000	65,300	20,000
200	20,00-20,49	19,050	19,700	148,000	50,000	65,300	20,005
205	20,50-20,99	25,000	20,200	159,000	56,000	67,000	20,500
205	20,50-20,99	25,400	20,200	159,000	56,000	67,000	20,505
210	21,00-21,49	25,000	20,700	161,000	56,000	68,600	21,000
210	21,00-21,49	25,400	20,700	161,000	56,000	68,600	21,005



Soporte Multiplex HPC

Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
215	21,50-21,99	25,000	21,200	163,000	56,000	70,100	21,500
215	21,50-21,99	25,400	21,200	163,000	56,000	70,100	21,505
220	22,00-22,49	25,000	21,700	165,000	56,000	71,700	22,000
220	22,00-22,49	25,400	21,700	165,000	56,000	71,700	22,005
225	22,50-22,99	25,000	22,200	168,000	56,000	73,300	22,500
225	22,50-22,99	25,400	22,200	168,000	56,000	73,300	22,505
230	23,00-23,49	25,000	22,700	170,000	56,000	74,900	23,000
230	23,00-23,49	25,400	22,700	170,000	56,000	74,900	23,005
235	23,50-23,99	25,000	23,200	173,000	56,000	76,500	23,500
235	23,50-23,99	25,400	23,200	173,000	56,000	76,500	23,505
240	24,00-24,49	25,000	23,700	175,000	56,000	78,100	24,000
240	24,00-24,49	25,400	23,700	175,000	56,000	78,100	24,005
245	24,50-24,99	25,000	24,200	177,000	56,000	79,700	24,500
245	24,50-24,99	25,400	24,200	177,000	56,000	79,700	24,505
250	25,00-25,49	25,000	24,700	180,000	56,000	81,300	25,000
250	25,00-25,49	25,400	24,700	180,000	56,000	81,300	25,005
255	25,50-25,99	32,000	25,200	187,000	60,000	82,900	25,500
255	25,50-25,99	31,750	25,200	187,000	60,000	82,900	25,505
260	26,00-26,49	32,000	25,700	191,000	60,000	84,000	26,000
260	26,00-26,49	31,750	25,700	191,000	60,000	84,000	26,005
265	26,50-26,99	32,000	26,200	193,000	60,000	86,100	26,500
265	26,50-26,99	31,750	26,200	193,000	60,000	86,100	26,505
270	27,00-27,49	32,000	26,700	196,000	60,000	87,200	27,000
270	27,00-27,49	31,750	26,700	196,000	60,000	87,200	27,005
275	27,50-27,99	32,000	27,200	198,000	60,000	88,900	27,500
275	27,50-27,99	31,750	27,200	198,000	60,000	88,900	27,505
280	28,00-28,49	32,000	27,700	200,000	60,000	90,400	28,000
280	28,00-28,49	31,750	27,700	200,000	60,000	90,400	28,005
285	28,50-28,99	32,000	28,200	202,000	60,000	92,500	28,500
285	28,50-28,99	31,750	28,200	202,000	60,000	92,500	28,505
290	29,00-29,49	32,000	28,700	205,000	60,000	94,600	29,000
290	29,00-29,49	31,750	28,700	205,000	60,000	94,600	29,005
295	29,50-29,99	32,000	29,200	207,000	60,000	95,100	29,500
295	29,50-29,99	31,750	29,200	207,000	60,000	95,100	29,505
300	30,00-30,49	32,000	29,700	210,000	60,000	96,700	30,000
300	30,00-30,49	31,750	29,700	210,000	60,000	96,700	30,005
305	30,50-30,99	32,000	30,200	212,000	60,000	98,300	30,500
305	30,50-30,99	31,750	30,200	212,000	60,000	98,300	30,505
310	31,00-31,49	32,000	30,700	214,000	60,000	99,800	31,000
310	31,00-31,49	31,750	30,700	214,000	60,000	99,800	31,005
315	31,50-31,99	32,000	31,200	216,000	60,000	101,400	31,500
315	31,50-31,99	31,750	31,200	216,000	60,000	101,400	31,505
320	32,00-32,99	32,000	31,700	221,000	60,000	104,600	32,000
320	32,00-32,99	31,750	31,700	221,000	60,000	104,600	32,005
330	33,00-33,99	32,000	32,700	226,000	60,000	107,800	33,000
330	33,00-33,99	31,750	32,700	226,000	60,000	107,800	33,005
340	34,00-34,99	32,000	33,700	230,000	60,000	111,000	34,000
340	34,00-34,99	31,750	33,700	230,000	60,000	111,000	34,005
350	35,00-35,99	32,000	34,700	235,000	60,000	114,200	35,000
350	35,00-35,99	31,750	34,700	235,000	60,000	114,200	35,005
360	36,00-36,99	32,000	35,700	240,000	60,000	117,300	36,000
360	36,00-36,99	31,750	35,700	240,000	60,000	117,300	36,005
370	37,00-37,99	32,000	36,700	245,000	60,000	120,500	37,000
370	37,00-37,99	31,750	36,700	245,000	60,000	120,500	37,005
380	38,00-38,99	32,000	37,700	249,000	60,000	123,700	38,000
380	38,00-38,99	31,750	37,700	249,000	60,000	123,700	38,005
390	39,00-40,00	32,000	38,700	254,000	60,000	126,900	39,000
390	39,00-40,00	31,750	38,700	254,000	60,000	126,900	39,005

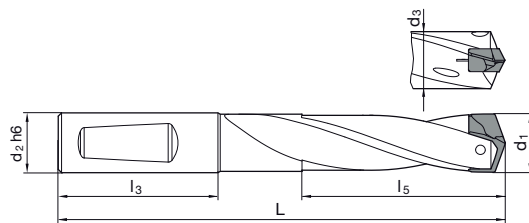


Soporte Multiplex HPC

Artículo N° 86684



alta resistencia al desgaste • sección de ranura optimizada • estabilidad muy buena • tornillos tensores Art.n°. 86843 incluidos
 • atornillador Art.N° 86842 incluidos



Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
110	11,00-11,49	12,000	10,700	124,000	45,000	59,600	11,000
110	11,00-11,49	12,700	10,700	124,000	45,000	59,600	11,005
115	11,50-11,99	12,000	11,200	127,000	45,000	62,100	11,500
115	11,50-11,99	12,700	11,200	127,000	45,000	62,100	11,505
120	12,00-12,49	12,000	11,700	131,000	45,000	64,700	12,000
120	12,00-12,49	12,700	11,700	131,000	45,000	64,700	12,005
125	12,50-12,99	14,000	12,200	134,000	45,000	67,300	12,500
125	12,50-12,99	15,875	12,200	134,000	45,000	67,300	12,505
130	13,00-13,49	14,000	12,700	137,000	45,000	69,900	13,000
130	13,00-13,49	15,875	12,700	137,000	45,000	69,900	13,005
135	13,50-13,99	14,000	13,200	141,000	45,000	72,600	13,500
135	13,50-13,99	15,875	13,200	141,000	45,000	72,600	13,505
140	14,00-14,49	14,000	13,700	144,000	45,000	75,200	14,000
140	14,00-14,49	15,875	13,700	144,000	45,000	75,200	14,005
145	14,50-14,99	16,000	14,200	150,000	48,000	77,800	14,500
145	14,50-14,99	15,875	14,200	150,000	48,000	77,800	14,505
150	15,00-15,49	16,000	14,700	154,000	48,000	80,300	15,000
150	15,00-15,49	15,875	14,700	154,000	48,000	80,300	15,005
155	15,50-15,99	16,000	15,200	157,000	48,000	82,900	15,500
155	15,50-15,99	15,875	15,200	157,000	48,000	82,900	15,505
160	16,00-16,49	16,000	15,700	160,000	48,000	85,900	16,000
160	16,00-16,49	15,875	15,700	160,000	48,000	85,900	16,005
165	16,50-16,99	18,000	16,200	164,000	48,000	88,100	16,500
165	16,50-16,99	19,050	16,200	164,000	48,000	88,100	16,505
170	17,00-17,49	18,000	16,700	167,000	48,000	90,800	17,000
170	17,00-17,49	19,050	16,700	167,000	48,000	90,800	17,005
175	17,50-17,99	18,000	17,200	170,000	48,000	93,400	17,500
175	17,50-17,99	19,050	17,200	170,000	48,000	93,400	17,505
180	18,00-18,49	18,000	17,700	174,000	48,000	95,900	18,000
180	18,00-18,49	19,050	17,700	174,000	48,000	95,900	18,005
185	18,50-18,99	20,000	18,200	179,000	50,000	98,500	18,500
185	18,50-18,99	19,050	18,200	179,000	50,000	98,500	18,505
190	19,00-19,49	20,000	18,700	182,000	50,000	101,100	19,000
190	19,00-19,49	19,050	18,700	182,000	50,000	101,100	19,005
195	19,50-19,99	20,000	19,200	186,000	50,000	103,700	19,500
195	19,50-19,99	19,050	19,200	186,000	50,000	103,700	19,505
200	20,00-20,49	20,000	19,700	189,000	50,000	106,300	20,000
200	20,00-20,49	19,050	19,700	189,000	50,000	106,300	20,005
205	20,50-20,99	25,000	20,200	201,000	56,000	109,000	20,500
205	20,50-20,99	25,400	20,200	201,000	56,000	109,000	20,505
210	21,00-21,49	25,000	20,700	204,000	56,000	111,600	21,000
210	21,00-21,49	25,400	20,700	204,000	56,000	111,600	21,005



Soporte Multiplex HPC

Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
215	21,50-21,99	25,000	21,200	207,000	56,000	114,100	21,500
215	21,50-21,99	25,400	21,200	207,000	56,000	114,100	21,505
220	22,00-22,49	25,000	21,700	210,000	56,000	116,700	22,000
220	22,00-22,49	25,400	21,700	210,000	56,000	116,700	22,005
225	22,50-22,99	25,000	22,200	214,000	56,000	119,300	22,500
225	22,50-22,99	25,400	22,200	214,000	56,000	119,300	22,505
230	23,00-23,49	25,000	22,700	217,000	56,000	121,900	23,000
230	23,00-23,49	25,400	22,700	217,000	56,000	121,900	23,005
235	23,50-23,99	25,000	23,200	221,000	56,000	124,500	23,500
235	23,50-23,99	25,400	23,200	221,000	56,000	124,500	23,505
240	24,00-24,49	25,000	23,700	224,000	56,000	127,100	24,000
240	24,00-24,49	25,400	23,700	224,000	56,000	127,100	24,005
245	24,50-24,99	25,000	24,200	227,000	56,000	129,700	24,500
245	24,50-24,99	25,400	24,200	227,000	56,000	129,700	24,505
250	25,00-25,49	25,000	24,700	231,000	56,000	132,300	25,000
250	25,00-25,49	25,400	24,700	231,000	56,000	132,300	25,005
255	25,50-25,99	32,000	25,200	239,000	60,000	134,900	25,500
255	25,50-25,99	31,750	25,200	239,000	60,000	134,900	25,505
260	26,00-26,49	32,000	25,700	244,000	60,000	137,000	26,000
265	26,50-26,99	32,000	26,200	247,000	60,000	140,000	26,500
270	27,00-27,49	32,000	26,700	251,000	60,000	142,200	27,000
275	27,50-27,99	32,000	27,200	254,000	60,000	144,800	27,500
280	28,00-28,49	32,000	27,700	257,000	60,000	147,400	28,000
285	28,50-28,99	32,000	28,200	260,000	60,000	150,400	28,500
290	29,00-29,49	32,000	28,700	264,000	60,000	153,500	29,000
295	29,50-29,99	32,000	29,200	267,000	60,000	155,100	29,500
300	30,00-30,49	32,000	29,700	271,000	60,000	157,600	30,000
305	30,50-30,99	32,000	30,200	274,000	60,000	160,200	30,500
310	31,00-31,49	32,000	30,700	277,000	60,000	162,800	31,000
315	31,50-31,99	32,000	31,200	280,000	60,000	165,400	31,500
320	32,00-32,99	32,000	31,700	287,000	60,000	170,600	32,000
330	33,00-33,99	32,000	32,700	294,000	60,000	175,800	33,000
340	34,00-34,99	32,000	33,700	300,000	60,000	181,000	34,000
350	35,00-35,99	32,000	34,700	307,000	60,000	186,200	35,000
360	36,00-36,99	32,000	35,700	314,000	60,000	191,300	36,000
370	37,00-37,99	32,000	36,700	321,000	60,000	196,500	37,000
380	38,00-38,99	32,000	37,700	327,000	60,000	201,700	38,000
390	39,00-40,00	32,000	38,700	334,000	60,000	206,900	39,000

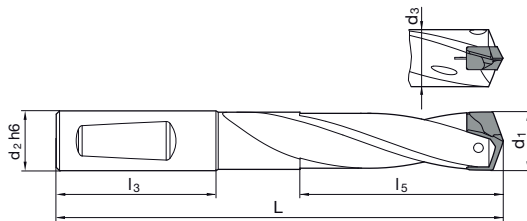


Soporte Multiplex HPC

Artículo N° 86685



alta resistencia al desgaste • sección de ranura optimizada • estabilidad muy buena • tornillos tensores Art.n°. 86843 incluidos
 • atornillador Art.N° 86842 incluidos



Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
110	11,00-11,49	12,000	10,700	147,000	45,000	82,600	11,000
110	11,00-11,49	12,700	10,700	147,000	45,000	82,600	11,005
115	11,50-11,99	12,000	11,200	151,000	45,000	86,100	11,500
115	11,50-11,99	12,700	11,200	151,000	45,000	86,100	11,505
120	12,00-12,49	12,000	11,700	156,000	45,000	89,700	12,000
120	12,00-12,49	12,700	11,700	156,000	45,000	89,700	12,005
125	12,50-12,99	14,000	12,200	160,000	45,000	93,300	12,500
125	12,50-12,99	15,875	12,200	160,000	45,000	93,300	12,505
130	13,00-13,49	14,000	12,700	164,000	45,000	96,900	13,000
130	13,00-13,49	15,875	12,700	164,000	45,000	96,900	13,005
135	13,50-13,99	14,000	13,200	169,000	45,000	100,600	13,500
135	13,50-13,99	15,875	13,200	169,000	45,000	100,600	13,505
140	14,00-14,49	14,000	13,700	173,000	45,000	104,200	14,000
140	14,00-14,49	15,875	13,700	173,000	45,000	104,200	14,005
145	14,50-14,99	16,000	14,200	180,000	48,000	107,800	14,500
145	14,50-14,99	15,875	14,200	180,000	48,000	107,800	14,505
150	15,00-15,49	16,000	14,700	185,000	48,000	111,300	15,000
150	15,00-15,49	15,875	14,700	185,000	48,000	111,300	15,005
155	15,50-15,99	16,000	15,200	189,000	48,000	114,900	15,500
155	15,50-15,99	15,875	15,200	189,000	48,000	114,900	15,505
160	16,00-16,49	16,000	15,700	193,000	48,000	118,900	16,000
160	16,00-16,49	15,875	15,700	193,000	48,000	118,900	16,005
165	16,50-16,99	18,000	16,200	198,000	48,000	122,100	16,500
165	16,50-16,99	19,050	16,200	198,000	48,000	122,100	16,505
170	17,00-17,49	18,000	16,700	202,000	48,000	125,800	17,000
170	17,00-17,49	19,050	16,700	202,000	48,000	125,800	17,005
175	17,50-17,99	18,000	17,200	206,000	48,000	129,400	17,500
175	17,50-17,99	19,050	17,200	206,000	48,000	129,400	17,505
180	18,00-18,49	18,000	17,700	211,000	48,000	132,900	18,000
180	18,00-18,49	19,050	17,700	211,000	48,000	132,900	18,005
185	18,50-18,99	20,000	18,200	217,000	50,000	136,500	18,500
185	18,50-18,99	19,050	18,200	217,000	50,000	136,500	18,505
190	19,00-19,49	20,000	18,700	221,000	50,000	140,100	19,000
190	19,00-19,49	19,050	18,700	221,000	50,000	140,100	19,005
195	19,50-19,99	20,000	19,200	226,000	50,000	143,700	19,500
195	19,50-19,99	19,050	19,200	226,000	50,000	143,700	19,505
200	20,00-20,49	20,000	19,700	230,000	50,000	147,300	20,000
200	20,00-20,49	19,050	19,700	230,000	50,000	147,300	20,005
205	20,50-20,99	25,000	20,200	243,000	56,000	151,000	20,500
205	20,50-20,99	25,400	20,200	243,000	56,000	151,000	20,505
210	21,00-21,49	25,000	20,700	247,000	56,000	154,600	21,000
210	21,00-21,49	25,400	20,700	247,000	56,000	154,600	21,005



Soporte Multiplex HPC

Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
215	21,50-21,99	25,000	21,200	251,000	56,000	158,100	21,500
215	21,50-21,99	25,400	21,200	251,000	56,000	158,100	21,505
220	22,00-22,49	25,000	21,700	255,000	56,000	161,700	22,000
220	22,00-22,49	25,400	21,700	255,000	56,000	161,700	22,005
225	22,50-22,99	25,000	22,200	260,000	56,000	165,300	22,500
225	22,50-22,99	25,400	22,200	260,000	56,000	165,300	22,505
230	23,00-23,49	25,000	22,700	264,000	56,000	168,900	23,000
230	23,00-23,49	25,400	22,700	264,000	56,000	168,900	23,005
235	23,50-23,99	25,000	23,200	269,000	56,000	172,500	23,500
235	23,50-23,99	25,400	23,200	269,000	56,000	172,500	23,505
240	24,00-24,49	25,000	23,700	273,000	56,000	176,100	24,000
240	24,00-24,49	25,400	23,700	273,000	56,000	176,100	24,005
245	24,50-24,99	25,000	24,200	277,000	56,000	179,700	24,500
245	24,50-24,99	25,400	24,200	277,000	56,000	179,700	24,505
250	25,00-25,49	25,000	24,700	282,000	56,000	183,300	25,000
250	25,00-25,49	25,400	24,700	282,000	56,000	183,300	25,005
255	25,50-25,99	32,000	25,200	291,000	60,000	186,900	25,500
255	25,50-25,99	31,750	25,200	291,000	60,000	186,900	25,505
260	26,00-26,49	32,000	25,700	297,000	60,000	190,000	26,000
260	26,00-26,49	31,750	25,700	297,000	60,000	190,000	26,005
265	26,50-26,99	32,000	26,200	301,000	60,000	194,000	26,500
265	26,50-26,99	31,750	26,200	301,000	60,000	194,000	26,505
270	27,00-27,49	32,000	26,700	306,000	60,000	197,200	27,000
270	27,00-27,49	31,750	26,700	306,000	60,000	197,200	27,005
275	27,50-27,99	32,000	27,200	310,000	60,000	200,800	27,500
275	27,50-27,99	31,750	27,200	310,000	60,000	200,800	27,505
280	28,00-28,49	32,000	27,700	314,000	60,000	204,400	28,000
280	28,00-28,49	31,750	27,700	314,000	60,000	204,400	28,005
285	28,50-28,99	32,000	28,200	318,000	60,000	208,400	28,500
285	28,50-28,99	31,750	28,200	318,000	60,000	208,400	28,505
290	29,00-29,49	32,000	28,700	323,000	60,000	212,500	29,000
290	29,00-29,49	31,750	28,700	323,000	60,000	212,500	29,005
295	29,50-29,99	32,000	29,200	327,000	60,000	215,100	29,500
295	29,50-29,99	31,750	29,200	327,000	60,000	215,100	29,505
300	30,00-30,49	32,000	29,700	332,000	60,000	218,600	30,000
300	30,00-30,49	31,750	29,700	332,000	60,000	218,600	30,005
305	30,50-30,99	32,000	30,200	336,000	60,000	222,200	30,500
305	30,50-30,99	31,750	30,200	336,000	60,000	222,200	30,505
310	31,00-31,49	32,000	30,700	340,000	60,000	225,800	31,000
310	31,00-31,49	31,750	30,700	340,000	60,000	225,800	31,005
315	31,50-31,99	32,000	31,200	344,000	60,000	229,400	31,500
315	31,50-31,99	31,750	31,200	344,000	60,000	229,400	31,505

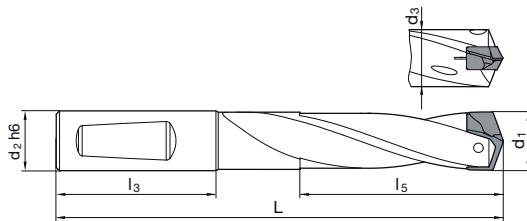


Soporte Multiplex HPC

Artículo N° 86686



alta resistencia al desgaste • sección de ranura optimizada • estabilidad muy buena • tornillos tensores Art.n°. 86843 incluidos
 • atornillador Art.N° 86842 incluidos



Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
110	11,00-11,49	12,000	10,700	182,000	45,000	117,100	11,000
110	11,00-11,49	12,700	10,700	182,000	45,000	117,100	11,005
115	11,50-11,99	12,000	11,200	187,000	45,000	122,100	11,500
115	11,50-11,99	12,700	11,200	187,000	45,000	122,100	11,505
120	12,00-12,49	12,000	11,700	194,000	45,000	127,200	12,000
120	12,00-12,49	12,700	11,700	194,000	45,000	127,200	12,005
125	12,50-12,99	14,000	12,200	199,000	45,000	132,300	12,500
125	12,50-12,99	15,875	12,200	199,000	45,000	132,300	12,505
130	13,00-13,49	14,000	12,700	205,000	45,000	137,500	13,000
130	13,00-13,49	15,875	12,700	205,000	45,000	137,500	13,005
135	13,50-13,99	14,000	13,200	211,000	45,000	142,500	13,500
135	13,50-13,99	15,875	13,200	211,000	45,000	142,500	13,505
140	14,00-14,49	14,000	13,700	217,000	45,000	147,700	14,000
140	14,00-14,49	15,875	13,700	217,000	45,000	147,700	14,005
145	14,50-14,99	16,000	14,200	225,000	48,000	152,800	14,500
145	14,50-14,99	15,875	14,200	225,000	48,000	152,800	14,505
150	15,00-15,49	16,000	14,700	232,000	48,000	157,800	15,000
150	15,00-15,49	15,875	14,700	232,000	48,000	157,800	15,005
155	15,50-15,99	16,000	15,200	237,000	48,000	162,900	15,500
155	15,50-15,99	15,875	15,200	237,000	48,000	162,900	15,505
160	16,00-16,49	16,000	15,700	243,000	48,000	168,000	16,000
160	16,00-16,49	15,875	15,700	243,000	48,000	168,000	16,005
165	16,50-16,99	18,000	16,200	249,000	48,000	170,000	16,500
165	16,50-16,99	19,050	16,200	249,000	48,000	170,000	16,505
170	17,00-17,49	18,000	16,700	255,000	48,000	178,300	17,000
170	17,00-17,49	19,050	16,700	255,000	48,000	178,300	17,005
175	17,50-17,99	18,000	17,200	260,000	48,000	183,500	17,500
175	17,50-17,99	19,050	17,200	260,000	48,000	183,500	17,505
180	18,00-18,49	18,000	17,700	267,000	48,000	188,400	18,000
180	18,00-18,49	19,050	17,700	267,000	48,000	188,400	18,005
185	18,50-18,99	20,000	18,200	274,000	50,000	193,500	18,500
185	18,50-18,99	19,050	18,200	274,000	50,000	193,500	18,505
190	19,00-19,49	20,000	18,700	280,000	50,000	198,700	19,000
190	19,00-19,49	19,050	18,700	280,000	50,000	198,700	19,005
195	19,50-19,99	20,000	19,200	286,000	50,000	203,700	19,500
195	19,50-19,99	19,050	19,200	286,000	50,000	203,700	19,505
200	20,00-20,49	20,000	19,700	292,000	50,000	208,900	20,000
200	20,00-20,49	19,050	19,700	292,000	50,000	208,900	20,005
205	20,50-20,99	25,000	20,200	306,000	56,000	214,000	20,500
205	20,50-20,99	25,400	20,200	306,000	56,000	214,000	20,505
210	21,00-21,49	25,000	20,700	312,000	56,000	219,100	21,000
210	21,00-21,49	25,400	20,700	312,000	56,000	219,100	21,005



Soporte Multiplex HPC

Tamaño	d1 mm	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	Código N°
215	21,50-21,99	25,000	21,200	317,000	56,000	224,200	21,500
215	21,50-21,99	25,400	21,200	317,000	56,000	224,200	21,505
220	22,00-22,49	25,000	21,700	323,000	56,000	229,300	22,000
220	22,00-22,49	25,400	21,700	323,000	56,000	229,300	22,005
225	22,50-22,99	25,000	22,200	329,000	56,000	234,400	22,500
225	22,50-22,99	25,400	22,200	329,000	56,000	234,400	22,505
230	23,00-23,49	25,000	22,700	335,000	56,000	239,500	23,000
230	23,00-23,49	25,400	22,700	335,000	56,000	239,500	23,005
235	23,50-23,99	25,000	23,200	341,000	56,000	244,600	23,500
235	23,50-23,99	25,400	23,200	341,000	56,000	244,600	23,505
240	24,00-24,49	25,000	23,700	347,000	56,000	249,700	24,000
240	24,00-24,49	25,400	23,700	347,000	56,000	249,700	24,005
245	24,50-24,99	25,000	24,200	352,000	56,000	254,800	24,500
245	24,50-24,99	25,400	24,200	352,000	56,000	254,800	24,505
250	25,00-25,49	25,000	24,700	359,000	56,000	259,900	25,000
250	25,00-25,49	25,400	24,700	359,000	56,000	259,900	25,005
255	25,50-25,99	32,000	25,200	369,000	60,000	265,000	25,500
255	25,50-25,99	31,750	25,200	369,000	60,000	265,000	25,505
260	26,00-26,49	32,000	25,700	377,000	60,000	270,000	26,000
260	26,00-26,49	31,750	25,700	377,000	60,000	270,000	26,005
265	26,50-26,99	32,000	26,200	382,000	60,000	275,000	26,500
265	26,50-26,99	31,750	26,200	382,000	60,000	275,000	26,505
270	27,00-27,49	32,000	26,700	388,000	60,000	280,100	27,000
270	27,00-27,49	31,750	26,700	388,000	60,000	280,100	27,005
275	27,50-27,99	32,000	27,200	394,000	60,000	285,200	27,500
275	27,50-27,99	31,750	27,200	394,000	60,000	285,200	27,505
280	28,00-28,49	32,000	27,700	400,000	60,000	290,300	28,000
280	28,00-28,49	31,750	27,700	400,000	60,000	290,300	28,005
285	28,50-28,99	32,000	28,200	405,000	60,000	295,400	28,500
285	28,50-28,99	31,750	28,200	405,000	60,000	295,400	28,505
290	29,00-29,49	32,000	28,700	412,000	60,000	300,500	29,000
290	29,00-29,49	31,750	28,700	412,000	60,000	300,500	29,005
295	29,50-29,99	32,000	29,200	418,000	60,000	305,600	29,500
295	29,50-29,99	31,750	29,200	418,000	60,000	305,600	29,505
300	30,00-30,49	32,000	29,700	424,000	60,000	310,600	30,000
300	30,00-30,49	31,750	29,700	424,000	60,000	310,600	30,005
305	30,50-30,99	32,000	30,200	429,000	60,000	315,700	30,500
305	30,50-30,99	31,750	30,200	429,000	60,000	315,700	30,505
310	31,00-31,49	32,000	30,700	435,000	60,000	320,800	31,000
310	31,00-31,49	31,750	30,700	435,000	60,000	320,800	31,005
315	31,50-31,99	32,000	31,200	441,000	60,000	325,900	31,500
315	31,50-31,99	31,750	31,200	441,000	60,000	325,900	31,505



Plaquitas intercambiables Multiplex HPC

Artículo N° 86721

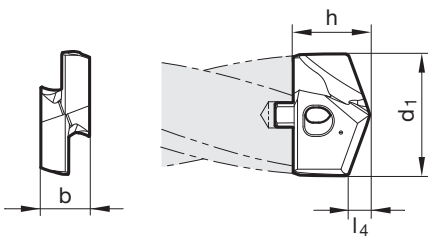


P	M	K	N	S	H
○	○	○	○	○	○



vaciado de punta $\geq \varnothing 11,000$ • afilado plano • forma recta del corte principal (mediante corrección) • tornillos tensores Art.n°. 86843 incluidos

Pilotar en todos los materiales



Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
110	11,000		1,800	4,500	7,200	11,000
110	11,200		1,800	4,500	7,200	11,200
110	11,500		1,900	4,500	7,200	11,500
110	11,510	29/64	1,900	4,500	7,200	11,510
110	11,700		1,900	4,500	7,200	11,700
110	11,800		1,900	4,500	7,200	11,800
110	11,910	15/32	1,900	4,500	7,200	11,910
120	12,000		1,900	5,000	7,400	12,000
120	12,100		2,000	5,000	7,400	12,100
120	12,200		2,000	5,000	7,400	12,200
120	12,300	31/64	2,000	5,000	7,400	12,300
120	12,500		2,000	5,000	7,400	12,500
120	12,600		2,000	5,000	7,400	12,600
120	12,700	1/2	2,100	5,000	7,400	12,700
120	12,800		2,100	5,000	7,400	12,800
120	12,900		2,100	5,000	7,400	12,900
130	13,000		2,100	5,500	8,200	13,000
130	13,100	33/64	2,100	5,500	8,200	13,100
130	13,490	17/32	2,200	5,500	8,200	13,490
130	13,500		2,200	5,500	8,200	13,500
130	13,600		2,200	5,500	8,200	13,600
130	13,700		2,200	5,500	8,200	13,700
130	13,800		2,200	5,500	8,200	13,800
130	13,890	35/64	2,200	5,500	8,200	13,890
140	14,000		2,300	6,000	9,400	14,000
140	14,100		2,300	6,000	9,400	14,100
140	14,290	9/16	2,300	6,000	9,400	14,290
140	14,400		2,300	6,000	9,400	14,400
140	14,500		2,300	6,000	9,400	14,500
140	14,600		2,400	6,000	9,400	14,600
140	14,680	37/64	2,400	6,000	9,400	14,680
140	14,700		2,400	6,000	9,400	14,700
140	14,800		2,400	6,000	9,400	14,800
140	15,000		2,400	6,000	9,400	15,000
140	15,080	19/32	2,400	6,000	9,400	15,080
140	15,100		2,400	6,000	9,400	15,100
140	15,200		2,400	6,000	9,400	15,200
140	15,300		2,500	6,000	9,400	15,300
140	15,480	39/64	2,500	6,000	9,400	15,480
140	15,500		2,500	6,000	9,400	15,500
140	15,600		2,500	6,000	9,400	15,600
140	15,700		2,500	6,000	9,400	15,700



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
140	15,800		2,500	6,000	9,400	15,800
140	15,870	5/8	2,600	6,000	9,400	15,870
160	16,000		2,600	7,000	10,600	16,000
160	16,270	41/64	2,600	7,000	10,600	16,270
160	16,500		2,700	7,000	10,600	16,500
160	16,670	21/32	2,700	7,000	10,600	16,670
160	17,000		2,700	7,000	10,600	17,000
160	17,070	43/64	2,700	7,000	10,600	17,070
160	17,460	11/16	2,800	7,000	10,600	17,460
160	17,500		2,800	7,000	10,600	17,500
160	17,600		2,800	7,000	10,600	17,600
160	17,860	45/64	2,900	7,000	10,600	17,860
180	18,000		2,900	8,000	12,100	18,000
180	18,260	23/32	2,900	8,000	12,100	18,260
180	18,500		3,000	8,000	12,100	18,500
180	18,650	47/64	3,000	8,000	12,100	18,650
180	19,000		3,000	8,000	12,100	19,000
180	19,050	3/4	3,100	8,000	12,100	19,050
180	19,450	49/64	3,100	8,000	12,100	19,450
180	19,500		3,100	8,000	12,100	19,500
180	19,600		3,100	8,000	12,100	19,600
180	19,840	25/32	3,200	8,000	12,100	19,840
200	20,000		3,200	9,000	13,300	20,000
200	20,240	51/64	3,200	9,000	13,300	20,240
200	20,500		3,300	9,000	13,300	20,500
200	20,640	13/16	3,300	9,000	13,300	20,640
200	21,000		3,400	9,000	13,300	21,000
200	21,030	53/64	3,400	9,000	13,300	21,030
200	21,100		3,400	9,000	13,300	21,100
200	21,430	27/32	3,400	9,000	13,300	21,430
200	21,500		3,400	9,000	13,300	21,500
200	21,830	55/64	3,500	9,000	13,300	21,830
220	22,000		3,500	10,000	14,800	22,000
220	22,220	7/8	3,600	10,000	14,800	22,220
220	22,500		3,600	10,000	14,800	22,500
220	22,620	57/64	3,600	10,000	14,800	22,620
220	23,000		3,700	10,000	14,800	23,000
220	23,020	29/32	3,700	10,000	14,800	23,020
220	23,420	59/64	3,700	10,000	14,800	23,420
220	23,500		3,800	10,000	14,800	23,500
220	23,810	15/16	3,800	10,000	14,800	23,810
240	24,000		3,800	11,000	15,300	24,000
240	24,100		3,800	11,000	15,300	24,100
240	24,210	61/64	3,900	11,000	15,300	24,210
240	24,500		3,900	11,000	15,300	24,500
240	24,610	31/32	3,900	11,000	15,300	24,610
240	25,000	63/64	4,000	11,000	15,300	25,000
240	25,400	1	4,100	11,000	15,300	25,400
240	25,500		4,100	11,000	15,300	25,500
240	25,700		4,100	11,000	15,300	25,700
260	26,000		4,100	12,000	19,400	26,000
260	26,190	1 1/32	4,200	12,000	19,400	26,190
260	26,500		4,200	12,000	19,400	26,500
260	26,590	1 3/64	4,200	12,000	19,400	26,590
260	27,000		4,300	12,000	19,400	27,000
260	27,500		4,400	12,000	19,400	27,500
260	27,700		4,400	12,000	19,400	27,700
260	27,780	1 3/32	4,400	12,000	19,400	27,780
280	28,000		4,500	13,000	20,100	28,000
280	28,180	1 7/64	4,500	13,000	20,100	28,180
280	28,500		4,500	13,000	20,100	28,500
280	28,580		4,600	13,000	20,100	28,580
280	29,000		4,600	13,000	20,100	29,000
280	29,370	1 5/32	4,700	13,000	20,100	29,370
280	29,500		4,700	13,000	20,100	29,500
300	30,000		4,800	14,000	21,700	30,000
300	30,160	1 3/16	4,800	14,000	21,700	30,160
300	30,500		4,900	14,000	21,700	30,500
300	30,960	1 7/32	4,900	14,000	21,700	30,960
300	31,000		4,900	14,000	21,700	31,000
300	31,500		5,000	14,000	21,700	31,500
300	31,750	1 1/4	5,100	14,000	21,700	31,750



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
320	32,000		5,100	15,000	22,400	32,000
320	32,500		5,200	15,000	22,400	32,500
320	32,540	1 9/32	5,200	15,000	22,400	32,540
320	33,000		5,300	15,000	22,400	33,000
320	33,340	1 5/16	5,300	15,000	22,400	33,340
320	33,500		5,300	15,000	22,400	33,500
320	34,000		5,400	15,000	22,400	34,000
320	34,130	1 11/32	5,400	15,000	22,400	34,130
320	34,500		5,500	15,000	22,400	34,500
320	34,930		5,600	15,000	22,400	34,930
320	35,000		5,600	15,000	22,400	35,000
320	35,500		5,600	15,000	22,400	35,500
320	35,720	1 13/32	5,700	15,000	22,400	35,720
360	36,000		5,700	16,000	23,200	36,000
360	36,500		5,800	16,000	23,200	36,500
360	36,510	1 7/16	5,800	16,000	23,200	36,510
360	37,000		5,900	16,000	23,200	37,000
360	37,310	1 15/32	5,900	16,000	23,200	37,310
360	37,500		6,000	16,000	23,200	37,500
360	38,000		6,000	16,000	23,200	38,000
360	38,100	1 1/2	6,100	16,000	23,200	38,100
360	38,500	1 33/64	6,100	16,000	23,200	38,500
360	39,000		6,200	16,000	23,200	39,000
360	39,500		6,300	16,000	23,200	39,500
360	40,000		6,400	16,000	23,200	40,000



Plaquitas intercambiables Multiplex HPC

Artículo N° 86722

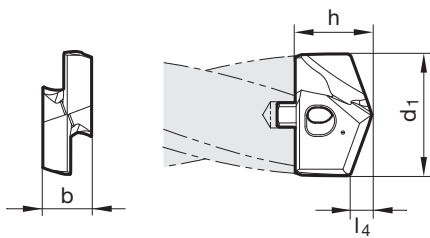


P	M	K	N	S	H
●	○	○			



vaciado de punta $\geq \varnothing 11,000$ • afilado plano • forma recta del corte principal (mediante corrección) • tornillos tensores Art.n°. 86843 incluidos

aceros de construcción y de cementación • aceros para tornos automáticos, aceros de bonificación • aceros aleados con una resistencia de hasta a 1200 N/mm²



Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
110	11,000		2,100	4,500	7,500	11,000
110	11,200		2,100	4,500	7,500	11,200
115	11,500		2,100	4,500	7,500	11,500
115	11,510	29/64	2,100	4,500	7,500	11,510
115	11,700		2,200	4,500	7,500	11,700
115	11,800		2,200	4,500	7,500	11,800
115	11,910	15/32	2,200	4,500	7,500	11,910
120	12,000		2,200	5,000	7,700	12,000
120	12,100		2,300	5,000	7,700	12,100
120	12,200		2,300	5,000	7,700	12,200
120	12,300	31/64	2,300	5,000	7,700	12,300
125	12,500		2,300	5,000	7,700	12,500
125	12,600		2,300	5,000	7,700	12,600
125	12,700	1/2	2,400	5,000	7,700	12,700
125	12,800		2,400	5,000	7,700	12,800
125	12,900		2,400	5,000	7,700	12,900
130	13,000		2,400	5,500	8,500	13,000
130	13,100	33/64	2,400	5,500	8,500	13,100
130	13,490	17/32	2,500	5,500	8,500	13,490
135	13,500		2,500	5,500	8,500	13,500
135	13,600		2,500	5,500	8,500	13,600
135	13,700		2,500	5,500	8,500	13,700
135	13,800		2,600	5,500	8,500	13,800
135	13,890	35/64	2,600	5,500	8,500	13,890
140	14,000		2,600	6,000	9,600	14,000
140	14,100		2,600	6,000	9,600	14,100
140	14,290	9/16	2,700	6,000	9,600	14,290
140	14,400		2,700	6,000	9,600	14,400
145	14,500		2,700	6,000	9,600	14,500
145	14,600		2,700	6,000	9,600	14,600
145	14,680	37/64	2,700	6,000	9,600	14,680
145	14,700		2,700	6,000	9,600	14,700
145	14,800		2,700	6,000	9,600	14,800
150	15,000		2,800	6,000	9,800	15,000
150	15,080	19/32	2,800	6,000	9,800	15,080
150	15,100		2,800	6,000	9,800	15,100
150	15,200		2,800	6,000	9,800	15,200
150	15,300		2,800	6,000	9,800	15,300
150	15,480	39/64	2,900	6,000	9,800	15,480
155	15,500		2,900	6,000	9,800	15,500
155	15,600		2,900	6,000	9,800	15,600
155	15,700		2,900	6,000	9,800	15,700



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
155	15,800		2,900	6,000	9,800	15,800
155	15,870	5/8	2,900	6,000	9,800	15,870
160	16,000		3,000	7,000	11,000	16,000
160	16,270	41/64	3,000	7,000	11,000	16,270
165	16,500		3,100	7,000	11,000	16,500
165	16,670	21/32	3,100	7,000	11,000	16,670
170	17,000		3,100	7,000	11,000	17,000
170	17,070	43/64	3,200	7,000	11,000	17,070
170	17,460	11/16	3,200	7,000	11,000	17,460
175	17,500		3,200	7,000	11,000	17,500
175	17,600		3,300	7,000	11,000	17,600
175	17,860	45/64	3,300	7,000	11,000	17,860
180	18,000		3,300	8,000	12,600	18,000
180	18,260	23/32	3,400	8,000	12,600	18,260
185	18,500		3,400	8,000	12,600	18,500
185	18,650	47/64	3,400	8,000	12,600	18,650
190	19,000		3,500	8,000	12,600	19,000
190	19,050	3/4	3,500	8,000	12,600	19,050
190	19,250		3,600	8,000	12,600	19,250
190	19,450	49/64	3,600	8,000	12,600	19,450
195	19,500		3,600	8,000	12,600	19,500
195	19,600		3,600	8,000	12,600	19,600
195	19,840	25/32	3,700	8,000	12,600	19,840
200	20,000		3,700	9,000	13,900	20,000
200	20,240	51/64	3,700	9,000	13,900	20,240
205	20,500		3,800	9,000	13,900	20,500
205	20,640	13/16	3,800	9,000	13,900	20,640
210	21,000		3,900	9,000	13,900	21,000
210	21,030	53/64	3,900	9,000	13,900	21,030
210	21,100		3,900	9,000	13,900	21,100
210	21,430	27/32	3,900	9,000	13,900	21,430
215	21,500		4,000	9,000	13,900	21,500
215	21,830	55/64	4,000	9,000	13,900	21,830
220	22,000		4,100	10,000	15,300	22,000
220	22,220	7/8	4,100	10,000	15,300	22,220
225	22,500		4,100	10,000	15,300	22,500
225	22,620	57/64	4,200	10,000	15,300	22,620
230	23,000		4,200	10,000	15,300	23,000
230	23,020	29/32	4,200	10,000	15,300	23,020
230	23,420	59/64	4,300	10,000	15,300	23,420
235	23,500		4,300	10,000	15,300	23,500
235	23,810	15/16	4,400	10,000	15,300	23,810
240	24,000		4,400	11,000	15,800	24,000
240	24,100		4,400	11,000	15,800	24,100
240	24,210	61/64	4,500	11,000	15,800	24,210
245	24,500		4,500	11,000	15,800	24,500
245	24,610	31/32	4,500	11,000	15,800	24,610
250	25,000	63/64	4,600	11,000	15,800	25,000
250	25,400	1	4,700	11,000	15,800	25,400
255	25,500		4,700	11,000	15,800	25,500
255	25,670		4,700	11,000	15,800	25,670
255	25,700		4,700	11,000	15,800	25,700
255	25,810		4,700	11,000	15,800	25,810
260	26,000		4,800	12,000	20,000	26,000
260	26,190	1 1/32	4,800	12,000	20,000	26,190
265	26,500		4,900	12,000	20,000	26,500
265	26,590	1 3/64	4,900	12,000	20,000	26,590
270	27,000		5,000	12,000	20,000	27,000
275	27,500		5,100	12,000	20,000	27,500
275	27,700		5,100	12,000	20,000	27,700
275	27,780	1 3/32	5,100	12,000	20,000	27,780
280	28,000		5,100	13,000	20,700	28,000
280	28,180	1 7/64	5,200	13,000	20,700	28,180
285	28,500		5,200	13,000	20,700	28,500
285	28,580		5,300	13,000	20,700	28,580
290	29,000		5,300	13,000	20,700	29,000
290	29,370	1 5/32	5,400	13,000	20,700	29,370
295	29,500		5,400	13,000	20,700	29,500
295	29,770	1 11/64	5,500	13,000	20,700	29,770
300	30,000		5,500	14,000	22,300	30,000
300	30,160	1 3/16	5,500	14,000	22,300	30,160
305	30,500		5,600	14,000	22,300	30,500



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
305	30,960	1 7/32	5,700	14,000	22,300	30,960
310	31,000		5,700	14,000	22,300	31,000
315	31,500		5,800	14,000	22,300	31,500
315	31,750	1 1/4	5,800	14,000	22,300	31,750
320	32,000		5,900	15,000	23,100	32,000
320	32,500		6,000	15,000	23,100	32,500
320	32,540	1 9/32	6,000	15,000	23,100	32,540
320	32,940	1 19/64	6,000	15,000	23,100	32,940
330	33,000		6,100	15,000	23,100	33,000
330	33,340	1 5/16	6,100	15,000	23,100	33,340
330	33,500		6,100	15,000	23,100	33,500
340	34,000		6,200	15,000	23,100	34,000
340	34,130	1 11/32	6,300	15,000	23,100	34,130
340	34,500		6,300	15,000	23,100	34,500
340	34,930		6,400	15,000	23,100	34,930
350	35,000		6,400	15,000	23,100	35,000
350	35,500		6,500	15,000	23,100	35,500
350	35,720	1 13/32	6,600	15,000	23,100	35,720
360	36,000		6,600	16,000	23,900	36,000
360	36,500		6,700	16,000	23,900	36,500
360	36,510	1 7/16	6,700	16,000	23,900	36,510
370	37,000		6,800	16,000	23,900	37,000
370	37,310	1 15/32	6,800	16,000	23,900	37,310
370	37,500		6,900	16,000	23,900	37,500
380	38,000		7,000	16,000	23,900	38,000
380	38,100	1 1/2	7,000	16,000	23,900	38,100
380	38,500	1 33/64	7,100	16,000	23,900	38,500
390	39,000		7,100	16,000	23,900	39,000
390	39,500		7,200	16,000	23,900	39,500
400	40,000		7,300	16,000	23,900	40,000



Plaquitas intercambiables Multiplex HPC

Artículo N° 86723

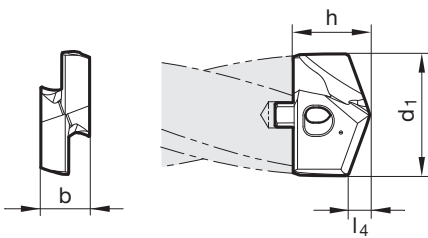


P	M	K	N	S	H
○		●			



vaciado de punta $\geq \varnothing 11,000$ • afilado plano • forma recta del corte principal (mediante corrección) • tornillos tensores Art.n°. 86843 incluidos

fundición vermicular GGV • fundición gris, fundición maleable, fundición esferica



Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
110	11,000		2,700	4,500	7,500	11,000
110	11,200		2,700	4,500	7,500	11,200
115	11,500		2,800	4,500	7,500	11,500
115	11,510	29/64	2,800	4,500	7,500	11,510
115	11,700		2,800	4,500	7,500	11,700
115	11,800		2,800	4,500	7,500	11,800
115	11,910	15/32	2,800	4,500	7,500	11,910
120	12,000		2,900	5,000	7,700	12,000
120	12,100		2,900	5,000	7,700	12,100
120	12,200		2,900	5,000	7,700	12,200
120	12,300	31/64	2,900	5,000	7,700	12,300
125	12,500		3,100	5,000	7,700	12,500
125	12,600		3,100	5,000	7,700	12,600
125	12,700	1/2	3,100	5,000	7,700	12,700
125	12,800		3,100	5,000	7,700	12,800
125	12,900		3,100	5,000	7,700	12,900
130	13,000		3,200	5,500	8,500	13,000
130	13,100	33/64	3,200	5,500	8,500	13,100
130	13,490	17/32	3,200	5,500	8,500	13,490
135	13,500		3,300	5,500	8,500	13,500
135	13,600		3,300	5,500	8,500	13,600
135	13,700		3,300	5,500	8,500	13,700
135	13,800		3,300	5,500	8,500	13,800
135	13,890	35/64	3,300	5,500	8,500	13,890
140	14,000		3,400	6,000	9,600	14,000
140	14,100		3,400	6,000	9,600	14,100
140	14,290	9/16	3,400	6,000	9,600	14,290
140	14,400		3,400	6,000	9,600	14,400
145	14,500		3,600	6,000	9,600	14,500
145	14,600		3,600	6,000	9,600	14,600
145	14,680	37/64	3,600	6,000	9,600	14,680
145	14,700		3,600	6,000	9,600	14,700
145	14,800		3,600	6,000	9,600	14,800
150	15,000		3,700	6,000	9,800	15,000
150	15,080	19/32	3,700	6,000	9,800	15,080
150	15,100		3,700	6,000	9,800	15,100
150	15,200		3,700	6,000	9,800	15,200
150	15,300		3,700	6,000	9,800	15,300
150	15,480	39/64	3,700	6,000	9,800	15,480
155	15,500		3,800	6,000	9,800	15,500
155	15,600		3,800	6,000	9,800	15,600
155	15,700		3,800	6,000	9,800	15,700



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
155	15,800		3,800	6,000	9,800	15,800
155	15,870	5/8	3,800	6,000	9,800	15,870
160	16,000		3,900	7,000	11,000	16,000
160	16,270	41/64	3,900	7,000	11,000	16,270
165	16,500		4,100	7,000	11,000	16,500
165	16,670	21/32	4,100	7,000	11,000	16,670
170	17,000		4,200	7,000	11,000	17,000
170	17,070	43/64	4,200	7,000	11,000	17,070
170	17,460	11/16	4,200	7,000	11,000	17,460
175	17,500		4,300	7,000	11,000	17,500
175	17,600		4,300	7,000	11,000	17,600
175	17,860	45/64	4,300	7,000	11,000	17,860
180	18,000		4,400	8,000	12,600	18,000
180	18,260	23/32	4,400	8,000	12,600	18,260
185	18,500		4,500	8,000	12,600	18,500
185	18,650	47/64	4,500	8,000	12,600	18,650
190	19,000		4,700	8,000	12,600	19,000
190	19,050	3/4	4,700	8,000	12,600	19,050
190	19,250		4,700	8,000	12,600	19,250
190	19,450	49/64	4,700	8,000	12,600	19,450
195	19,500		4,800	8,000	12,600	19,500
195	19,600		4,800	8,000	12,600	19,600
195	19,840	25/32	4,800	8,000	12,600	19,840
200	20,000		4,900	9,000	13,900	20,000
200	20,240	51/64	4,900	9,000	13,900	20,240
205	20,500		5,100	9,000	13,900	20,500
205	20,640	13/16	5,100	9,000	13,900	20,640
210	21,000		5,200	9,000	13,900	21,000
210	21,030	53/64	5,200	9,000	13,900	21,030
210	21,100		5,200	9,000	13,900	21,100
210	21,430	27/32	5,200	9,000	13,900	21,430
215	21,500		5,300	9,000	13,900	21,500
215	21,830	55/64	5,300	9,000	13,900	21,830
220	22,000		5,400	10,000	15,300	22,000
220	22,220	7/8	5,400	10,000	15,300	22,220
225	22,500		5,600	10,000	15,300	22,500
225	22,620	57/64	5,600	10,000	15,300	22,620
230	23,000		5,700	10,000	15,300	23,000
230	23,020	29/32	5,700	10,000	15,300	23,020
230	23,420	59/64	5,700	10,000	15,300	23,420
235	23,500		5,800	10,000	15,300	23,500
235	23,810	15/16	5,800	10,000	15,300	23,810
240	24,000		6,000	11,000	15,800	24,000
240	24,100		6,000	11,000	15,800	24,100
240	24,210	61/64	6,000	11,000	15,800	24,210
245	24,500		6,100	11,000	15,800	24,500
245	24,610	31/32	6,100	11,000	15,800	24,610
250	25,000	63/64	6,200	11,000	15,800	25,000
250	25,400	1	6,200	11,000	15,800	25,400
255	25,500		6,300	11,000	15,800	25,500
255	25,670		6,300	11,000	15,800	25,670
255	25,700		6,300	11,000	15,800	25,700
255	25,810		6,300	11,000	15,800	25,810
260	26,000		6,400	12,000	20,000	26,000
260	26,190	1 1/32	6,400	12,000	20,000	26,190
265	26,500		6,500	12,000	20,000	26,500
265	26,590	1 3/64	6,500	12,000	20,000	26,590
270	27,000		6,600	12,000	20,000	27,000
275	27,500		6,700	12,000	20,000	27,500
275	27,700		6,700	12,000	20,000	27,700
275	27,780	1 3/32	6,700	12,000	20,000	27,780
280	28,000		6,800	13,000	20,700	28,000
280	28,180	1 7/64	6,800	13,000	20,700	28,180
285	28,500		6,900	13,000	20,700	28,500
285	28,580		6,900	13,000	20,700	28,580
290	29,000		7,100	13,000	20,700	29,000
290	29,370	1 5/32	7,100	13,000	20,700	29,370
295	29,500		7,200	13,000	20,700	29,500
295	29,770	1 11/64	7,200	13,000	20,700	29,770
300	30,000		7,300	14,000	22,300	30,000
300	30,160	1 3/16	7,300	14,000	22,300	30,160
305	30,500		7,400	14,000	22,300	30,500



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
305	30,960	1 7/32	7,400	14,000	22,300	30,960
310	31,000		7,500	14,000	22,300	31,000
315	31,500		7,600	14,000	22,300	31,500
315	31,750	1 1/4	7,600	14,000	22,300	31,750
320	32,000		7,700	15,000	23,100	32,000
320	32,500		7,800	15,000	23,100	32,500
320	32,540	1 9/32	7,800	15,000	23,100	32,540
320	32,940	1 19/64	7,800	15,000	23,100	32,940
330	33,000		7,900	15,000	23,100	33,000
330	33,340	1 5/16	7,900	15,000	23,100	33,340
330	33,500		8,100	15,000	23,100	33,500
340	34,000		8,200	15,000	23,100	34,000
340	34,130	1 11/32	8,200	15,000	23,100	34,130
340	34,500		8,400	15,000	23,100	34,500
340	34,930		8,400	15,000	23,100	34,930
350	35,000		8,500	15,000	23,100	35,000
350	35,500		8,600	15,000	23,100	35,500
350	35,720	1 13/32	8,600	15,000	23,100	35,720
360	36,000		8,700	16,000	23,900	36,000
360	36,500		8,800	16,000	23,900	36,500
360	36,510	1 7/16	8,800	16,000	23,900	36,510
370	37,000		9,000	16,000	23,900	37,000
370	37,310	1 15/32	9,000	16,000	23,900	37,310
370	37,500		9,100	16,000	23,900	37,500
380	38,000		9,200	16,000	23,900	38,000
380	38,100	1 1/2	9,200	16,000	23,900	38,100
380	38,500	1 33/64	9,400	16,000	23,900	38,500
390	39,000		9,500	16,000	23,900	39,000
390	39,500		9,700	16,000	23,900	39,500
400	40,000		9,700	16,000	23,900	40,000



Plaquitas intercambiables Multiplex HPC

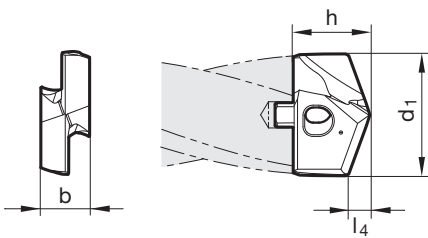
Artículo N° 86724



P	M	K	N	S	H
			•		



vaciado de punta $\geq \varnothing 11,000$ • entrada cónica • tornillos tensores Art.n°. 86843 incluidos • forma cóncava del corte principal
aluminio y sus aleaciones • metales no ferríticos



Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
110	11,000		2,100	4,500	7,500	11,000
110	11,200		2,100	4,500	7,500	11,200
115	11,500		2,100	4,500	7,500	11,500
115	11,510	29/64	2,100	4,500	7,500	11,510
115	11,700		2,200	4,500	7,500	11,700
115	11,800		2,200	4,500	7,500	11,800
115	11,910	15/32	2,200	4,500	7,500	11,910
120	12,000		2,200	5,000	7,700	12,000
120	12,100		2,300	5,000	7,700	12,100
120	12,200		2,300	5,000	7,700	12,200
120	12,300	31/64	2,300	5,000	7,700	12,300
125	12,500		2,300	5,000	7,700	12,500
125	12,600		2,300	5,000	7,700	12,600
125	12,700	1/2	2,400	5,000	7,700	12,700
125	12,800		2,400	5,000	7,700	12,800
125	12,900		2,400	5,000	7,700	12,900
130	13,000		2,400	5,500	8,500	13,000
130	13,100	33/64	2,400	5,500	8,500	13,100
130	13,490	17/32	2,500	5,500	8,500	13,490
135	13,500		2,500	5,500	8,500	13,500
135	13,600		2,500	5,500	8,500	13,600
135	13,700		2,500	5,500	8,500	13,700
135	13,800		2,600	5,500	8,500	13,800
135	13,890	35/64	2,600	5,500	8,500	13,890
140	14,000		2,600	6,000	9,600	14,000
140	14,100		2,600	6,000	9,600	14,100
140	14,290	9/16	2,700	6,000	9,600	14,290
140	14,400		2,700	6,000	9,600	14,400
145	14,500		2,700	6,000	9,600	14,500
145	14,600		2,700	6,000	9,600	14,600
145	14,680	37/64	2,700	6,000	9,600	14,680
145	14,700		2,700	6,000	9,600	14,700
145	14,800		2,700	6,000	9,600	14,800
150	15,000		2,800	6,000	9,800	15,000
150	15,080	19/32	2,800	6,000	9,800	15,080
150	15,100		2,800	6,000	9,800	15,100
150	15,200		2,800	6,000	9,800	15,200
150	15,300		2,800	6,000	9,800	15,300
150	15,480	39/64	2,900	6,000	9,800	15,480
155	15,500		2,900	6,000	9,800	15,500
155	15,600		2,900	6,000	9,800	15,600
155	15,700		2,900	6,000	9,800	15,700



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
155	15,800		2,900	6,000	9,800	15,800
155	15,870	5/8	2,900	6,000	9,800	15,870
160	16,000		3,000	7,000	11,000	16,000
160	16,270	41/64	3,000	7,000	11,000	16,270
165	16,500		3,100	7,000	11,000	16,500
165	16,670	21/32	3,100	7,000	11,000	16,670
170	17,000		3,100	7,000	11,000	17,000
170	17,070	43/64	3,200	7,000	11,000	17,070
170	17,460	11/16	3,200	7,000	11,000	17,460
175	17,500		3,200	7,000	11,000	17,500
175	17,600		3,300	7,000	11,000	17,600
175	17,860	45/64	3,300	7,000	11,000	17,860
180	18,000		3,300	8,000	12,600	18,000
180	18,260	23/32	3,400	8,000	12,600	18,260
185	18,500		3,400	8,000	12,600	18,500
185	18,650	47/64	3,400	8,000	12,600	18,650
190	19,000		3,500	8,000	12,600	19,000
190	19,050	3/4	3,500	8,000	12,600	19,050
190	19,250		3,600	8,000	12,600	19,250
190	19,450	49/64	3,600	8,000	12,600	19,450
195	19,500		3,600	8,000	12,600	19,500
195	19,600		3,600	8,000	12,600	19,600
195	19,840	25/32	3,700	8,000	12,600	19,840
200	20,000		3,700	9,000	13,900	20,000
200	20,240	51/64	3,700	9,000	13,900	20,240
205	20,500		3,800	9,000	13,900	20,500
205	20,640	13/16	3,800	9,000	13,900	20,640
210	21,000		3,900	9,000	13,900	21,000
210	21,030	53/64	3,900	9,000	13,900	21,030
210	21,100		3,900	9,000	13,900	21,100
210	21,430	27/32	3,900	9,000	13,900	21,430
215	21,500		4,000	9,000	13,900	21,500
215	21,830	55/64	4,000	9,000	13,900	21,830
220	22,000		4,100	10,000	15,300	22,000
220	22,220	7/8	4,100	10,000	15,300	22,220
225	22,500		4,100	10,000	15,300	22,500
225	22,620	57/64	4,200	10,000	15,300	22,620
230	23,000		4,200	10,000	15,300	23,000
230	23,020	29/32	4,200	10,000	15,300	23,020
230	23,420	59/64	4,300	10,000	15,300	23,420
235	23,500		4,300	10,000	15,300	23,500
235	23,810	15/16	4,400	10,000	15,300	23,810
240	24,000		4,400	11,000	15,800	24,000
240	24,100		4,400	11,000	15,800	24,100
240	24,210	61/64	4,500	11,000	15,800	24,210
245	24,500		4,500	11,000	15,800	24,500
245	24,610	31/32	4,500	11,000	15,800	24,610
250	25,000	63/64	4,600	11,000	15,800	25,000
250	25,400	1	4,700	11,000	15,800	25,400
255	25,500		4,700	11,000	15,800	25,500
255	25,670		4,700	11,000	15,800	25,670
255	25,700		4,700	11,000	15,800	25,700
255	25,810		4,700	11,000	15,800	25,810
260	26,000		4,800	12,000	20,000	26,000
260	26,190	1 1/32	4,800	12,000	20,000	26,190
265	26,500		4,900	12,000	20,000	26,500
265	26,590	1 3/64	4,900	12,000	20,000	26,590
270	27,000		5,000	12,000	20,000	27,000
275	27,500		5,100	12,000	20,000	27,500
275	27,700		5,100	12,000	20,000	27,700
275	27,780	1 3/32	5,100	12,000	20,000	27,780
280	28,000		5,100	13,000	20,700	28,000
280	28,180	1 7/64	5,200	13,000	20,700	28,180
285	28,500		5,200	13,000	20,700	28,500
285	28,580		5,300	13,000	20,700	28,580
290	29,000		5,300	13,000	20,700	29,000
290	29,370	1 5/32	5,400	13,000	20,700	29,370
295	29,500		5,400	13,000	20,700	29,500
295	29,770	1 11/64	5,500	13,000	20,700	29,770
300	30,000		5,500	14,000	22,300	30,000
300	30,160	1 3/16	5,500	14,000	22,300	30,160
305	30,500		5,600	14,000	22,300	30,500



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
305	30,960	1 7/32	5,700	14,000	22,300	30,960
310	31,000		5,700	14,000	22,300	31,000
315	31,500		5,800	14,000	22,300	31,500
315	31,750	1 1/4	5,800	14,000	22,300	31,750
320	32,000		5,900	15,000	23,100	32,000
320	32,500		6,000	15,000	23,100	32,500
320	32,540	1 9/32	6,000	15,000	23,100	32,540
320	32,940	1 19/64	6,000	15,000	23,100	32,940
330	33,000		6,100	15,000	23,100	33,000
330	33,340	1 5/16	6,100	15,000	23,100	33,340
330	33,500		6,100	15,000	23,100	33,500
340	34,000		6,200	15,000	23,100	34,000
340	34,130	1 11/32	6,300	15,000	23,100	34,130
340	34,500		6,300	15,000	23,100	34,500
340	34,930		6,400	15,000	23,100	34,930
350	35,000		6,400	15,000	23,100	35,000
350	35,500		6,500	15,000	23,100	35,500
350	35,720	1 13/32	6,600	15,000	23,100	35,720
360	36,000		6,600	16,000	23,900	36,000
360	36,500		6,700	16,000	23,900	36,500
360	36,510	1 7/16	6,700	16,000	23,900	36,510
370	37,000		6,800	16,000	23,900	37,000
370	37,310	1 15/32	6,800	16,000	23,900	37,310
370	37,500		6,900	16,000	23,900	37,500
380	38,000		7,000	16,000	23,900	38,000
380	38,100	1 1/2	7,000	16,000	23,900	38,100
380	38,500	1 33/64	7,100	16,000	23,900	38,500
390	39,000		7,100	16,000	23,900	39,000
390	39,500		7,200	16,000	23,900	39,500
400	40,000		7,300	16,000	23,900	40,000



Plaquitas intercambiables Multiplex HPC

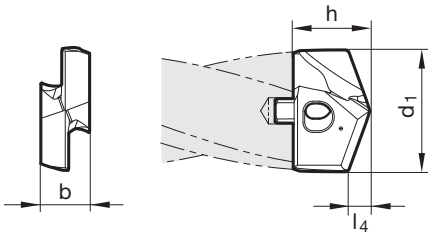
Artículo N° 86725



P	M	K	N	S	H
○	●			○	○



vaciado de punta $\geq \varnothing 11,000$ • entrada cónica • forma recta del corte principal (mediante corrección) • tornillos tensores Art.n°. 86843 incluidos
aceros inoxidables



Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
110	11,000		2,100	4,500	7,500	11,000
110	11,200		2,100	4,500	7,500	11,200
115	11,500		2,100	4,500	7,500	11,500
115	11,510	29/64	2,100	4,500	7,500	11,510
115	11,700		2,200	4,500	7,500	11,700
115	11,800		2,200	4,500	7,500	11,800
115	11,910	15/32	2,200	4,500	7,500	11,910
120	12,000		2,200	5,000	7,700	12,000
120	12,100		2,300	5,000	7,700	12,100
120	12,200		2,300	5,000	7,700	12,200
120	12,300	31/64	2,300	5,000	7,700	12,300
125	12,500		2,300	5,000	7,700	12,500
125	12,600		2,300	5,000	7,700	12,600
125	12,700	1/2	2,400	5,000	7,700	12,700
125	12,800		2,400	5,000	7,700	12,800
125	12,900		2,400	5,000	7,700	12,900
130	13,000		2,400	5,500	8,500	13,000
130	13,100	33/64	2,400	5,500	8,500	13,100
130	13,490	17/32	2,500	5,500	8,500	13,490
135	13,500		2,500	5,500	8,500	13,500
135	13,600		2,500	5,500	8,500	13,600
135	13,700		2,500	5,500	8,500	13,700
135	13,800		2,600	5,500	8,500	13,800
135	13,890	35/64	2,600	5,500	8,500	13,890
140	14,000		2,600	6,000	9,600	14,000
140	14,100		2,600	6,000	9,600	14,100
140	14,290	9/16	2,700	6,000	9,600	14,290
140	14,400		2,700	6,000	9,600	14,400
145	14,500		2,700	6,000	9,600	14,500
145	14,600		2,700	6,000	9,600	14,600
145	14,700		2,700	6,000	9,600	14,700
145	14,800		2,700	6,000	9,600	14,800
150	15,000		2,800	6,000	9,800	15,000
150	15,080	19/32	2,800	6,000	9,800	15,080
150	15,100		2,800	6,000	9,800	15,100
150	15,200		2,800	6,000	9,800	15,200
150	15,300		2,800	6,000	9,800	15,300
155	15,500		2,900	6,000	9,800	15,500
155	15,600		2,900	6,000	9,800	15,600
155	15,700		2,900	6,000	9,800	15,700
155	15,800		2,900	6,000	9,800	15,800
155	15,870	5/8	2,900	6,000	9,800	15,870



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
160	16,000		3,000	7,000	11,000	16,000
160	16,270	41/64	3,000	7,000	11,000	16,270
165	16,500		3,100	7,000	11,000	16,500
165	16,670	21/32	3,100	7,000	11,000	16,670
170	17,000		3,100	7,000	11,000	17,000
170	17,070	43/64	3,200	7,000	11,000	17,070
170	17,460	11/16	3,200	7,000	11,000	17,460
175	17,500		3,200	7,000	11,000	17,500
175	17,600		3,300	7,000	11,000	17,600
175	17,860	45/64	3,300	7,000	11,000	17,860
180	18,000		3,300	8,000	12,600	18,000
180	18,260	23/32	3,400	8,000	12,600	18,260
185	18,500		3,400	8,000	12,600	18,500
185	18,650	47/64	3,400	8,000	12,600	18,650
190	19,000		3,500	8,000	12,600	19,000
190	19,050	3/4	3,500	8,000	12,600	19,050
190	19,450	49/64	3,600	8,000	12,600	19,450
195	19,500		3,600	8,000	12,600	19,500
195	19,600		3,600	8,000	12,600	19,600
195	19,840	25/32	3,700	8,000	12,600	19,840
200	20,000		3,700	9,000	13,900	20,000
200	20,240	51/64	3,700	9,000	13,900	20,240
205	20,500		3,800	9,000	13,900	20,500
205	20,640	13/16	3,800	9,000	13,900	20,640
210	21,000		3,900	9,000	13,900	21,000
210	21,030	53/64	3,900	9,000	13,900	21,030
210	21,100		3,900	9,000	13,900	21,100
210	21,430	27/32	3,900	9,000	13,900	21,430
215	21,500		4,000	9,000	13,900	21,500
215	21,830	55/64	4,000	9,000	13,900	21,830
220	22,000		4,100	10,000	15,300	22,000
220	22,220	7/8	4,100	10,000	15,300	22,220
225	22,500		4,100	10,000	15,300	22,500
225	22,620	57/64	4,200	10,000	15,300	22,620
230	23,000		4,200	10,000	15,300	23,000
230	23,020	29/32	4,200	10,000	15,300	23,020
230	23,420	59/64	4,300	10,000	15,300	23,420
235	23,500		4,300	10,000	15,300	23,500
235	23,810	15/16	4,400	10,000	15,300	23,810
240	24,000		4,400	11,000	15,800	24,000
240	24,100		4,400	11,000	15,800	24,100
240	24,210	61/64	4,500	11,000	15,800	24,210
245	24,500		4,500	11,000	15,800	24,500
245	24,610	31/32	4,500	11,000	15,800	24,610
250	25,000	63/64	4,600	11,000	15,800	25,000
250	25,400	1	4,700	11,000	15,800	25,400
255	25,500		4,700	11,000	15,800	25,500
255	25,670		4,700	11,000	15,800	25,670
255	25,700		4,700	11,000	15,800	25,700
260	26,000		4,800	12,000	20,000	26,000
260	26,190	1 1/32	4,800	12,000	20,000	26,190
265	26,500		4,900	12,000	20,000	26,500
265	26,590	1 3/64	4,900	12,000	20,000	26,590
270	27,000		5,000	12,000	20,000	27,000
275	27,500		5,100	12,000	20,000	27,500
275	27,700		5,100	12,000	20,000	27,700
275	27,780	1 3/32	5,100	12,000	20,000	27,780
280	28,000		5,100	13,000	20,700	28,000
280	28,180	1 7/64	5,200	13,000	20,700	28,180
285	28,500		5,200	13,000	20,700	28,500
285	28,580		5,300	13,000	20,700	28,580
290	29,000		5,300	13,000	20,700	29,000
290	29,370	1 5/32	5,400	13,000	20,700	29,370
295	29,500		5,400	13,000	20,700	29,500
295	29,600		5,400	13,000	20,700	29,600
295	29,770	1 11/64	5,500	13,000	20,700	29,770
300	30,000		5,500	14,000	22,300	30,000
300	30,160	1 3/16	5,500	14,000	22,300	30,160
305	30,500		5,600	14,000	22,300	30,500
305	30,960	1 7/32	5,700	14,000	22,300	30,960
310	31,000		5,700	14,000	22,300	31,000
315	31,500		5,800	14,000	22,300	31,500



Plaquitas intercambiables Multiplex HPC

Tamaño	d1 mm	inch	l4 mm	b mm	h mm	Código N°
315	31,750	1 1/4	5,800	14,000	22,300	31,750
320	32,000		5,900	15,000	23,100	32,000
320	32,500		6,000	15,000	23,100	32,500
320	32,540	1 9/32	6,000	15,000	23,100	32,540
320	32,940	1 19/64	6,000	15,000	23,100	32,940
330	33,000		6,100	15,000	23,100	33,000
330	33,340	1 5/16	6,100	15,000	23,100	33,340
330	33,500		6,100	15,000	23,100	33,500
340	34,000		6,200	15,000	23,100	34,000
340	34,130	1 11/32	6,300	15,000	23,100	34,130
340	34,500		6,300	15,000	23,100	34,500
340	34,930		6,400	15,000	23,100	34,930
350	35,000		6,400	15,000	23,100	35,000
350	35,500		6,500	15,000	23,100	35,500
350	35,720	1 13/32	6,600	15,000	23,100	35,720
360	36,000		6,600	16,000	23,900	36,000
360	36,500		6,700	16,000	23,900	36,500
360	36,510	1 7/16	6,700	16,000	23,900	36,510
370	37,000		6,800	16,000	23,900	37,000
370	37,310	1 15/32	6,800	16,000	23,900	37,310
370	37,500		6,900	16,000	23,900	37,500
380	38,000		7,000	16,000	23,900	38,000
380	38,100	1 1/2	7,000	16,000	23,900	38,100
380	38,500	1 33/64	7,100	16,000	23,900	38,500
390	39,000		7,100	16,000	23,900	39,000
390	39,500		7,200	16,000	23,900	39,500
400	40,000		7,300	16,000	23,900	40,000



Plaquitas para avellanar Multiplex HPC

Artículo N° 86726



P	M	K	N	S	H
○		●			



fundición gris, fundición maleable, fundición esférica

ISO	Tamaño del porta	Código N°	ISO	Tamaño del porta	Código N°
CPGW050202FN-K	110-140	52,020			
CPGW050204FN-K	110-140	52,040			
CPGW060202FN-K	160-180	62,020			
CPGW060204FN-K	160-180	62,040			
CPGW09T308FN-K	300-360	93,080			

Artículo N° 86727



P	M	K	N	S	H
			●		



aluminio y sus aleaciones • metales no ferríticos

ISO	Tamaño del porta	Código N°	ISO	Tamaño del porta	Código N°
CPGT050202FR-AL	110-140	52,020			
CPGT050204FR-AL	110-140	52,040			
CPGT060202FR-AL	160-180	62,020			
CPGT060204FR-AL	160-180	62,040			
CPGT09T308FR-AL	300-360	93,080			



Plaquitas para avellanar Multiplex HPC

Artículo N° 86728



P	M	K	N	S	H
•	○	○		○	○



aceros y fundición de aceros (aleados y sin alear)

ISO	Tamaño del porta	Código N°	ISO	Tamaño del porta	Código N°
CPGT050202FR-P	110-140	52,020			
CPGT050204FR-P	110-140	52,040			
CPGT060202FR-P	160-180	62,020			
CPGT060204FR-P	160-180	62,040			
CPGT09T308FR-P	300-360	93,080			

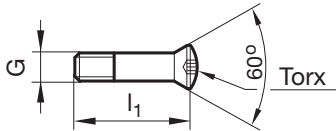


Tornillos tensores para porta Multiplex HPC 1,5-10xD

Artículo N° 86843



asignación tornillos tensores/portas s. " Multiplex HPC -tecnología y ventajas



G	l1 mm	Torx	Código N°	G	l1 mm	Torx	Código N°
M 2,2	9,500	T7	2,200	M 6	28,500	T25	6,001
M 2,2	10,500	T7	2,201	M 6	32,500	T25	6,002
M 2,5	11,400	T8	2,500				
M 3	12,100	T9	3,000				
M 3	13,100	T9	3,001				
M 3,5	14,250	T10	3,500				
M 4	16,000	T15	4,000				
M 4,5	18,000	T15	4,500				
M 5	19,750	T20	5,000				
M 5	21,750	T20	5,001				
M 5	23,400	T20	5,003				
M 6	27,000	T25	6,000				



HARTNER

Llave dinamométrica

Artículo N° 86844



sujeción hexagonal

Medida punta	Par de giro Nm	L mm	Tipo	Código N°
1/4"	0,8...2	160,000	A	2,000
1/4"	2...8	200,000	A	8,000
1/4"	0,4...14	200,000	A	14,000



HARTNER

Adaptor exagonal

Artículo N° 86845



Medida punta		Torx	L mm	Código N°
1/4	hexágono	T7	25,000	7,000
1/4	hexágono	T8	25,000	8,000
1/4	hexágono	T9	25,000	9,000
1/4	hexágono	T10	25,000	10,000
1/4	hexágono	T15	25,000	15,000
1/4	hexágono	T20	25,000	20,000
1/4	hexágono	T25	25,000	25,001

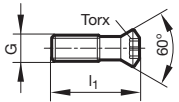


Tornillos tensores para porta de avellanar Multiplex HPC

Artículo N° 86846



asignación tornillos tensores/portas s. " Multiplex HPC -tecnología y ventajas



G	l1 mm	Torx	Código N°	G	l1 mm	Torx	Código N°
M 2,0X5,50	5,500	T6	2,000				
M 2,0X5,30	5,300	T7	2,500				
M 4 X9,50	9,500	T15	4,006				



Multiplex - La alternativa versátil

Todos los mangos multiplex están equipados con un sistema de refrigeración interior que garantiza un suministro óptimo del lubricante en el proceso de corte tanto horizontal como verticalmente y alargan la vida de la herramienta. Además, de una óptima evacuación desde el agujero. El tipo de refrigerante se suministra dependiendo del diseño del mango:

Entrada del refrigerante al final del mango.

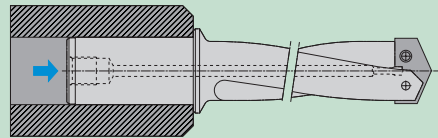
Para herramientas tanto fijas como rotativas:

Entrada axial del refrigerante.

Para mangos cilíndricos y agujero de $\text{Ø}10$ a 102 mm.

Referencia del mango 86612/86622/86624/86730/86740/86750

y mangos con longitudes extra



El suministro de refrigerante en la superficie del mango portabrocas.

Para herramientas rotativas:

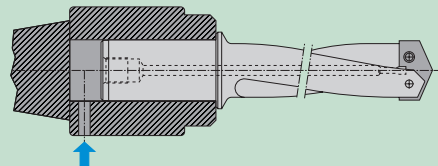
Suministro radial del refrigerante a través del portabrocas.

Para mangos cilíndricos y agujeros $\text{Ø}10$ a 102 mm.

Ref. del mango 86612/86622/86624/86730/86740/86750 y mangos con

long. extra

Mangos SK40/50 con alojamiento cilíndrico y cono Morse 4/5/6 con alojamiento cilíndrico.



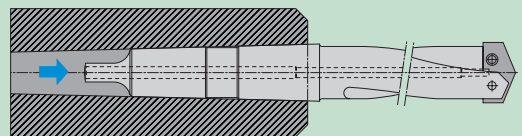
Suministro del refrigerante en el tallo

Para herramientas tanto fijas como rotativas:

Suministro axial del refrigerante a través del mango.

Para mangos cono Morse y eje $\text{Ø} 10$ a 25 mm

Referencia de mango no. 986630/86650



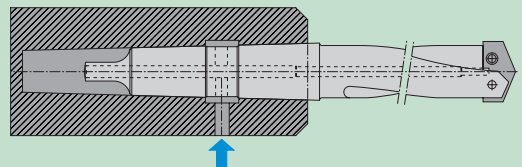
Suministro lateral del refrigerante en mangos cono Morse

Para herramientas estáticas:

Suministro radial del refrigerante a través del mango.

Para mangos cono Morse y eje $\text{Ø} 10$ a 25 mm.

mango bajo demanda



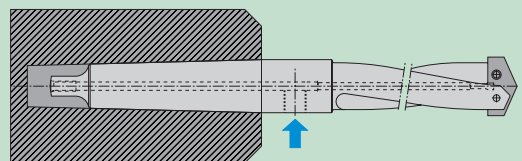
Entrada lateral del refrigerante en el final del cuello

Para herramientas estáticas:

Suministro del refrigerante vía tubería directa con rosca R 1/4 y R 1/2.

Para mangos cono Morse con asentamiento para suministro de eje $\text{Ø} 25$ a 102 mm.

Referencia del mango no. 86670/86680 y longitudes extras de mango



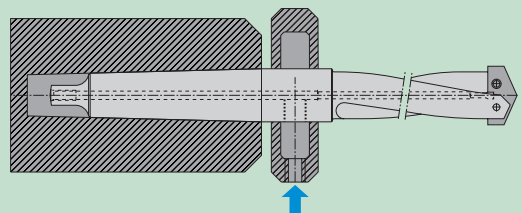
Entrada lateral del refrigerante en el final del cuello

Para herramientas rotativas:

Entrada radial del refrigerante a través del canal.

Para mangos cono Morse con para agujeros Ø por encima de 25 mm.

Referencia del mango no. 86670/86680 y longitudes extras de mango

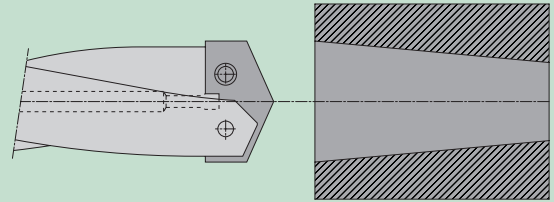




Multiplex - Consejos y trucos

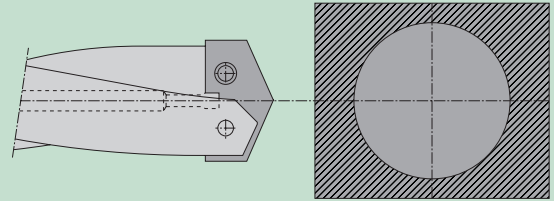
Taladrando agujeros previos

Debido a que el sistema Multiplex es predominantemente guiado por el cincel, no es recomendable para taladrar agujeros previos. Sin embargo, si el sistema se utiliza bajo las mencionadas condiciones, los parámetros de corte deben ser reducidos.



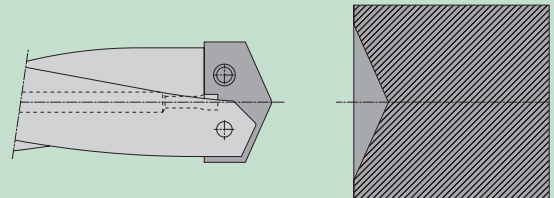
Corte interrumpido

El sistema Multiplex no es apto para cortes interrumpidos (por ejemplo, taladros transversales que son más largos que el diámetro).



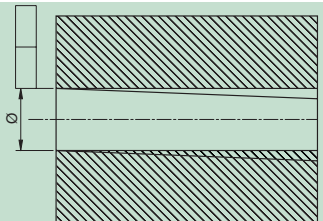
Centro

Las entradas para el sistema Multiplex son de cuerpo rebajado. Por lo tanto, el centrado es sólo necesario para taladros profundos. Si el centrado es necesario por razones técnicas, el ángulo del punto de centrado debe ser igual o mayor que el ángulo del punto de entrada. Lo siguiente aplica: ACE 7 mayor que $d = 25.4 \text{ mm} = 135^\circ$
mayor que $d = 66.0 \text{ mm} = 132^\circ$
desde $d = 66.0 \text{ mm} = 140^\circ$
Un mango corto (3xD) debe ser aplicado para centraje



Descentraje del taladro

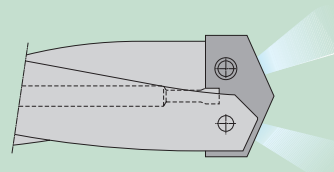
El descentraje del taladro puede ser debido a varios factores. Un valor aproximado de 0.1-0.16 mm para taladros mayores de 7xD está aceptado. En este caso el mango más corto y, por lo tanto, el más rígido debe ser aplicado.



Presión del lubricante

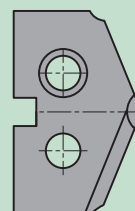
El lubricante utilizado con el sistema Multiplex es extremadamente importante para la evacuación de las virutas. Puede ser introducido a una presión aproximada de 5 bar. Generalmente, la siguiente regla aplica: cuanto mayor refrigerante esté disponible, mejor.

Por el uso de refrigerante o mandriles con refrigerante, el sistema Multiplex puede ser aplicado en máquinas viejas con refrigerante externo. Uno de nuestros ingenieros encontrará una solución a su problema.



Filo de corte pesado

Si el calor ha erosionado las esquinas, la velocidad de corte es demasiado alta y debe ser reducida. Mida el diámetro no afectado y recalcula la velocidad de corte en base a este nuevo diámetro. Reste un 10% de la velocidad resultante e introduzca el valor en el máquina.

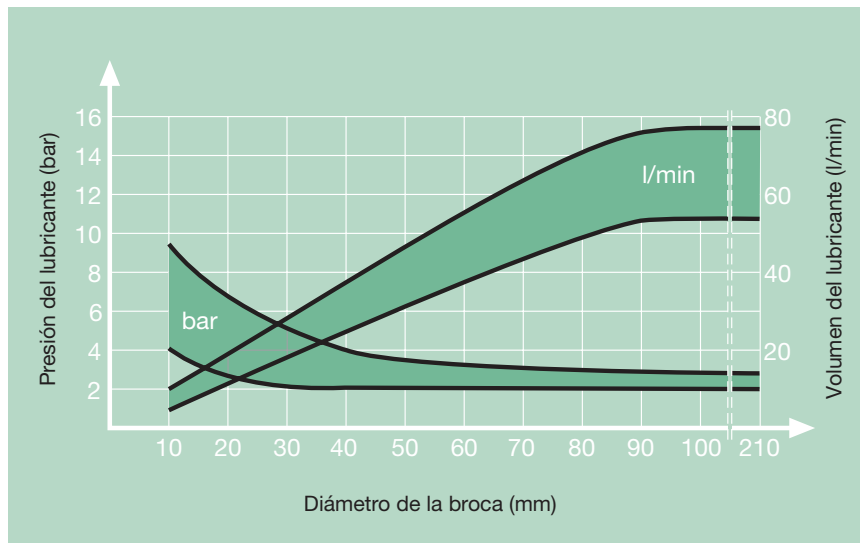




Multiplex - Tipos de refrigerante

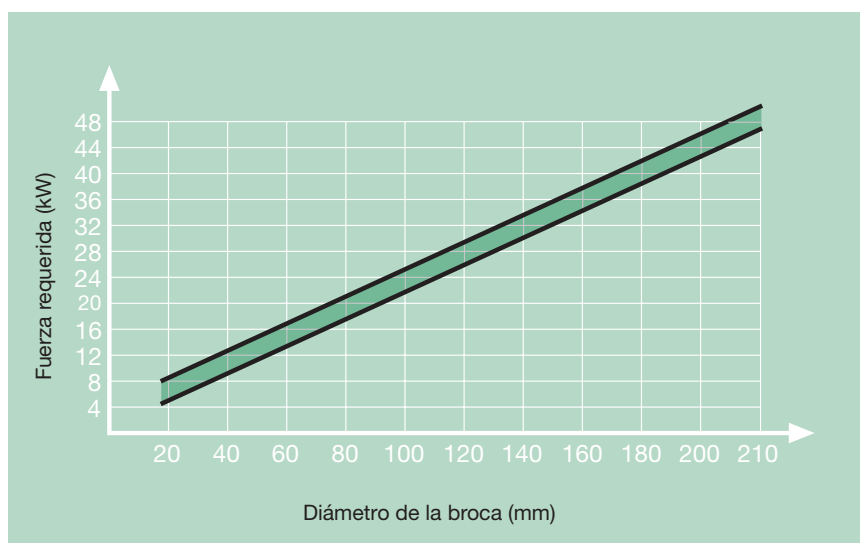
Un agente refrigerante eficaz es de extrema importancia. Insuficiente presión del refrigerante y volumen pueden producir un acabado insatisfactorio o una rotura de la herramienta. Si es posible, la medida de las partículas sólidas en el refrigerante no debe exceder 50 μm .

Para la aplicación de herramientas Multiplex en acero de alta velocidad o metal duro recomendamos utilizar lubricante soluble como refrigerante aplicando el ratio estándar de mezcla 1:20. La presión del refrigerante y el volumen son más importantes que la composición del lubricante soluble. Un eficiente agente refrigerante es un importante prerequisite para una lubricación y refrigeración.



Máquina y pieza a trabajar

Sólo en una máquina rígida, con husillo, pieza de trabajo con sujeción de abrazaderas hacen posible el uso de metal duro. La rigidez insuficiente conduce a vibraciones rápidas del taladro durante la producción de agujeros cuando el borde del cincel sale de la pieza causando una reducción de la vida de la herramienta o una rotura.

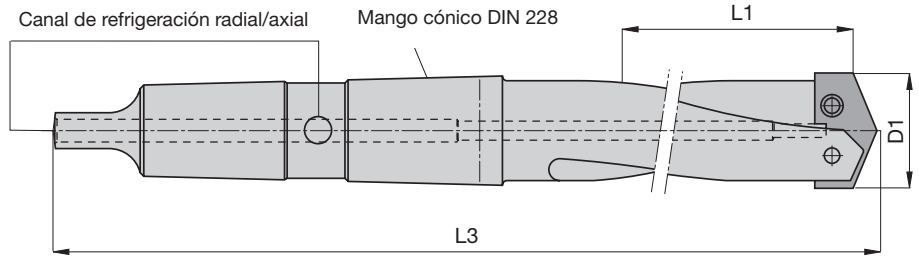




Multiplex - Podemos solucionar sus necesidades

(POR FAVOR, MARQUE CON UNA X SEGÚN SUS NECESIDADES)

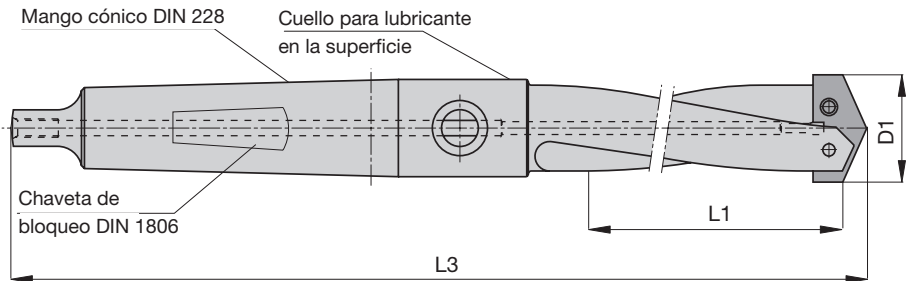
Mango cónico



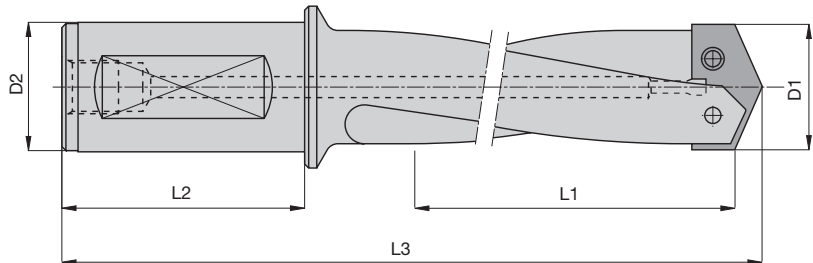
Mango cónico con entrada para el lubricante cuello ref. 86690 para la entrada del lubricante

Con plano

Sin plano



Mango cilíndrico



Para el suministro, necesitamos los siguientes datos:

Diámetro del agujero (máximo para plaquitas de dia. 190).....	<input type="text"/>	Material a trabajar.....	<input type="text"/>
Longitud del taladro L1.....	<input type="text"/>	Presión del refrigerante.....	<input type="text"/>
Longitud del labio.....	<input type="text"/>	Cantidad (pedido mínimo 2 unidades).....	<input type="text"/>
Longitud total longitud máxima 1000 mm.....	<input type="text"/>	Ranura adaptación (en caso de Cono morse).....	<input type="text"/>
Diámetro del mango (en caso de ser mango tipo Weldon).....	<input type="text"/>		

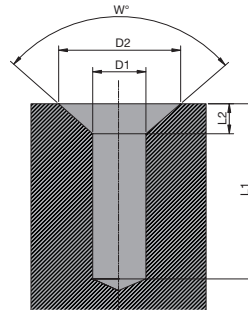
Para cualquier otra información, póngase en contacto con nuestro departamento técnico. Teléfono 00 49 743 112 50



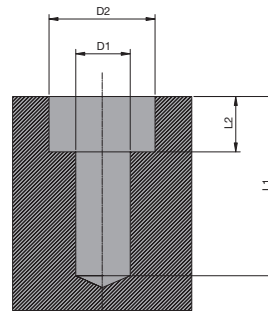
Para el taladro de agujeros especiales, necesitamos los siguientes datos



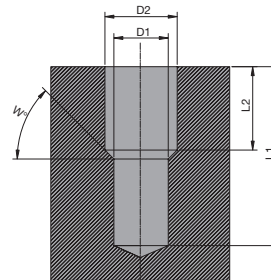
Taladro previo
para agujeros roscados
con ángulo de 90°



Taladro previo
Con ángulo de paso de 180°



Agujero previo
Con ángulo de paso variable



Para el suministro, necesitamos los siguientes datos:

Forma del agujero.....	Por favor, marca con una cruz	Ángulo W°	<input type="text"/>
Diámetro (D1).....	<input type="text"/>	Material a trabajar.....	<input type="text"/>
Diámetro D2.....	<input type="text"/>		
Longitud L1.....	<input type="text"/>		
Longitud L2.....	<input type="text"/>		

o enviar una sección del plano en la que incluya las medidas solicitadas



Multiplex - Geometrías especiales



Formulario para clientes (HSS-E/HSS-E-PM o metal duro)



Plaquitas para NC (HSS-E/HSS-E-PM o MD) de 90° o 120° (dependiendo de Ø el ángulo de 90° puede ser distorsionado)



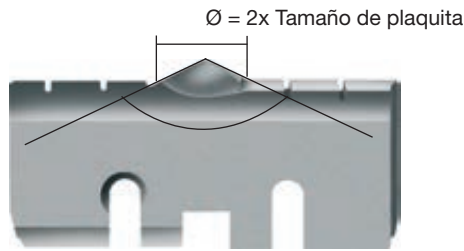
Plaquitas en radio (HSS-E/HSS-E-PM o metal duro).



Plaquitas de paso (HSS-E/HSS-E-PM o metal duro).



Geometría del aluminio (metal duro) para la aplicación en metales no ferrosos y plásticos.



Plaquitas para agujeros ciegos* (HSS-E/HSS-E-PM) con centraje.



Geometría para latón (metal duro) para la aplicación en latón y materiales similares.



Plaquitas para agujeros ciegos* (HSS-E/HSS-E-PM) sin centraje.



Afilado de punta para fibras de plástico (metal duro)

Por favor, cuando utilice agujeros ciegos o contornos:

- Utilizar sólo mangos cortos.
- Pre-trabajando el calibre del agujero con Multiplex standards (\varnothing del standard $\leq \varnothing$ del agujero ciego).
- Taladrar en materiales sólidos sólo es recomendable bajo condiciones especiales.
- Por favor, mande un dibujo del calibre del agujero a nuestros técnicos, si es posible.



Multiplex HPC - técnica y ventajas

Con el nuevo sistema de taladrar con plaquitas intercambiables Multiplex HPC, Hartner suministra porta-herramientas eficientes en costes para taladros en un campo de diámetros desde 11,00 a 40,00m y que aporta las siguientes ventajas:

• **Mayor rendimiento**

Gracias a cortes micromecanizados y los recubrimientos según cada aplicación las plaquitas intercambiables para los porta-herramientas Multiplex HPC WP para taladrar, son de gran rendimiento. Esto se basa en el material optimizado de los porta-herramientas con superficies niqueladas y medidas que incrementan en un escalonado de 0,5mm hasta dia. 31,99mm y 1,0mm desde dia. 32,00mm. Esto supone menos esfuerzo en el cuerpo base del porta-herramientas.

• **Transporte optimizado de la viruta**

Gracias a la sección de ranuras los porta-herramientas del sistema de taladrado Multiplex HPC WP aseguran una buena evacuación de viruta fuera del agujero incluso en agujeros de mas profundidad.

• **Lubricación y refrigeración perfecta**

Los canales de refrigeración con máxima sección garantizan una buena lubricación y refrigeración. Los cortes se lubrican y refrigeran optimamente a la vez que se ayuda así a una buena evacuación de la viruta fuera del agujero.

• **Asientos para las plaquitas exactos y rígidos**

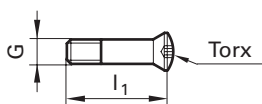
El asiento perfecto de las plaquitas permite cambiarlas dentro de la máquina en pocos y sencillos pasos con un destornillador torx estándar. Gracias al material optimizado de los porta-herramientas Multiplex HPC de taladrar, las plaquitas se pueden cambiar mas amenudo que con los sistemas convencionales en los que había que reemplazar el porta-herramientas por el desgaste del asiento.

Los tornillos de ajuste bloqueantes garantizan una sujeción segura de las plaquitas intercambiables dentro del porta-herramientas incluso en máquinas con altos niveles de vibración.

• **Porta-herramientas rígidos**

Los saltos pequeños en el escalonado de diámetros de los porta-herramientas no solo reducen el desgaste. Gracias a la mejor guía de la herramienta en el agujero también se aumentan rendimientos de los sistemas de taladrado Multiplex HPC WP. Todo esto aporta mayor rendimiento y mejor calidad superficial en las piezas.

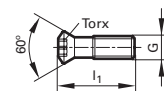
Tornillos de ajuste para porta-herramientas 1,5 - 10 x D 86843



para porta-herramientas	Torx	Code nº
110/115	T7	2,200
120/125	T7	2,201
130/135	T8	2,500
140/145	T9	3,000
150/155	T9	3,001
160 - 175	T10	3,500
180 - 195	T15	4,000
200 - 215	T15	4,500

para porta-herramientas	Torx	Code nº
220 - 235	T20	5,000
240 - 255	T20	5,001
260 - 295	T20	5,003
300 - 315	T25	6,000
320 - 350	T25	6,001
360 - 390	T25	6,002

para Porta-herramientas de avellanar 86846



para porta-herramientas	Torx	Code nº
110 - 140	T6	2,000
160 - 280	T7	2,500
300 - 360	T15	4,006

¡Recomendamos cambiar los tornillos cada vez que cambiamos las plaquitas!

Cada porta-herramientas se suministra con un tornillo de ajuste art.nº 86843, un destornillador art.nº. 86842. Cada plaquita intercambiable se suministra con un tornillo de ajuste art.nº. 86843.

Par de fuerzas para tornillos de ajuste:

Gama Ø	11.0 - 12.99	13.0 - 13.99	14.0 - 15.99	16.0 - 17.99	18.0 - 19.99	20.0 - 21.99	22.0 - 29.99	30.0 - 40.00
Rosca	M2.2	M2.5	M3	M3.5	M4	M4.5	M5	M6
Torx	T7	T8	T9	T10	T15	T15	T20	T25
Par de giro [Nm]	0.8	1.0	1.7	2.7	4.0	6.0	8.0	14.0



Cuestionario para herramienta especial

Pedido

Petición de oferta

Nombre/cliente Nuevo cliente

Calle/ n°

Teléfono

Fecha

Contacto

Número de pedido

Ciudad/código postal

Fax

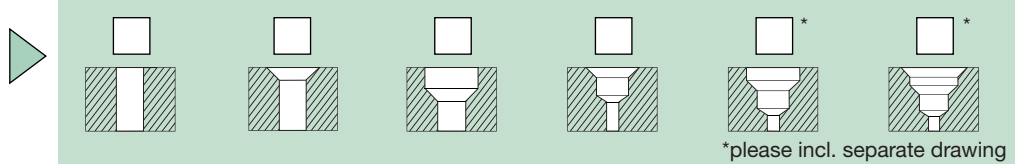
Firma

Cantidad

porta-herramientas plaquitas

Material a mecanizar

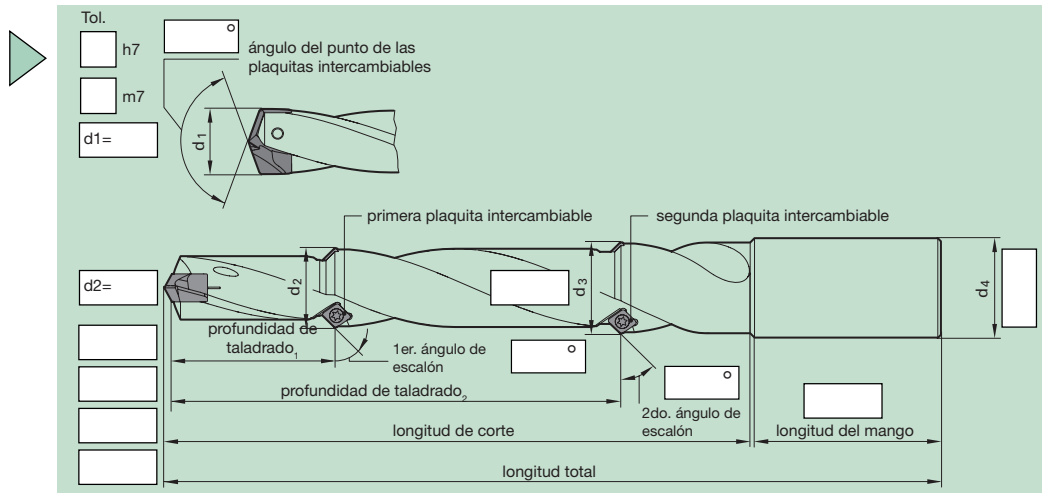
Mecanizar



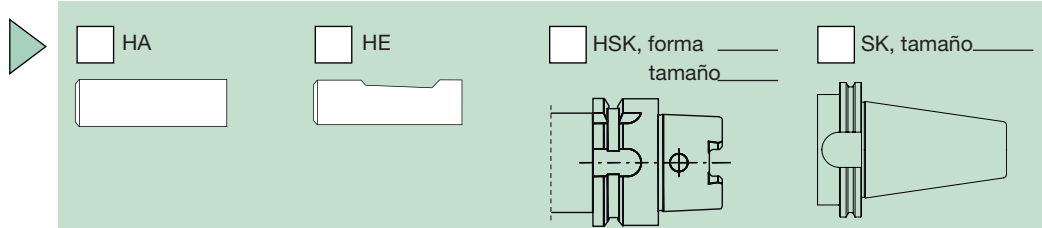
Ranura

espiralizadas espiralizadas parcialmente recta

Dimensiones
Para ranuras espiralizadas y rectas



Forma del mango



Refrigeración interna

si no

Recubrimiento de plaq. intercamb.

FIRE TiAlN SuperA TiAlN TiCN TiN blancas nano FIRE AlTiN nano



HARTNER

Precision Cutting Tools

PARTE TÉCNICA

Dimensiones, definiciones, recomendaciones



HARTNER

Contenido Dimensiones, definiciones

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Dimensiones de las brocas de mango cilíndrico

Ø mm por encima	DIN 1897		DIN 338		DIN 339		DIN 340		DIN 1869		DIN 1869		DIN 1869	
	longitud total mm	longitud del labio de corte mm	longitud total mm	longitud del labio de corte mm	longitud total mm	longitud del labio de corte mm	longitud total mm	longitud del labio de corte mm	longitud total mm	longitud del labio de corte mm	longitud total mm	longitud del labio de corte mm	longitud total mm	longitud del labio de corte mm
0,19 – 0,24			19	2,5					serie 1		serie 2		serie 3	
0,24 – 0,30			19	3										
0,30 – 0,38			19	4										
0,38 – 0,48			20	5										
0,48 – 0,53	20	3	22	6	28	12	32	12						
0,53 – 0,60	21	3,5	24	7	32	15	35	15						
0,60 – 0,67	22	4	26	8	36	18	38	18						
0,67 – 0,75	23	4,5	28	9	39	20	42	21						
0,75 – 0,85	24	5	30	10	42	22	46	25						
0,85 – 0,95	25	5,5	32	11	45	24	51	29						
0,95 – 1,06	26	6	34	12	48	26	56	33						
1,06 – 1,18	28	7	36	14	50	28	60	37						
1,18 – 1,32	30	8	38	16	52	30	65	41						
1,32 – 1,50	32	9	40	18	55	33	70	45						
1,50 – 1,70	34	10	43	20	58	35	76	50						
1,70 – 1,90	36	11	46	22	62	38	80	53						
1,90 – 2,12	38	12	49	24	66	41	85	56	125	85				
2,12 – 2,36	40	13	53	27	70	44	90	59	135	90				
2,36 – 2,65	43	14	57	30	74	47	95	62	140	95				
2,65 – 3,00	46	16	61	33	79	51	100	66	150	100	190	130		
3,00 – 3,35	49	18	65	36	84	55	106	69	155	105	200	135		
3,35 – 3,75	52	20	70	39	91	60	112	73	165	115	210	145	265	180
3,75 – 4,25	55	22	75	43	96	64	119	78	175	120	220	150	280	190
4,25 – 4,75	58	24	80	47	102	69	126	82	185	125	235	160	295	200
4,75 – 5,30	62	26	86	52	108	74	132	87	195	135	245	170	315	210
5,30 – 6,00	66	28	93	57	116	80	139	91	205	140	260	180	330	225
6,00 – 6,70	70	31	101	63	124	86	148	97	215	150	275	190	350	235
6,70 – 7,50	74	34	109	69	133	93	156	102	225	155	290	200	370	250
7,50 – 8,50	79	37	117	75	142	100	165	109	240	165	305	210	390	265
8,50 – 9,50	84	40	125	81	151	107	175	115	250	175	320	220	410	280
9,50 – 10,60	89	43	133	87	162	116	184	121	265	185	340	235	430	295
10,60 – 11,80	95	47	142	94	173	125	195	128						
11,80 – 13,20	102	51	151	101	184	134	205	134						
13,20 – 14,00	107	54	160	108	194	142	214	140						
14,00 – 15,00	111	56	169	114	202	147	220	144						
15,00 – 16,00	115	58	178	120	211	153	227	149						
16,00 – 17,00	119	60	184	125	218	159	235	154						
17,00 – 18,00	123	62	191	130	226	165	241	158						
18,00 – 19,00	127	64	198	135	234	171	247	162						
19,00 – 20,00	131	66	205	140	242	177	254	166						
20,00 – 21,20	136	68					261	171						
21,20 – 22,40	141	70					268	176						
22,40 – 23,60	146	72					275	180						
23,60 – 25,00	151	75					282	185						
25,00 – 26,50	156	78												
26,50 – 28,00	162	81												
28,00 – 30,00	168	84												
30,00 – 31,50	174	87												
31,50 – 33,50	180	90												
33,50 – 35,50	186	93												
35,50 – 37,50	193	96												
37,50 – 40,00	200	100												



Dimensiones de las brocas de mango cónico

Ø mm por encima hasta	DIN 345			DIN 346			DIN 341			DIN 1870			DIN 1870		
	long. total mm	long. del labio de corte mm	Cono morse	long. total mm	long. del labio de corte mm	Cono morse	long. total mm	long. del labio de corte mm	Cono morse	long. total mm	long. del labio de corte mm	Cono morse	long. total mm	long. del labio de corte mm	Cono morse
2,65 - 3,00	114	33	1							serie 1			serie 2		
3,00 - 3,35	117	36	1												
3,35 - 3,75	120	39	1												
3,75 - 4,25	124	43	1				145	64	1						
4,25 - 4,75	128	47	1				150	69	1						
4,75 - 5,30	133	52	1				155	74	1						
5,30 - 6,00	138	57	1				161	80	1						
6,00 - 6,70	144	63	1				167	86	1						
6,70 - 7,50	150	69	1				174	93	1						
7,50 - 8,50	156	75	1				181	100	1	265	165	1	330	210	1
8,50 - 9,50	162	81	1				188	107	1	275	175	1	345	220	1
9,50 - 10,60	168	87	1	185	87	2	197	116	1	285	185	1	360	235	1
10,60 - 11,80	175	94	1	192	94	2	206	125	1	300	195	1	375	250	1
11,80 - 13,20	182	101	1	199	101	2	215	134	1	310	205	1	395	260	1
13,20 - 14,00	189	108	1	206	108	2	223	142	1	325	220	1	410	275	1
14,00 - 15,00	212	114	2	235	114	3	245	147	2	340	220	2	425	275	2
15,00 - 16,00	218	120	2	241	120	3	251	153	2	355	230	2	445	295	2
16,00 - 17,00	223	125	2	246	125	3	257	159	2	355	230	2	445	295	2
17,00 - 18,00	228	130	2	251	130	3	263	165	2	370	245	2	465	310	2
18,00 - 19,00	233	135	2	256	135	3	269	171	2	370	245	2	465	310	2
19,00 - 20,00	238	140	2	261	140	3	275	177	2	385	260	2	490	325	2
20,00 - 21,20	243	145	2	266	145	3	282	184	2	385	260	2	490	325	2
21,20 - 22,40	248	150	2	271	150	3	289	191	2	405	270	2	515	345	2
22,40 - 23,02	253	155	2	276	155	3	296	198	2	405	270	2	515	345	2
23,02 - 23,60	276	155	3	276	155	3	319	198	3	425	270	3	535	345	3
23,60 - 25,00	281	160	3	309	160	4	327	206	3	440	290	3	555	365	3
25,00 - 26,50	286	165	3	314	165	4	335	214	3	440	290	3	555	365	3
26,50 - 28,00	291	170	3	319	170	4	343	222	3	460	305	3	580	385	3
28,00 - 30,00	296	175	3	324	175	4	351	230	3	460	305	3	580	385	3
30,00 - 31,50	301	180	3	329	180	4	360	239	3	480	320	3	610	410	3
31,50 - 31,75	306	185	3	334	185	4	369	248	3	480	320	3	610	410	3
31,75 - 33,50	334	185	4	372	185	5	397	248	4	505	320	4	635	410	4
33,50 - 35,50	339	190	4	377	190	5	406	257	4	530	340	4	665	430	4
35,50 - 37,50	344	195	4	382	195	5	416	267	4	530	340	4	665	430	4
37,50 - 40,00	349	200	4	387	200	5	426	277	4	555	360	4	695	460	4
40,00 - 42,50	354	205	4	392	205	5	436	287	4	555	360	4	695	460	4
42,50 - 45,00	359	210	4	397	210	5	447	298	4	585	385	4	735	490	4
45,00 - 47,50	364	215	4	402	215	5	459	310	4	585	385	4	735	490	4
47,50 - 50,00	369	220	4	407	220	5	470	321	4	605	405	4	765	510	4
50,00 - 50,80	374	225	4	412	225	5									
50,80 - 53,00	412	225	5												
53,00 - 56,00	417	230	5												
56,00 - 60,00	422	235	5												
60,00 - 63,00	427	240	5												
63,00 - 67,00	432	245	5												
67,00 - 71,00	437	250	5												
71,00 - 75,00	442	255	5												
75,00 - 76,20	447	260	5												
76,20 - 80,00	514	260	6												
80,00 - 85,00	519	265	6												
85,00 - 90,00	524	270	6												
90,00 - 95,00	529	275	6												
95,00 - 100,00	534	280	6												



HARTNER

Material de las herramientas HARTNER

Acero alto velocidad

descripción breve	descripción acero	material no.	Aplicación	comparable description in:			
				USA	France	Italy	Great Britain
HSS	S-6-5-2 (DMO5)	1,3343	Material usado para aplicaciones comunes	M 2	Z 90 WDCV 06-05-04-02	HS 6-5-2	BM 2
HSCO HSS-E	S-6-5-2-5 (EMO5CO5)	1,3243	Resistencia a altas temperaturas, especialmente adecuado para trabajar con temperatura elevada o insuficiente refrigerante	M 35	Z 90 WDKCV 06-05-05-04-02	HS 6-5-2-5	BM 35
HSS-E	S-6-5-3 (EMO5V3)	1,3344	Alta resistencia a la fricción y estabilidad del filo de corte, especialmente importante para operaciones de escariado, resistencia incrementada a la alta temperatura	M 3	Z 120 WDCV 06-05-04-03	HS 6-5-3	-
M42 HSS-E	S-2-10-1-8	1,3247	Adecuado para materiales difíciles	M 42	Z 110 DKCWV 09-08-04-02-01	HS 2-9-1-8	BM 42
HSS-E-PM	S-6-5-3-9 ASP 30	-	Alta dureza, gran resistencia térmica y estabilidad de corte, muy densa, estructura muy fina	-	-	-	-

Metal duro

Referencia	Material de la herramienta y recubrimiento		grupo ISO	Aplicación
Plaquita Multiplex	Metal duro H22	FIRE TiN	Grano fino K20-K40	para fundición gris, metales no ferreos y plasticos, aceros y aceros de molde
Broca helicoidal de metal duro	Metal duro		K10-K20	para fundición gris, aleaciones Al, duroplasticos, CFK, GFK
Brocas TS metal duro tipo U	Metal duro	FIRE TiN	Grano fino K/P	para aceros hasta 1200 N/mm ²
Brocas TS metal duro ipo U	Metal duro	FIRE TiN	Grano fino K/P	para fundición gris, aceros aleados y no-aleados, cobre, bronce y plasticos
Brocas TS metal duro tipo U	Metal duro	FIRE TiN	Grano fino K/P	para materiales de viruta corta como hierro fundido, fundición gris
Enteriza MD TS-Drill R	Metal duro	FIRE	Grano fino K/P	para GGV y ADI
Enteriza MD TS-150 GG	Metal duro		Grano fino K	para materiales de viruta corta como fundicion gris, hierro esferoidal con grafito, fundición AISI
Enteriza MD TS 100 T	Metal duro	TiAlN	Grano fino K/P	para acero y fundición
Enteriza MD TS 100 INOX	Metal duro	AlTiN nano	Grano fino K/P	para acero no ferreos
Enteriza MD TS 100 H	Metal duro	TiAlSiN	Grano fino K/P	para aceros templados y de alta dureza, aleaciones especiales

Debido al hecho de que nuestro nuevo K-grados de carburo de ofrecer una gama más amplia de aplicaciones que? Acaba de hacer una distinción entre el grupo K carburo (para sin herramientas) y K / P carburo de grupo (por recubiertos herramientas).



HARTNER

Hartner Material de la herramienta

Metal Duro

Carbide, similar al acero, es menos de una precisa y, de hecho, un término muy general para todo el material de un grupo. Carburo se pueden producir en un número infinito de variaciones con características diferentes a través de la combinación de al menos dos componentes básicos.

Producción metal duro

Carburo consta de una dureza transportista - carburo de tungsteno y tal vez una o más carburos - y un componente extremadamente difíciles: Cobalto (Co). Cobalto, básicamente, sirve como una cementación o aglutinante en el que el carburo de partículas se distribuyen. Con el fin de satisfacer las diversas demandas que, depende de la tarea individual de aplicación, se colocan sobre el carburo, Hartner ofrece una selección de más de 20 diferentes tipos estándar de carburo. Algunos son especialmente duras, otros poseen una muy alta resistencia, algunos de ellos son ultra de grano fino y grueso son otros. Además, a petición del cliente, cualquier grado de carburo concebible puede ser desarrollado y producido como un especial de carburo, por lo que a uso de la palabra.

Nuestra división de carburo tiene un estado de la técnica de laboratorio a su disposición para asegurar que nuestros carburo siempre se corresponde con las necesidades del cliente. A partir de la materia prima al producto acabado, las muestras son objeto de examen con el fin de garantizar y documentar la más alta calidad y fiabilidad del proceso, de conformidad con la certificación.

Características básicas del metal duro

Para las aplicaciones de taladro son importantes las siguientes características:

Rigidez

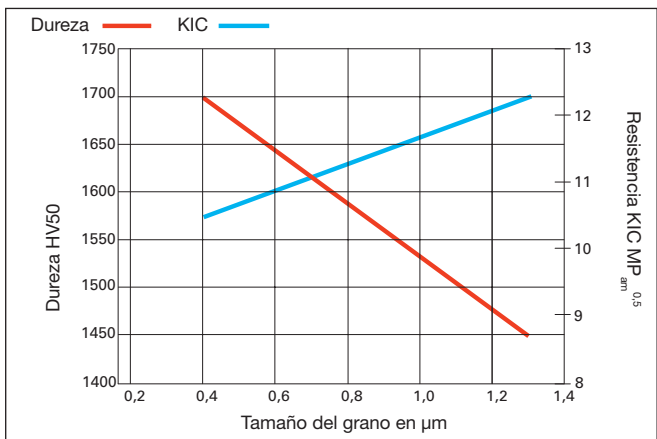
La rigidez es una medida de la energía que se requiere para una fuerza material para deformar. Con carburo se determina por el contenido de cobalto. Cuanto más alto sea el contenido de cobalto, menor es la rigidez del material.

La rigidez de carburo convencional es más del doble en comparación con la de acero. Posteriormente, los agujeros de considerable mayor rectitud puede ser producido con carburo de ejercicios con ejercicios de acero. Sin embargo, este efecto positivo de la rigidez está limitada a causa de la deformación se ven obligadas a la perforación - por ejemplo a través de compensar o desequilibrio - resultado en un aumento de la pesada carga sobre el material. Por lo tanto, más rígida materiales también son más propensos a la rotura.

Dureza

Dureza que se describe como la resistencia de un material contra la penetración de otro. Es evidente, que la herramienta debe ser considerablemente más difícil que la de la pieza, con el fin de no estar expuesto a un desgaste excesivo.

Hay varias posibilidades para ajustar la dureza del carburo: por un lado, por modificar el contenido de cobalto y, por otra parte, variando el tamaño de los granos de carburo. Si el contenido de cobalto se incrementa al mismo tiempo, manteniendo el mismo tamaño de grano, la dureza del carburo se reduce. Sin embargo, si el tamaño de grano se reduce al mismo tiempo, manteniendo el mismo contenido de cobalto, la dureza se incrementa.



Resistencia

Dureza se define como la resistencia del material contra la ofrece el crecimiento de una fisura. Una fisura de alta resistencia es una indicación de "afable" de carburo, que poseen alta resistencia al impacto. Lamentablemente, dureza y tenacidad son los atributos opuestos. Alto contenido de cobalto y / o material grueso duro granos son una fuerte indicación de carburo. Alta resistencia es necesaria cuando un repentino corte o de alta carga se produce durante el proceso de mecanizado. Una alta corte de carga se produce cuando existe un alto coeficiente de fricción entre la herramienta y la pieza. El coeficiente de fricción está determinado por la rugosidad de la superficie de la herramienta y por la relación entre la química de la superficie de la herramienta y la pieza.

Por favor tenga en cuenta, la dureza no es sinónimo de alta resistencia de flexión. Una importante característica y específica para la determinación de la Resistencia a la flexión es la vanguardia de estabilidad.

Estabilidad del corte de la cara

Vanguardia estabilidad se define como la resistencia de la vanguardia en contra de la ruptura de cada uno de los materiales duros o granos más grandes formaciones de grano. La fuerza de plegado proporciona una medida aproximada de la vanguardia estabilidad. Además de la dureza, el tamaño de grano más largo de la frontera dentro de la estructura del material es también de importancia para la Resistencia a la flexión. Posteriormente, la alta resistencia de plegado aumenta la fuerza, sin embargo, los límites de grano largo (= más tosca granos) disminuye.

Reacción

Aunque hoy en día la mayoría de herramientas de carburo están recubiertos, la reacción entre el carburo de tendencia y de trabajo deben ser tomados en consideración. Debido al rápido desgaste de la capa en la vanguardia, una reacción entre la herramienta y la pieza es una posibilidad.

Similares a picaduras en el proceso de corrosión, localizado un ataque puede tener un considerable efecto duradero ya que los daños en una amplia zona. Debido a la alta temperatura de desarrollo a la vanguardia, el cobalto, en particular, reacciona muy rápidamente con metales ferrosos. Otros metales, como el titanio o silicón son propensos a reaccionar con carburo de tungsteno. Por estas razones, el cobalto contenido es de interés en relación con la reacción de la herramienta.



HARTNER

Hartner Material de la herramienta

Metal Duro

Selección de material

Depende de la aplicación específica tarea, los diversos atributos, por lo tanto, ser cuidadosamente equilibrada. Posteriormente, hay varios carburos disponibles. Con el fin de encontrar la correcta carburo para una aplicación específica tarea, varios sistemas de clasificación se experimentó con e introdujo como estándar para simplificar la selección. Ampliamente aceptada es la DIN ISO sistema de clasificación a la norma DIN ISO 513.

Una clasificación carta describe la aplicación de límites y revestimiento de carburo de combinaciones, un número de clasificación se describe la dureza y tenacidad de equilibrio. Un pequeño número de clasificación señales de alta una dureza de la solicitud, un número elevado de la resistencia.

Materiales grupo P

Este grupo incluye metales ferreos, excepto inoxidable y aceros austeníticos, de acuerdo con los grupos de aplicación 01-50.

Materiales grupo M

Grupo M incluye los aceros inoxidables austeníticos, austenítico / aceros de ferrítica y de fundición de acero. El grupo se subdivide en grupos de la aplicación 01 - 40, depende de la reducción de la carga. En Hartner, P y M aplicaciones se consiguen con K recubierto de carburo.

Materiales grupo K

Grupo K incorpora todas las formas de fundición de hierro gris y fundición de hierro maleable. Dependientes en la reducción de la carga que se subdivide en grupos de la aplicación 01 - 40.

Materiales grupo S

Resistentes al calor "super aleaciones" a base de hierro, el níquel o el cobalto, así como las aleaciones de titanio se incluyen en el grupo S. Se divide en grupos de la aplicación 01 - 30, depende de la reducción de la carga.

Materiales grupo N

Este grupo incluye a los metales no ferrosos, especialmente aluminio y aleaciones de metales no-materiales. El grupo se subdivide en grupos de la aplicación 01 - 40, depende de la reducción de la carga.

Materiales grupo H

Este grupo incluye difícil mecanizado de aceros endurecidos. La aplicación grupos de 01 a 30, dependiendo de la carga de corte.

Muchos grados de carburo de cubrir el amplio espectro de los principales grupos de material, sobre todo cuando recubiertos herramientas se apliquen. Por ejemplo, la mayoría de las FUEGO recubierto de carburo de ejercicios en la gama Hartner se asignan a los principales grupos de materiales y P. K.

Grado individual Hartner

En la tabla siguiente se enumeran las más importantes de los carburos de que se dispone de Hartner ex-almacén para aplicaciones generales. Además los grados de carburo están disponibles bajo petición. En más del 80% de las solicitudes sabe que Hartner, los resultados de DK 460 UF grado de carburo de herramientas junto con un revestimiento especialmente adaptados no puede ser superado por cualquier otro carburo de los grados, incluidos los revestidos herramientas. Esto y la disponibilidad del material ex-almacén simplificar enormemente la herramienta de selección. Para más información acerca de la aplicación de otros grados de carburo póngase en contacto con nuestro ingenieros técnicos.

Descripción	Co (M%)	tamaño del grano de Tungsteno	Dureza (HV)	Clasificación ISO	Características
DK460UF	10	0,5	1620	K20-K40 recubierto P, M20-M40, H,S, N25	Un carburo de grado con una amplia gama de aplicaciones posibilidades. It se aplica, en su mayoría revestidas, para el mecanizado de acero, aleaciones Al suave, de hierro fundido, así como "super aleaciones", como Inconel 718. Esta calidad es la columna vertebral de nuestra producción de carburo.
DK255F	8	0,7	1720	K20 recubrimiento P, M, H, S, N20	La serie se recomienda para el mecanizado duro, el de mecanizado de alta resistencia a la tracción de la fundición gris y duro Alsi-aleaciones. Mecanizado en seco es posible. Una aplicación de revestimiento es preferible.
DK120	6	1,3	1620	K15 recubrimiento N15	El grado es especialmente recomendado para aplicaciones con recubrimiento de diamante.
DK120UF	7	0,5	1850	K05	Grado ultra fino de alta resistencia al desgaste, disponible únicamente para maquinas duras.
DK400N	10	0,7	1580	K35M recubrimiento P, M, S. N35M	Recomendado para el mecanizado de metales resistentes al calor.



HARTNER

Recubrimientos

Descripción corta

	T	A	A	C	DLC	F	Diamante
	Recubiertas de TiN	Recubiertas de TiAIN	Recubiertas de AlTiN / AlTiN	Recubiertas de TiCN	Recubiertas de DLC	Recubiertas de FIRE	Recubiertas de Diamante
Procesos	PVD	PVD	PVD	PVD	PVD	PVD	CVD
Temperatura máxima del recubrimiento (°C)	400° – 500°	400° – 500°	400° – 500°	400° – 500°	< 150°	400° – 500°	> 700°
Sustrato	aceros de alta vel., MD, cerámica	aceros de alta vel., MD, cerámica	aceros de alta velocidad, MD	aceros de alta vel., MD, cerámica	carburos, cermet, HSS	aceros de alta vel., MD, cerámica	carburos, cermet
Capas	1	1	1	1	de una capa	6	de una capa
Color	oro (amarillo)	violeta oscuro	violeta oscuro	violeta grisáceo	negro	violeta oscuro	gris-negro
Dureza (HV 0,05)	2200	3300	3400	3000	> 6000	3000	> 8000
Temperatura de la aplicación (°C)	< 600°	< 800°	< 900°	< 450°	< 500°	< 800°	< 600°
Transferencia de calor (kW/mK)	0,07	0,05	0,05	0,1	0,01	0,05	> 0,1
Tipo de mecanizado	universal	torneado, taladrado	universal	fresado, taladrado, roscado	taladrado, roscado, escariado	universal	torneado, taladrado, fresado
Material recomendado a trabajar	universal	aceros, fundición	aceros inoxidables, aceros templados, aleaciones con base de níquel	aceros, aceros con alta resistencia a la tensión, Inconel, Monel	aleaciones maleables de Al, aleac. fund. de Al ≤12% Si, metales no ferríticos	universal	<u>Diamante C:</u> grafito <u>Diamante E:</u> fibre reinforced plastics <u>Diamante M:</u> AlSi, MMC
Características	rentable	resistente a la temperatura	mecanizado duro (>52 HRC, únicamente metal duro) mecanizado HSC	mecanizado en seco, corte inter-rumpido	minimises the tendency for residues to build up	aplicación de gama de anchos	for highly abrasive materials

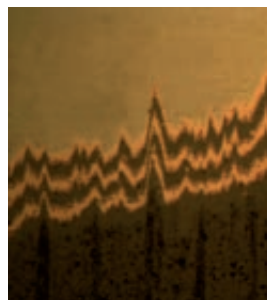
Comparación de capas

de una capa



Ejemplo
Recubiertas de TiAlN

multi-capa



Ejemplo
Recubiertas de FIRE



HARTNER

Recubrimientos

Descripción corta

	M	TiAlZrN	AlTiZrN	Y	TiSiN	ZrN
	Recubiertas de MolyGlide	Recubiertas de TiAlZrN	Recubiertas de AlTiZrN	Recubiertas de TiAlSiN	Recubiertas de TiSiN	Recubiertas de ZrN
Procesos	PVD	PVD	PVD	PVD	PVD	PVD
Temperatura máxima del recubrimiento (°C)	100° – 150°	400° – 500°	400° – 500°	400° – 500°	450° – 500°	400° – 500°
Sustrato	aceros de alta vel., MD, cerámica	aceros rápidos, carburos, cermet	aceros rápidos, carburos, cermet	aceros de alta vel., MD, cerámica	aceros rápidos, (roscado), carburos, cermet	aceros rápidos, carburos, cermet
Capas	1	7	nano-capa	nanocomposite	multi-capa, nanocomposite	multi-capa
Color	gris	oro pálido	oro pálido	bronce-rojo	copper	oro pálido
Dureza (HV 0,05)	20 – 50	3300	3400	5500	4000	2500
Temperatura de la aplicación (°C)	< 800°	< 800°	< 800°	< 800°	< 800°	< 700°
Transferencia de calor (kW/mK)	< 0,1	0,05	0,05	0,03	0,03	0,04
Tipo de mecanizado	taladrado, roscado, escariado, fresado	taladrado, fresado, roscado	taladrado, roscado	taladrado, fresado, escariado	taladrado, fresado, escariado	taladrado, fresado, Dekor
Material recomendado a trabajar	Al, AlSi, aceros, aleaciones especiales	universal	aceros inoxidables, aleaciones con base de níquel	hierro fundido, aceros endurecidos, aceros con alta resistencia a la tensión, CFK	universal, especialmente aceros-C, aceros Mn, aceros con resistencia térmica	titanio, aluminio, aleaciones con base de níquel, aceros inoxidables
Características	mecanizado en seco, MMS	desalajo de viruta mejorada	poca fricción	aplicación de gama de anchos	baja tendencia a adherirse	baja tendencia a adherirse



Procesos para recubrimientos

○ Brillante

Debido a sus buenas propiedades básicamente, de acero de alta velocidad y herramientas de carburo son ofrecidos sin que la superficie tratada, es decir, en un acabado brillante.

Procesos para recubrimientos

Para aplicaciones especiales es conveniente para aumentar la durabilidad y reducir la resistencia al deslizamiento y tendencia de la soldadura en frío especial por los procesos de refinado de la superficie. Los siguientes procesos de refinación siguen siendo de menor importancia. En general, mucho mejores resultados se logran con objetos duros o blandos recubiertos herramientas.

● Vapor nitrurado

◐ fase nitrurada

Nitruración es un medio de aumentar la durabilidad de las herramientas. Este acabado se recomienda para el mecanizado de fundición de hierro gris, aluminio con un alto contenido de silicio, plásticos, aceros con un alto contenido de perlita etc.. Nuestras herramientas son nitrurado utilizando diferentes procesos orientados a la aplicación.

● Sulfanizado

De vapor templado herramientas también ofrecen una reducción en el deslizamiento resistencia. Así soldadura fría que se produce, por ejemplo, durante el mecanizado de aceros que tienen un bajo contenido de carbono, se pueden evitar más económicamente. De vapor templado son sólo herramientas adecuadas para materiales ferrosos.

Recubrimientos Hartner

A Recubrimiento A o TiAlN (Titanaluminiumnitrid)

Revestimiento de color: violeta
El revestimiento monocapa TiAlN es adecuado para abrasivo de carburo de operaciones con instrumentos debido a su alta dureza y resistencia química, por ejemplo, duro y mecanizado de alta velocidad de corte (HSC).

A Recubrimiento Super A o AlTiN (Aluminiumtitannitrid) **a** Recubrimiento nanoA o AlTiN nano (Aluminiumtitannitrid)

Revestimiento de color: gris-violeta
El bien establecido un recubrimiento se ha desarrollado en Hartner. Mediante la optimización de la estructura, química y propiedades mecánicas de la nueva Super-A un revestimiento extremadamente caliente de alta dureza, muy buena resistencia a la oxidación y excelente adherencia de revestimiento se han logrado. Este recubrimiento se utiliza exclusivamente en el carburo de herramientas de corte y es ideal para máquina difícil de materiales aeroespaciales, tales como las aleaciones de titanio, Inconel, así como el mecanizado de materiales de acero endurecido (> 52 HRC) y aplicaciones de HSC.

C Recubrimiento C o TiCN (Titanarbonnitrid)

Revestimiento de color: gris
Fin molinos y expuestos a toques de alta carga mecánica están recubiertos con TiCN. Con respecto a la alta dureza y tenacidad de TiCN revestimiento de las herramientas de mecanizado de ofrecer sus buenos resultados con el operativo de corte interrumpido

F Recubrimiento F o FIRE/nanoFIRE

Revestimiento de color: violeta
Este TiAlN / TiN recubrimiento multicapa se aplica a FSS y de carburo de ejercicios. Ofrece excelente resistencia al desgaste en las operaciones de perforación y de alta resistencia al calor. Además de las aplicaciones convencionales húmedo este revestimiento es ideal para la lubricación mínima de mecanizado en seco y, a menudo combinado con MolyGlide para optimizar el funcionamiento en el desgaste y la mejora de la resistencia a la mortificante.

T Recubrimiento T o TiN (Titanitrid)

Revestimiento de color: amarillo-oro
La monocapa de revestimiento de nitruro de titanio es estándar para el FSS y herramientas de carburo. Se utiliza para la perforación, la grabación y las operaciones de molienda. Sin embargo, la mayoría de aplicación es el mecanizado de acero.

M Recubrimiento M o MolyGlide®

Revestimiento de color: gris claro
MolyGlide es un delgado, minimizando la fricción de recubrimiento para aplicaciones que requieren un mínimo de coeficiente de fricción, por ejemplo, seco o mínima cantidad de lubricación (MQL) mecanizado. Además, este recubrimiento ofrece resistencia a la mortificante, cuando falla la lubricación mínima.



Procesos para recubrimientos

Y Recubrimiento Y o TiAlSiN

Revestimiento de color: bronce
Este TiAlSiN recubrimiento multicapa es muy duro y resistente a las altas temperaturas. Se utiliza especialmente para el mecanizado de aceros con alta resistencia, aceros templados y hierro fundido.

AlTiZrN-recubrimiento

Color del recubrimiento: dorado pálido
Especialmente apropiado para el mecanizado de acero inoxidable con altas exigencias de desalojo de la viruta.

TiSiN-recubrimiento

Color del recubrimiento: rojo cobre
Alta resistencia térmica por recubrimiento nanocomposite para el mecanizado de aceros al carbono, aceros automáticos y aceros mangánicos. Reduce el desgaste por carbono. Además muy apropiado para mecanizar aceros cálidos y duros. Para taladrar y fresar en herramientas de metal duro apropiado con limitaciones.

ZrN-recubrimiento

Color del recubrimiento: dorado pálido
Capa especialmente apropiada para el mecanizado de titanio, aleaciones básicas de níquel y aluminios más duros y aleaciones de fundición de aluminio de hasta el 12% de Si. Se minimiza la viruta pegada sobre los cortes y se optimiza el desalojo de la viruta.

DLC-recubrimiento

Color recubrimiento: negro
Este recubrimiento al carbono de alta dureza (DLC-diamond-like-carbon) reduce la adhesión de viruta en el mecanizado de aleaciones de aluminio y permite así un control preciso de dimensiones y una buena calidad superficial en la pieza.

Recubrimiento diamante

Color del recubrimiento: gris-negro
Recubrimiento muy duro de diamante para trabajar grafito, plásticos con fibra y aleaciones de fundición de aluminio con más del 12% de Si. Alta resistencia al desgaste y poca creación de viruta pegada en los cortes.

TiAlZrN-recubrimiento

Color del recubrimiento: oro pálido
Desarrollo del recubrimiento FIRE para el mecanizado de aceros en general. La aplicación empieza donde FIRE tiene problemas de desalojo de viruta.



tabla de conversión: pulgadas / milímetros

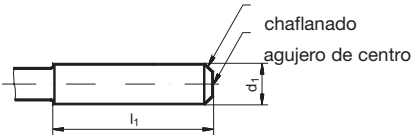
desde 1/64 a 11 63/64

Partes de una pulgada	pulgadas												
	0	1	2	3	4	5	6	7	8	9	10	11	
	mm												
0	0	25,40 0	50,80 0	76,20	101,60 0	127,00 0	152,40 0	177,80 0	203,20 0	228,60 0	254,00 0	279,40 0	
1/ 64	0,015 625	0,396 9	25,796 9	51,196 9	76,596	101,996 9	127,396 9	152,796 9	178,196 9	203,596 9	228,996 9	254,396 9	279,796 9
1/ 32	0,031 25	0,793 8	26,193 8	51,593 8	76,993	102,393 8	127,793 8	153,193 8	178,593 8	203,993 8	229,393 8	254,793 8	280,193 8
3/ 64	0,046 875	1,19 6	26,59 6	51,99 6	77,39	102,79 6	128,19 6	153,59 6	178,99 6	204,39 6	229,79 6	255,19 6	280,59 6
1/ 16	0,062 5	1,587 5	26,987 5	52,387 5	77,787	103,187 5	128,587 5	153,987 5	179,387 5	204,787 5	230,187 5	255,587 5	280,987 5
5/ 64	0,078 125	1,984 4	27,384 4	52,784 4	78,181	103,584 4	128,984 4	154,384 4	179,784 4	205,184 4	230,584 4	255,984 4	281,384 4
3/ 32	0,093 75	2,381 2	27,781 2	53,181 2	78,581	103,981 2	129,381 2	154,781 2	180,181 2	205,581 2	230,981 2	256,381 2	281,781 2
7/ 64	0,109 375	2,778 1	28,178 1	53,578 1	78,978	104,378 1	129,778 1	155,178 1	180,578 1	205,978 1	231,378 1	256,778 1	282,178 1
1/ 8	0,125	3,175 0	28,575 0	53,975 0	79,375	104,775 0	130,175 0	155,575 0	180,975 0	206,375 0	231,775 0	257,175 0	282,575 0
9/ 64	0,14 625	3,571 9	28,971 9	54,371 9	79,771	105,171 9	130,571 9	155,971 9	181,371 9	206,771 9	232,171 9	257,571 9	282,971 9
5/ 32	0,156 25	3,968 8	29,368 8	54,768 8	80,168	105,568 8	130,968 8	156,368 8	181,768 8	207,168 8	232,568 8	257,968 8	283,368 8
11/ 64	0,171 875	4,365 6	29,765 6	55,165 6	80,565	105,965 6	131,365 6	156,765 6	182,165 6	207,565 6	232,965 6	258,365 6	283,765 6
3/ 16	0,187 5	4,762 5	30,162 5	55,562 5	80,962	106,362 5	131,762 5	157,162 5	182,562 5	207,962 5	233,362 5	258,762 5	284,162 5
13/ 64	0,203 125	5,159 4	30,559 4	55,959 4	81,359	106,759 4	132,159 4	157,559 4	182,959 4	208,359 4	233,759 4	259,159 4	284,559 4
7/ 32	0,218 75	5,556 2	30,956 2	56,356 2	81,756	107,156 2	132,556 2	157,956 2	183,356 2	208,756 2	234,156 2	259,556 2	284,956 2
15/ 64	0,234 375	5,953 1	31,353 1	56,753 1	82,153	107,553 1	132,953 1	158,353 1	183,753 1	209,153 1	234,553 1	259,953 1	285,353 1
1/ 4	0,25	6,35 0	31,75 0	57,15 0	82,55	107,95 0	133,35 0	158,75 0	184,15 0	209,55 0	234,95 0	260,35 0	285,75 0
17/ 64	0,265 625	6,746 9	32,146 9	57,546 9	82,946	108,346 9	133,746 9	159,146 9	184,546 9	209,946 9	235,346 9	260,746 9	286,146 9
9/ 32	0,281 25	7,143 8	32,543 8	57,943 8	83,343	108,743 8	134,143 8	159,543 8	184,943 8	210,343 8	235,743 8	261,143 8	286,543 8
19/ 64	0,296 875	7,54 6	32,94 6	58,34 6	83,74	109,14 6	134,54 6	159,94 6	185,34 6	210,74 6	236,14 6	261,54 6	286,94 6
5/ 16	0,312 5	7,937 5	33,337 5	58,737 5	84,137	109,537 5	134,937 5	160,337 5	185,737 5	211,137 5	236,537 5	261,937 5	287,337 5
21/ 64	0,328 125	8,334 4	33,734 4	59,134 4	84,534	109,934 4	135,334 4	160,734 4	186,134 4	211,534 4	236,934 4	262,334 4	287,734 4
11/ 32	0,343 75	8,731 2	34,131 2	59,531 2	84,931	110,331 2	135,731 2	161,131 2	186,531 2	211,931 2	237,331 2	262,731 2	288,131 2
23/ 64	0,359 375	9,128 1	34,528 1	59,928 1	85,328	110,728 1	136,128 1	161,528 1	186,928 1	212,328 1	237,728 1	263,128 1	288,528 1
3/ 8	0,375	9,525 0	34,925 0	60,325 0	85,725	111,125 0	136,525 0	161,925 0	187,325 0	212,725 0	238,125 0	263,525 0	288,925 0
25/ 64	0,39 625	9,921 9	35,321 9	60,721 9	86,121	111,521 9	136,921 9	162,321 9	187,721 9	213,121 9	238,521 9	263,921 9	289,321 9
13/ 32	0,406 25	10,318 8	35,718 8	61,118 8	86,518	111,918 8	137,318 8	162,718 8	188,118 8	213,518 8	238,918 8	264,318 8	289,718 8
27/ 64	0,421 875	10,715 6	36,115 6	61,515 6	86,915	112,315 6	137,715 6	163,115 6	188,515 6	213,915 6	239,315 6	264,715 6	290,115 6
7/ 16	0,437 5	11,112 5	36,512 5	61,912 5	87,312	112,712 5	138,112 5	163,512 5	188,912 5	214,312 5	239,712 5	265,112 5	290,512 5
29/ 64	0,453 125	11,509 4	36,909 4	62,309 4	87,709	113,109 4	138,509 4	163,909 4	189,309 4	214,709 4	240,109 4	265,509 4	290,909 4
15/ 32	0,468 75	11,906 2	37,306 2	62,706 2	88,106	113,506 2	138,906 2	164,306 2	189,706 2	215,106 2	240,506 2	265,906 2	291,306 2
31/ 64	0,484 375	12,303 1	37,703 1	63,103 1	88,503	113,903 1	139,303 1	164,703 1	190,103 1	215,503 1	240,903 1	266,303 1	291,703 1
1/ 2	0,5	12,70 0	38,10 0	63,50 0	88,90	114,30 0	139,70 0	165,10 0	190,50 0	215,90 0	241,30 0	266,70 0	292,10 0
33/ 64	0,515 625	13,096 9	38,496 9	63,896 9	89,296	114,696 9	140,096 9	165,496 9	190,896 9	216,296 9	241,696 9	267,096 9	292,496 9
17/ 32	0,531 25	13,493 8	38,893 8	64,293 8	89,693	115,093 8	140,493 8	165,893 8	191,293 8	216,693 8	242,093 8	267,493 8	292,893 8
35/ 64	0,546 875	13,89 6	39,29 6	64,69 6	90,090	115,49 6	140,89 6	166,29 6	191,69 6	217,096 6	242,49 6	267,89 6	293,29 6
9/ 16	0,562 5	14,287 5	39,687 5	65,087 5	90,487	115,887 5	141,287 5	166,687 5	192,087 5	217,487 5	242,887 5	268,287 5	293,687 5
37/ 64	0,578 125	14,684 4	40,084 4	65,484 4	90,884	116,284 4	141,684 4	167,084 4	192,484 4	217,884 4	243,284 4	268,684 4	294,084 4
19/ 32	0,593 75	15,081 2	40,481 2	65,881 2	91,281	116,681 2	142,081 2	167,481 2	192,881 2	218,281 2	243,681 2	269,081 2	294,481 2
39/ 64	0,609 375	15,478 1	40,878 1	66,278 1	91,678	117,078 1	142,478 1	167,878 1	193,278 1	218,678 1	244,078 1	269,478 1	294,878 1
5/ 8	0,625	15,875 0	41,275 0	66,675 0	92,075	117,475 0	142,875 0	168,275 0	193,675 0	219,075 0	244,475 0	269,875 0	295,275 0
41/ 64	0,64 625	16,271 9	41,671 9	67,071 9	92,471	117,871 9	143,271 9	168,671 9	194,071 9	219,471 9	244,871 9	270,271 9	295,671 9
21/ 32	0,656 25	16,668 8	42,068 8	67,468 8	92,868	118,268 8	143,668 8	169,068 8	194,468 8	219,868 8	245,268 8	270,668 8	296,068 8
43/ 64	0,671 875	17,065 6	42,465 6	67,865 6	93,265	118,665 6	144,065 6	169,465 6	194,865 6	220,265 6	245,665 6	271,065 6	296,465 6
11/ 16	0,687 5	17,462 5	42,862 5	68,262 5	93,662	119,062 5	144,462 5	169,862 5	195,262 5	220,662 5	246,062 5	271,462 5	296,862 5
45/ 64	0,703 125	17,859 4	43,259 4	68,659 4	94,059	119,459 4	144,859 4	170,259 4	195,659 4	221,059 4	246,459 4	271,859 4	297,259 4
23/ 32	0,718 75	18,256 2	43,656 2	69,056 2	94,456	119,856 2	145,256 2	170,656 2	196,056 2	221,456 2	246,856 2	272,256 2	297,656 2
47/ 64	0,734 375	18,653 1	44,053 1	69,453 1	94,853	120,253 1	145,653 1	171,053 1	196,453 1	221,853 1	247,253 1	272,653 1	298,053 1
3/ 4	0,75	19,050 0	44,45 0	69,85 0	95,25	120,65 0	146,050 0	171,45 0	196,85 0	222,25 0	247,65 0	273,050 0	298,45 0
49/ 64	0,765 625	19,446 9	44,846 9	70,246 9	95,646	121,046 9	146,446 9	171,846 9	197,246 9	222,646 9	248,046 9	273,446 9	298,846 9
25/ 32	0,781 25	19,843 8	45,243 8	70,643 8	96,043	121,443 8	146,843 8	172,243 8	197,643 8	223,043 8	248,443 8	273,843 8	299,243 8
51/ 64	0,796 875	20,24 6	45,64 6	70,040 6	96,44	121,84 6	147,24 6	172,64 6	198,040 6	223,44 6	248,84 6	274,24 6	299,64 6
13/ 16	0,812 5	20,637 5	46,037 5	71,437 5	96,837	122,237 5	147,637 5	173,037 5	198,437 5	223,837 5	249,237 5	274,637 5	300,037 5
53/ 64	0,828 125	21,034 4	46,434 4	71,834 4	97,234	122,634 4	148,034 4	173,434 4	198,834 4	224,234 4	249,634 4	275,034 4	300,434 4
27/ 32	0,843 75	21,431 2	46,831 2	72,231 2	97,631	123,031 2	148,431 2	173,831 2	199,231 2	224,631 2	250,031 2	275,431 2	300,831 2
55/ 64	0,859 375	21,828 1	47,228 1	72,628 1	98,028	123,428 1	148,828 1	174,228 1	199,628 1	225,028 1	250,428 1	275,828 1	301,228 1
7/ 8	0,875	22,225 0	47,625 0	73,025 0	98,425	123,825 0	149,225 0	174,625 0	200,025 0	225,425 0	250,825 0	276,225 0	301,625 0
57/ 64	0,89 625	22,621 9	48,021 9	73,421 9	98,821	124,221 9	149,621 9	175,021 9	200,421 9	225,821 9	251,221 9	276,621 9	302,021 9
29/ 32	0,906 25	23,018 8	48,418 8	73,818 8	99,218	124,618 8	150,018 8	175,418 8	200,818 8	226,218 8	251,618 8	277,018	

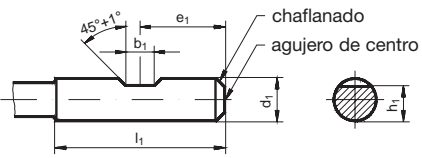
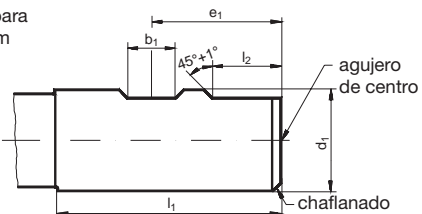


Diseño del mango para trabajar a altas velocidades según DIN 1835

Forma A, plano

Dimensiones en mm	d_1 h8	l_1 $+2$ 0	d_1 h8	l_1 $+2$ 0	d_1 h8	l_1 $+2$ 0
	3	28	10	40	32	60
	4	28	12	45	40	70
	5	28	16	48	50	80
	6	36	20	50	63	90
	8	36	25	56		

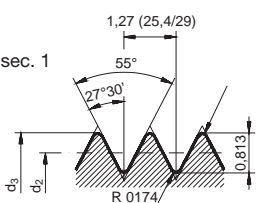
Forma B, con plano de arrastre

Dimensiones en mm	d_1 h6	b_1 $+0.05$ 0	e_1 0 -1	h_1 h13	l_1 $+2$ 0	l_2 $+1$ 0	agujero central forma R DIN 332 sección 1
con un plano para $d_1 = 6 \dots 20$ mm	6	4,2	18	4,8	36	-	1.6x2.5
	8	5,5	18	6,6	36	-	1.6x3.35
	10	7	20	8,4	40	-	1.6x3.35
	12	8	22,5	10,4	45	-	1.6x3.35
	16	10	24	14,2	48	-	2.0x4.25
	20	11	25	18,2	50	-	2.5x5.3
con dos plano para $d_1 = 25 \dots 63$ mm	25	12	32	23	56	17	2.5x5.3
	32	14	36	30	60	19	3.15x6.7
	40	14	40	38	70	19	3.15x6.7
	50	18	45	47,8	80	23	3.15x6.7
	63	18	50	60,8	90	23	3.15x6.7

Forma D, mango atornillado

Dimensiones en mm	d_1 h8	d_3 tol. zone	d_2 tol. zone	l_1 $+2$ 0	l_3 $+2$ 0	agujero de centro forma R DIN 332 part 1
	6	5,9 0 -0,1	5,087 0 -0,1	36	10	1.6 x 2.5
	10	9,9 0 -0,1	9,087 0 -0,1	40	10	1.6 x 3.35
	12	11,9 0 -0,1	11,087 0 -0,1	45	10	1.6 x 3.35
	16	15,9 0 -0,1	15,087 0 -0,1	48	10	2.0 x 4.25
	20	19,9 0 -0,15	19,087 0 -0,15	50	15	2.5 x 5.3
	25	24,9 0 -0,15	24,087 0 -0,15	56	15	2.5 x 5.3
	32	31,9 0 -0,15	31,087 0 -0,15	60	15	3.15 x 6.7

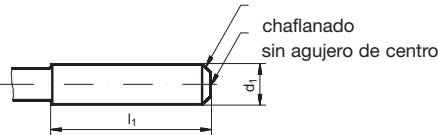
Detallado Z
sección transversal
rosca DIN-ISO 228 sec. 1





Diseño del mango para trabajar a altas velocidades según DIN 6535

Forma HA, plain

Dimensiones en mm	d_1 h6	l_1 $+2$ 0	d_1 h6	l_1 $+2$ 0	d_1 h6	l_1 $+2$ 0
	2	28	8	36	18	48
	3	28	10	40	20	50
	4	28	12	45	25	56
	5	28	14	45	32	60
	6	36	16	48		

Forma HB, con plano de arrastre

Dimensiones en mm	d_1 h6	b_1 $+0,05$ 0	e_1 0 -1	h_1 h11	l_1 $+2$ 0	l_2 $+1$ 0
con un plano para $d_1 = 6 \dots 20$ mm	6	4,2	18	5,1	36	-
	8	5,5	18	6,9	36	-
	10	7	20	8,5	40	-
	12	8	22,5	10,4	45	-
	14	8	22,5	12,7	45	-
	16	10	24	14,2	48	-
	18	10	24	16,2	48	-
	20	11	25	18,2	50	-
con dos plano para $d_1 = 25$ and 32 mm	25	12	32	23	56	17
	32	14	36	30	60	19

Forma HE, Forma HE, plano inclinado sin conducto para el refrigerante*

* Diseño: Mangos cilíndricos según DIN 6535 están disponibles con o sin conductos para el refrigerante. Aplicaciones y detalles en la sección correspondiente.

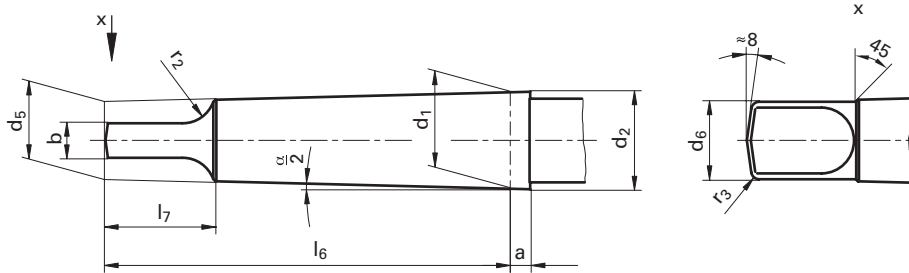
	d_1 h6	(b_2) ≈	(b_2)	h_2 h13	(h_2)	l_1 $+2$ 0	l_4 0 -1	l_5 nom. size	r_2 min.
para $d_1 = 6 \dots 20$ mm	6	4,3	-	5,1	-	36	25	18	1,2
	8	5,5	-	6,9	-	36	25	18	1,2
	10	7,1	-	8,5	-	40	28	20	1,2
	12	8,2	-	10,4	-	45	33	22,5	1,2
	14	8,1	-	12,7	-	45	33	22,5	1,2
	16	10,1	-	14,2	-	48	36	24	1,6
	18	10,8	-	16,2	-	48	36	24	1,6
	20	11,4	-	18,2	-	50	38	25	1,6
para $d_1 = 25$ and 32 mm	25	13,6	9,3	23,0	24,1	56	44	32	1,6
	32	15,5	9,9	30,0	31,2	60	48	35	1,6



HARTNER

Diseñado en cono morse con plano según DIN 228 forma B

Mango DIN 228 forma B grandeza	a	tol. zone	b h13	d1	d ₂ ≈	d ₅ ≈	d ₆ max.	l ₆ -1	l ₇ max.	r ₂ max.	r ₃ ≈	$\frac{\alpha}{2}$
MT 0	3,0	$+1,2$ 0	3,9	9,045	9,2	6,1	6	56,5	10,5	4	1	1°29'27"
MT 1	3,5	$+1,4$ 0	5,2	12,065	12,2	9,0	8,7	62	13,5	5	1,2	1°25'43"
MT 2	5,0	$+1,4$ 0	6,3	17,78	18,0	14,0	13,5	75	16	6	1,6	1°25'50"
MT 3	5,0	$+1,7$ 0	7,9	23,825	24,1	19,1	18,5	94	20	7	2	1°26'16"
MT 4	6,5	$+1,9$ 0	11,9	31,267	31,6	25,2	24,5	117,5	24	8	2,5	1°29'15"
MT 5	6,5	$+1,9$ 0	15,9	44,399	44,7	36,5	35,7	149,5	29	10	3	1°30'26"
MT 6	8,0	$+2,3$ 0	19,0	63,348	63,8	52,4	51,0	210,0	40	13	4	1°29'36"





Diámetros de pretaladro para el fresado de roscas

Roscas métrica normalizada ISO DIN 13

Diá. nom.	Paso P mm	Ø d. pre-taladr. p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas 6H* min. mm max. mm	
M 1	0,25	0,75	0,729	0,785
M 1,1	0,25	0,85	0,829	0,885
M 1,2	0,25	0,95	0,929	0,985
M 1,4	0,30	1,10	1,075	1,142
M 1,6	0,35	1,25	1,221	1,321
M 1,8	0,35	1,45	1,421	1,521
M 2	0,40	1,60	1,567	1,679
M 2,2	0,45	1,75	1,713	1,838
M 2,5	0,45	2,05	2,013	2,138
M 3	0,50	2,50	2,459	2,599
M 3,5	0,60	2,90	2,850	3,010
M 4	0,70	3,30	3,242	3,422
M 4,5	0,75	3,70	3,688	3,878
M 5	0,80	4,20	4,134	4,334
M 6	1,00	5,00	4,917	5,153
M 7	1,00	6,00	5,917	6,153
M 8	1,25	6,80	6,647	6,912
M 9	1,25	7,80	7,647	7,912
M 10	1,50	8,50	8,376	8,676
M 11	1,50	9,50	9,376	9,676
M 12	1,75	10,20	10,106	10,441
M 14	2,00	12,00	11,835	12,210
M 16	2,00	14,00	13,835	14,210
M 18	2,50	15,50	15,294	15,744
M 20	2,50	17,50	17,294	17,744
M 22	2,50	19,50	19,294	19,744
M 24	3,00	21,00	20,752	21,252
M 27	3,00	24,00	23,752	24,252
M 30	3,50	26,50	26,211	26,771
M 33	3,50	29,50	29,211	29,771
M 36	4,00	32,00	31,670	32,270
M 39	4,00	35,00	34,670	35,270
M 42	4,50	37,50	37,129	37,799
M 45	4,50	40,50	40,129	40,799
M 48	5,00	43,00	42,587	43,297
M 52	5,00	47,00	46,587	47,297
M 56	5,50	50,50	50,046	50,796

Roscas métrica fina DIN 13

Diá. x nom.	Paso P mm	Ø d. pre-taladr. p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas 6H* min. mm max. mm	
M 2,5 x 0,35	2,15	2,121	2,221	
M 3,0 x 0,35	2,65	2,621	2,721	
M 3,5 x 0,35	3,15	3,121	3,221	
M 4,0 x 0,50	3,50	3,459	3,599	
M 4,5 x 0,50	4,00	3,959	4,099	
M 5,0 x 0,50	4,50	4,459	4,599	
M 5,5 x 0,50	5,00	4,959	5,099	
M 6,0 x 0,75	5,20	5,188	5,378	
M 7,0 x 0,75	6,20	6,188	6,378	
M 8,0 x 0,50	7,50	7,459	7,599	
M 8,0 x 0,75	7,20	7,188	7,378	
M 8,0 x 1,00	7,00	6,917	7,153	
M 9,0 x 0,75	8,20	8,188	8,378	
M 9,0 x 1,00	8,00	7,917	8,153	
M 10 x 0,75	9,20	9,188	9,378	
M 10 x 1,00	9,00	8,917	9,153	
M 10 x 1,25	8,80	8,647	8,912	
M 11 x 0,75	10,20	10,188	10,378	
M 11 x 1,00	10,00	9,917	10,153	
M 12 x 1,00	11,00	10,917	11,153	
M 12 x 1,25	10,80	10,647	10,912	
M 12 x 1,50	10,50	10,376	10,676	
M 14 x 1,00	13,00	12,917	13,153	
M 14 x 1,25	12,80	12,647	12,912	
M 14 x 1,50	12,50	12,376	12,676	
M 15 x 1,00	14,00	13,917	14,153	
M 15 x 1,50	13,50	13,376	13,676	
M 16 x 1,00	15,00	14,917	15,153	
M 16 x 1,25	14,80	14,647	14,912	
M 16 x 1,50	14,50	14,376	14,676	
M 17 x 1,00	16,00	15,917	16,153	
M 17 x 1,50	15,50	15,376	15,676	
M 18 x 1,00	17,00	16,917	17,153	
M 18 x 1,50	16,50	16,376	16,676	
M 20 x 1,00	19,00	18,917	19,153	
M 20 x 1,50	18,50	18,376	18,676	
M 20 x 2,00	18,00	17,835	18,210	
M 22 x 1,00	21,00	20,917	21,153	

Roscas UNC ASME B1.1

Diá. nom.	hilos por pulgada	Ø d. pre-taladr. p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas 2B min. mm max. mm	
Nr. 1 - 64	1,55	1,425	1,580	
Nr. 2 - 56	1,85	1,694	1,872	
Nr. 3 - 48	2,10	1,941	2,146	
Nr. 4 - 40	2,35	2,157	2,385	
Nr. 5 - 40	2,65	2,487	2,698	
Nr. 6 - 32	2,85	2,642	2,896	
Nr. 8 - 32	3,50	3,302	3,531	
Nr. 10 - 24	3,90	3,683	3,937	
Nr. 12 - 24	4,50	4,343	4,597	
1/4 - 20	5,10	4,978	5,258	
5/16 - 18	6,60	6,401	6,731	
3/8 - 16	8,00	7,798	8,153	
7/16 - 14	9,40	9,144	9,550	
1/2 - 13	10,80	10,592	11,024	
9/16 - 12	12,20	11,989	12,446	
5/8 - 11	13,50	13,386	13,868	
3/4 - 10	16,50	16,307	16,840	
7/8 - 9	19,50	19,177	19,761	
1 - 8	22,25	21,971	22,606	
1 1/8 - 7	25,00	24,638	25,349	
1 1/4 - 7	28,00	27,813	28,524	
1 3/8 - 6	30,75	30,353	31,115	
1 1/2 - 6	34,00	33,528	34,290	
1 3/4 - 5	39,50	38,938	39,802	
2 - 4,5	45,00	44,679	45,593	

* M 1,1 hasta M 1,4 Ø-pretaladro roscas de tuercas 5 H

Roscas MJ DIN ISO 5855

Diá. nom.	x Paso P mm	Ø d. pre-taladr. p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas 5H* min. mm max. mm	
MJ 3	x 0,50	2,60	2,513	2,653
MJ 4	x 0,70	3,40	3,318	3,498
MJ 5	x 0,80	4,30	4,221	4,421
MJ 6	x 0,50	5,55	5,513	5,625
MJ 6	x 0,75	5,35	5,269	5,419
MJ 6	x 1,00	5,10	5,026	5,216
MJ 8	x 0,50	7,55	7,513	7,625
MJ 8	x 0,75	7,35	7,269	7,419
MJ 8	x 1,00	7,10	7,026	7,216
MJ 8	x 1,25	6,90	6,782	6,994
MJ 10	x 1,00	9,10	9,026	9,216
MJ 10	x 1,25	8,90	8,782	8,994
MJ 10	x 1,50	8,60	8,539	8,775
MJ 12	x 1,75	10,40	10,295	10,560
MJ 16	x 2,00	14,20	14,051	14,351

Roscas UNC ISO 3161

Diá. nom.	hilos por pulgada	Ø d. pre-taladr. p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas 3B min. mm max. mm	
Nr. 6 - 32	2,85	2,733	2,939	
Nr. 8 - 32	3,55	3,393	3,599	
Nr. 10 - 24	4,00	3,795	4,064	
Nr. 12 - 24	4,60	4,455	4,704	
1/4 - 20	5,30	5,113	5,387	
5/16 - 18	6,75	6,563	6,833	
3/8 - 16	8,20	7,978	8,255	
7/16 - 14	9,60	9,346	9,639	
1/2 - 13	11,00	10,798	11,095	
9/16 - 12	12,40	12,228	12,482	
5/8 - 11	13,80	13,627	13,904	

Roscas UNF ISO 3161

Diá. nom.	hilos por pulgada	Ø d. pre-taladr. p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas 3B min. mm max. mm	
Nr. 6 - 40	3,00	2,888	3,053	
Nr. 8 - 36	3,60	3,480	3,663	
Nr. 10 - 32	4,20	4,054	4,255	
Nr. 12 - 28	4,75	4,602	4,816	
1/4 - 28	5,60	5,466	5,662	
5/16 - 24	7,00	6,906	7,109	
3/8 - 24	8,60	8,494	8,679	
7/16 - 20	10,00	9,876	10,084	
1/2 - 20	11,60	11,463	11,661	
9/16 - 18	13,00	12,913	13,122	
5/8 - 18	14,60	14,501	14,702	

* MJ3 x0,50 hasta MJ 5 x 0,80 Ø-pretaladro rosca de tuercas 6H





Diámetros de pretaladro para el fresado de roscas

Roscas UNF ASME B1.1					Roscas BSW-(Whitworth) BS84					Roscas withworth para tubos (según DIN-ISO 228-1)					Roscas para tubos de blindaje de acero según DIN 40430				
Diá. nom.	hilos por pulgada	Ø d. pre-tal. roscas p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas 2B min. mm max. mm		Diá. nom.	hilos por pulgada	Ø d. pre-tal. roscas p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas min. mm max. mm		Diá. nom.	hilos por pulgada	Ø d. pre-tal. roscas p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas min. mm max. mm		Diá. nom.	hilos por pulgada	Ø d. pre-tal. roscas p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas min. mm max. mm	
Nr. 1 - 72		1,55	1,473	1,610	W 1/16	60	1,20	1,045	1,230	G 1/16	28	6,80	6,561	6,843	Pg 7	20	11,40	11,280	11,430
Nr. 2 - 64		1,85	1,755	1,910	W 3/32	48	1,80	1,704	1,912	G 1/8	28	8,80	8,566	8,848	Pg 9	18	14,00	13,860	14,010
Nr. 3 - 56		2,15	2,024	2,197	W 1/8	40	2,50	2,362	2,591	G 1/4	19	11,80	11,445	11,890	Pg 11	18	17,30	17,260	17,410
Nr. 4 - 48		2,40	2,271	2,459	W 3/32	32	3,20	2,952	3,214	G 3/8	19	15,25	14,950	15,395	Pg 13,5	18	19,00	19,060	19,210
Nr. 5 - 44		2,70	2,550	2,741	W 9/16	24	3,60	3,407	3,745	G 1/2	14	19,00	18,631	19,172	Pg 16	18	21,30	21,160	21,310
Nr. 6 - 40		2,95	2,819	3,023	W 7/32	24	4,50	4,201	4,539	G 5/8	14	21,00	20,587	21,128	Pg 21	16	26,90	26,780	27,030
Nr. 8 - 36		3,50	3,404	3,607	W 1/4	20	5,10	4,724	5,156	G 3/4	14	24,50	24,117	24,658	Pg 29	16	35,50	35,480	35,730
Nr. 10 - 32		4,10	3,962	4,166	W 5/16	18	6,50	6,130	6,590	G 7/8	14	28,25	27,877	28,418	Pg 36	16	45,50	45,480	45,730
Nr. 12 - 28		4,60	4,496	4,724	W 3/8	16	7,90	7,492	7,987	G 1	11	30,75	30,291	30,931	Pg 42	16	52,50	52,480	52,730
1/4 - 28		5,50	5,359	5,588	W 7/16	14	9,20	8,789	9,330	G 1 1/8	11	35,50	34,939	35,579	Pg 48	16	57,80	57,780	58,030
5/16 - 24		6,90	6,782	7,036	W 1/2	12	10,50	9,989	10,591	G 1 1/4	11	39,50	38,952	39,592					
3/8 - 24		8,50	8,382	8,636	W 9/16	12	12,00	11,577	12,179	G 1 1/2	11	45,25	44,845	45,485					
7/16 - 20		9,90	9,728	10,033	W 5/8	11	13,50	12,918	13,558	G 1 3/4	11	51,00	50,788	51,428					
1/2 - 20		11,50	11,328	11,608	W 3/4	10	16,25	15,797	16,483	G 2	11	57,00	56,656	57,296					
9/16 - 18		12,90	12,751	13,081	W 7/8	9	19,25	18,611	19,353										
5/8 - 18		14,50	14,351	14,681	W 1	8	22,00	21,334	22,147										
3/4 - 16		17,50	17,323	17,678	W 1 1/8	7	24,50	23,928	24,832										
7/8 - 14		20,40	20,269	20,650	W 1 1/4	7	27,75	27,103	28,007										
1 - 12		23,25	23,114	23,571	W 1 3/8	6	30,50	29,504	30,528										
1 1/8 - 12		26,50	26,289	26,746	W 1 1/2	6	33,50	32,679	33,703										
1 1/4 - 12		29,50	29,464	29,921	W 1 5/8	5	35,50	34,769	35,963										
1 3/8 - 12		32,75	32,639	33,096	W 1 3/4	5	39,00	37,944	39,138										
1 1/2 - 12		36,00	35,814	36,271	W 2	4,5	44,50	43,571	44,877										

NPT ANSI B 2.1

Roscas americana, cónica para tubos 1:16

Versión A (evitar a ser posible)	Versión B	Diá. nom.	Hilos por pulgada	Pretaladro cilindr. (A) d ₁	Pretaladro cónico (B) D ₁	Profundidad de entrada ET mm	Prof. de taladro BT (min) mm
		1/16	- 27	6,15	6,39	9,29	10,7
		1/8	- 27	8,40	8,74	9,32	10,8
		1/4	- 18	11,10	11,36	13,52	15,6
		3/8	- 18	14,30	14,80	13,83	16,0
		1/2	- 14	17,90	18,32	18,07	20,8
		3/4	- 14	23,30	23,67	18,55	21,3
		1	- 11,5	29,00	29,69	22,29	25,6
		1 1/4	- 11,5	37,70	38,45	22,80	26,1
		1 1/2	- 11,5	43,70	44,52	22,80	26,1
		2	- 11,5	55,60	56,56	23,20	26,5
		2 1/2	- 8	66,30	67,62	31,75	36,3
		3	- 8	82,30	83,52	33,74	38,5

Roscas-EG métr./métr.fino (EG M 14x1,25) para injertos roscados de hilo según DIN 8140

Diá. nom.	x Paso P mm	Ø d. pre-tal. roscas p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas min. mm max. mm	
EG M 4	0,70	4,20	4,152	4,292
EG M 5	0,80	5,25	5,174	5,334
EG M 6	1,00	6,30	6,217	6,407
EG M 8	1,25	8,40	8,271	8,483
EG M10	1,50	10,50	10,324	10,560
EG M12	1,75	12,50	12,379	12,644
EG M14 x 1,25		14,40	14,271	14,483
EG M16	2,00	16,50	16,433	16,733

Roscas EG UNC (UNC-STI) para injertos roscados de hilo ASME B18.29.1

Diá. nom.	hilos por pulgada	Ø d. pre-tal. roscas p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas min. mm max. mm	
EG Nr. 6 - 32		3,80	3,678	3,879
EG Nr. 8 - 32		4,40	4,338	4,524
EG Nr. 10 - 24		5,20	5,055	5,283
EG Nr. 12 - 24		5,80	5,715	5,944
EG 1/4 - 20		6,70	6,624	6,868
EG 5/16 - 18		8,40	8,242	8,489
EG 3/8 - 16		10,00	9,868	10,127
EG 7/16 - 14		11,60	11,506	11,783
EG 1/2 - 13		13,30	13,122	13,393
EG 9/16 - 12		14,90	14,747	15,032
EG 5/8 - 11		16,50	16,375	16,673

Roscas EG UNF (UNF-STI) para injertos roscados de hilo ASME B18.29.1

Diá. nom.	hilos por pulgada	Ø d. pre-tal. roscas p. taladr. DIN 336 mm	Diámetro pretaladro roscas de tuercas min. mm max. mm	
EG Nr. 6 - 40		3,70	3,644	3,818
EG Nr. 8 - 36		4,40	4,321	4,498
EG Nr. 10 - 32		5,10	4,999	5,184
EG Nr. 12 - 28		5,70	5,682	5,809
EG 1/4 - 28		6,60	6,546	6,721
EG 5/16 - 24		8,25	8,166	8,352
EG 3/8 - 24		9,80	9,754	9,931
EG 7/16 - 20		11,50	11,389	11,585
EG 1/2 - 20		13,10	12,974	13,172
EG 9/16 - 18		14,70	14,592	14,798
EG 5/8 - 18		16,25	16,180	16,386



Taladros recomendados para la laminación de roscas

Roscas métrica normalizada ISO DIN 13					
Diá. nom.	Paso mm	Diá. taladro mm	Diámetro pretaladro roscas de tuercas 7H*		
			min. mm	max. mm	max. mm
M 1	0,25	0,75	0,729	0,785	
M 1,1	0,25	0,85	0,829	0,885	
M 1,2	0,25	0,95	0,929	0,985	
M 1,4	0,30	1,10	1,075	1,142	
M 1,6	0,35	1,25	1,221	1,321	
M 1,8	0,35	1,45	1,421	1,521	
M 2	0,40	1,85	1,84	1,88	1,567 1,679
M 2,2	0,45	2,00	2,01	2,05	1,713 1,838
M 2,5	0,45	2,30	2,28	2,32	2,013 2,138
M 3	0,50	2,80	2,78	2,85	2,459 2,639
M 3,5	0,60	3,25	3,23	3,30	2,850 3,050
M 4	0,70	3,70	3,68	3,76	3,242 3,466
M 4,5	0,75	4,20			
M 5	0,80	4,65	4,62	4,71	4,134 4,384
M 6	1,00	5,55	5,52	5,62	4,917 5,217
M 7	1,00	6,55	6,52	6,62	5,917 6,217
M 8	1,25	7,40	7,36	7,47	6,647 6,982
M 9	1,25	8,40	8,36	8,47	7,647 7,982
M 10	1,50	9,30	9,26	9,38	8,376 8,751
M 11	1,50	10,30	10,26	10,38	9,376 9,751
M 12	1,75	11,20	11,15	11,29	10,106 10,531
M 14	2,00	13,10	13,05	13,20	11,835 12,310
M 16	2,00	15,10	15,05	15,20	13,835 14,310
M 18	2,50	16,90	16,83	17,02	15,294 15,854
M 20	2,50	18,90	18,83	19,02	17,294 17,854
M 22	2,50	20,90	20,83	21,02	19,294 19,854
M 24	3,00	22,70	22,62	22,80	20,752 21,382
M 27	3,00	25,70	25,62	25,80	23,752 24,382
M 30	3,50	28,50	28,40	28,60	26,211 26,921
M 33	3,50	31,50	31,40	31,60	29,211 29,921
M 36	4,00	34,30	34,17	34,40	31,670 32,420
M 39	4,00	37,30	37,17	37,40	34,670 35,420
M 42	4,50	40,10	39,95	40,20	37,129 37,979

* M 1,1 hasta M 1,4 Ø-pretaladro roscas de tuercas 5 H

Roscas métrica fina DIN 13											
Diá. x Paso nom.	Diá. taladro mm	Diá. taladro		Diámetro pretaladro roscas de tuercas 7H*		Diá. x Paso nom.	Diá. taladro mm	Diámetro pretaladro roscas de tuercas 7H*			
		min. mm	max. mm	min. mm	max. mm			min. mm	max. mm		
M 2,5 x 0,35	2,35	2,35	2,38	2,121	2,221	M 20 x 1,50	19,30	19,26	19,38	18,376	19,751
M 3 x 0,35	2,85	2,85	2,88	2,621	2,721	M 24 x 1,00	23,55	23,52	23,62	22,917	23,217
M 4 x 0,35	3,85	3,85	3,88	3,621	3,721	M 24 x 1,50	23,30	23,26	23,38	22,376	22,751
M 4 x 0,50	3,80	3,78	3,83	3,459	3,639	M 24 x 2,00	23,10	23,05	23,20	21,835	22,310
M 5 x 0,50	4,80	4,78	4,83	4,459	4,639	M 27 x 1,50	26,30	26,26	26,38	25,376	25,751
M 5,5 x 0,50	5,30	5,28	5,33	4,959	5,139	M 30 x 1,50	29,30	29,26	29,38	28,376	28,751
M 6 x 0,75	5,65	5,62	5,70	5,188	5,424	M 33 x 1,50	32,30	32,26	32,38	31,376	31,751
M 7 x 0,75	6,65	6,62	6,70	6,188	6,424	M 36 x 1,50	35,30	35,26	35,38	34,376	34,751
M 8 x 0,75	7,65	7,62	7,70	7,188	7,424	M 39 x 1,50	38,30	38,26	38,38	37,376	37,751
M 8 x 1,00	7,55	7,52	7,62	6,917	7,217	M 42 x 1,50	41,30	41,26	41,38	42,376	42,751
M 9 x 0,75	8,65	8,62	8,70	8,188	8,424						
M 9 x 1,00	8,55	8,52	8,62	7,917	8,217						
M 10 x 0,75	9,65	9,62	9,70	9,188	9,424						
M 10 x 1,00	9,55	9,52	9,62	8,917	9,217						
M 10 x 1,25	9,40	9,36	9,47	8,647	8,982						
M 11 x 0,75	10,65	10,62	10,70	10,188	10,424						
M 11 x 1,00	10,55	10,52	10,62	9,917	10,217						
M 12 x 1,00	11,55	11,52	11,62	10,917	11,217						
M 12 x 1,25	11,40	11,36	11,47	10,647	10,982						
M 12 x 1,50	11,30	11,26	11,38	10,376	10,751						
M 14 x 1,00	13,55	13,52	13,62	12,917	13,217						
M 14 x 1,25	13,40	13,36	13,47	12,647	12,982						
M 14 x 1,50	13,30	13,26	13,38	12,376	12,751						
M 15 x 1,00	14,55	14,52	14,62	13,917	14,217						
M 15 x 1,50	14,30	14,26	14,38	13,376	13,751						
M 16 x 1,00	15,55	15,52	15,62	14,917	15,217						
M 16 x 1,50	15,30	15,26	15,38	14,376	14,751						
M 17 x 1,00	16,55	16,52	16,62	15,917	16,217						
M 17 x 1,50	16,30	16,26	16,38	15,376	15,751						
M 18 x 1,00	17,55	17,52	17,62	16,917	17,217						
M 18 x 1,50	17,30	17,26	17,38	16,376	16,751						
M 18 x 2,00	17,10	17,05	17,20	15,835	16,310						
M 20 x 1,00	19,55	19,52	19,62	18,917	19,217						

* MJ3 x0,50 hasta MJ 5 x 0,80 Ø-pretaladro rosca de tuercas 6H

Campo de tolerancias para pretaladros en el laminado de roscas (según DIN 13, Parte 50)

Por razones de tenacidad no es necesario cumplir con las tolerancias de pretaladros de las tolerancias 6H; la tolerancia 7H es suficiente para cumplir el que se compenetren las roscas macho y hembra no menos de 0.32xP. Además las roscas laminadas suelen tener una tenacidad más alta que las roscas cortadas por el fluido del material regular y el endurecimiento térmico.



Taladros recomendados para la laminación de roscas

Roscas UNC ASME B1.1						
Diá. nom.	hilos por pulg.	Diá. taladro mm	Diá. taladro		Diámetro pretaladro roscas de tuercas 2B	
			min. mm	max. mm	min. mm	max. mm
Nr. 1 - 64		1,68	1,67	1,70	1,425	1,580
Nr. 2 - 56		1,98	1,97	2,01	1,694	1,872
Nr. 3 - 48		2,28	2,27	2,32	1,941	2,146
Nr. 4 - 40		2,55	2,54	2,59	2,157	2,385
Nr. 5 - 40		2,90	2,89	2,94	2,487	2,698
Nr. 6 - 32		3,15	3,14	3,19	2,642	2,896
Nr. 8 - 32		3,80	3,78	3,82	3,302	3,531
Nr. 10 - 24		4,35	4,33	4,39	3,683	3,937
Nr. 12 - 24		5,00	4,97	5,03	4,343	4,597
1/4 - 20		5,75	5,72	5,80	4,978	5,258
5/16 - 18		7,30	7,26	7,37	6,401	6,731
3/8 - 16		8,80	8,77	8,88	7,798	8,153
7/16 - 14		10,30	10,27	10,37	9,144	9,550
1/2 - 13		11,80	11,77	11,88	10,592	11,024
9/16 - 12		13,30	13,28	13,39	11,989	12,446
5/8 - 11		14,80	14,78	14,90	13,386	13,868
3/4 - 10		17,90	17,85	17,97	16,307	16,840
7/8 - 9		21,00	20,95	21,10	19,177	19,761
1 - 8		24,00	23,95	24,12	21,971	22,606

Roscas UNF ASME B1.1						
Diá. nom.	hilos por pulg.	Diá. taladro mm	Diá. taladro		Diámetro pretaladro roscas de tuercas 2B	
			min. mm	max. mm	min. mm	max. mm
Nr. 1 - 72		1,70	1,69	1,72	1,473	1,610
Nr. 2 - 64		2,00	1,99	2,03	1,755	1,910
Nr. 3 - 56		2,30	2,29	2,34	2,024	2,197
Nr. 4 - 48		2,60	2,59	2,63	2,271	2,459
Nr. 5 - 44		2,90	2,89	2,93	2,550	2,741
Nr. 6 - 40		3,20	3,19	3,24	2,819	3,023
Nr. 8 - 36		3,85	3,83	3,88	3,404	3,607
Nr. 10 - 32		4,45	4,43	4,49	3,962	4,166
Nr. 12 - 28		5,10	5,07	5,13	4,496	4,724
1/4 - 28		5,95	5,92	5,99	5,359	5,588
5/16 - 24		7,45	7,42	7,50	6,782	7,036
3/8 - 24		9,05	9,02	9,10	8,338	8,636
7/16 - 20		10,55	10,48	10,58	9,728	10,033
1/2 - 20		12,10	12,08	12,18	11,328	11,608
9/16 - 18		13,65	13,61	13,72	12,751	13,081
5/8 - 18		15,25	15,21	15,32	14,351	14,681
3/4 - 16		18,35	18,30	18,41	17,323	17,678
7/8 - 14		21,40	21,35	21,49	20,269	20,650
1 - 12		24,45	24,40	24,54	23,114	23,571

Roscas withworth para tubos DIN EN ISO 228-1						
Diá. nom.	hilos por pulg.	Diá. taladro mm	Diá. taladro		Diámetro pretaladro roscas de tuercas	
			min. mm	max. mm	min. mm	max. mm
G 1/16 - 28		7,30	7,28	7,35	6,561	6,843
G 1/8 - 28		9,30	9,28	9,35	8,566	8,848
G 1/4 - 19		12,50	12,48	12,55	11,445	11,890
G 3/8 - 19		16,00	15,98	16,05	14,950	15,395
G 1/2 - 14		20,00	19,98	20,12	18,631	19,172
G 5/8 - 14		22,00	21,98	22,12	20,587	21,128
G 3/4 - 14		25,50	25,48	25,62	24,117	24,658
G 7/8 - 14		29,25	29,23	29,37	27,877	28,418
G 1 - 11		32,00	31,98	32,15	30,291	30,931
G 1 1/4 - 11		40,75	40,70	40,85	38,952	39,592



Abreviaturas de nuevos materiales (selección)

Referencia	Antigua abreviatura	Nueva abreviatura	Referencia	Antigua abreviatura	Nueva abreviatura	Referencia	Antigua abreviatura	Nueva abreviatura	Referencia	Antigua abreviatura	Nueva abreviatura
0,6010	GG10	EN-GJL-100	1,0728	60 S 20	-	1,4436	X5CrNiMo 17 13 3	X3CrNiMo17-13-3	1,7043	-	38Cr4
0,6020	GG20	EN-GJL-200	1,0736	9 SMn 36	11SMn37	1,4438	X2CrNiMo 18 16 4	X2CrNiMo18-15-4	1,7147	20 MnCr 5	20MnCr5
0,6025	GG25	EN-GJL-250	1,0737	9 SMnPb 36	11SMnPb37	1,446	X4CrNiMo 27 5 2	X3CrNiMoN27-5-2	1,7149	20 MnCrS 5	20MnCrS5
0,6035	GG35	EN-GJL-350	1,0756	35 SPb 20	35SPb20	1,4462	X2CrNiMoN2253	X2CrNiMoN22-5-3	1,7176	55 Cr 3	55Cr3
0,7050	GGG50	EN-GJS-500-7	1,0757	45 SPb 20	46SPb20	1,4509	X6CrTiNb 18	X2CrTiNb18	1,7182	27 MnCrB 5 2	27MnCrB5-2
0,7070	GGG70	EN-GJS-700-2	1,0760	-	38SMn26	1,451	X6CrTi 17	X3CrTi17	1,7185	33 MnCrB 5 2	33MnCrB5-2
0,8035	GTW35	EN-GJMW-350-4	1,0761	-	38SMnPb26	1,4511	X6CrNb 17	X3CrNb17	1,7189	39 MnCrB 6 2	39MnCrB6-2
0,8155	GTS55	EN-GJMB-550-4	1,0762	-	44SMn28	1,4512	X6CrTi 12	X2CrTi12	1,7213	25 CrMoS 4	25CrMoS4
0,817	GTS70	EN-GJMB-700-2	1,0763	-	44SMnPb28	1,452	X1CrTi 15	X2CrTi17	1,7218	25 CrMo 4	25CrMo4
1,0022	St 01Z	-	1,0873	-	DC06 [Fe P06]	1,4521	X2CrMoTi 18 2	X2CrMoTi18-2	1,7219	-	26CrMo4-2
1,0035	St 33	S185	1,1103	ESTe 255	S255NL1	1,4522	X2CrMoNb 18 2	X2CrMoNb18-2	1,722	34 CrMo 4	34CrMo4
1,0039	St 37 -2	S235JRH	1,1105	ESTe 315	S315NL1	1,4532	X7CrNiMoAl 15 7	X8CrNiMoAl15-7-2	1,7225	42 CrMo 4	42CrMo4
1,0044	St 44 -2	S275JR	1,1121	Ck 10	C10E	1,4541	X6CrNiTi18 10	X6CrNiTi18-10	1,7226	34 CrMoS 4	34CrMoS4
1,0050	St 50 -2	E295	1,1141	Ck15	C15E	1,4542	X5CrNiCuNb 17 4	X5CrNiCuNb16-4	1,7227	42 CrMoS 4	42CrMoS4
1,0060	St 60 -2	E335	1,1151	Ck 22	C22E	1,455	X6CrNiNb 18 10	X6CrNiNb18-10	1,7228	50 CrMo 4	50CrMo4
1,0070	St 70 -2	E360	1,1158	Ck 25	C25E	1,4558	X2NiCrAlTi 32 20	X2NiCrAlTi32-20	1,7264	20 CrMo 5	20CrMo5
1,0114	St 37 -3U	S235J0	1,117	28 Mn 6	28Mn6	1,4567	X3CrNiCu 18 9 X	X3CrNiCu18-9-4	1,7321	20 MoCr 4	20MoCr4
1,0226	St 02Z	DX51D	1,1178	Ck 30	C30E	1,4568	X7CrNiAl 17 7	X7CrNiAl17-7	1,7323	20 MoCrS 4	20MoCrS4
1,0242	StE 250 -2Z	S250GD	1,1181	Ck 35	C35E	1,4571	-	X6CrNiMoTi17-12-2	1,7333	22 CrMoS 3 5	22CrMoS3-5
1,0244	StE 280 -2Z	S280GD	1,1186	Ck 40	C40E	1,4577	X3CrNiMoTi 25 25	X3CrNiMoTi25-25	1,7335	13 CrMo 4 4	13CrMo4-5
1,0250	StE 320 -3Z	S320GD	1,1191	Ck 45	C45E	1,4592	X1CrMoTi 29 4	X2CrMoTi29-4	1,7362	12 CrMo 19 5	12CrMo19-5
1,0301	C 10	-	1,1203	Ck 55	C55E	1,4713	X10CrAl 7	X10CrAlSi7	1,738	10 CrMo 9 10	10CrMo9-10
1,0302	C 10 Pb	-	1,1206	Ck 50	C50E	1,4724	X10CrAl 13	X10CrAlSi13	1,7383	-	11CrMo9-10
1,0306	St 06 Z	DX54D	1,1221	Ck 60	C60E	1,4742	X10CrAl 18	X10CrAlSi18	1,7779	-	20CrMoV13-5-5
1,0312	St 15	DC05 [Fe P05]	1,1241	Cm 50	C50R	1,4762	X10CrAl 24	X10CrAlSi25	1,8159	50 CrV 4	51CrV4
1,0319	RRStE 210.7	L210GA	1,175	C 75 W	C75W	1,4821	X20CrNiSi 25 4	X20CrNiSi25-4	1,8504	34 CrAl 6	34CrAl6
1,0322	-	DX56D	1,2067	102 Cr 6	102Cr6	1,4828	X15CrNiSi 20 12	X15CrNiSi20-12	1,8519	31 CrMoV 9	31CrMoV9
1,0330	St 12 [St 2]	DC01 [Fe P01]	1,2080	-	X210Cr12	1,4833	X7CrNi 23 14	X7CrNi23-12	1,855	34 CrAlNi 7	34CrAlNi7
1,0333	USt 13	-	1,2083	-	X42Cr13	1,4841	X15CrNiSi 25 20	X15CrNiSi25-21	1,8807	13 MnNiMoV 5 4	13MnNiMoV5-4
1,0338	St 14 [St 4]	DC04 [Fe P04]	1,2419	-	105WCr6	1,4845	X12CrNi 25 21	X12CrNi25-21	1,8812	18 MnMoV 5 2	18MnMoV5-2
1,0345	H I	P235GH	1,2767	-	X45NiCrMo4	1,4864	X12NiCrSi 36 16	X12NiCrSi35-16	1,8815	18 MnMoV 6 3	18MnMoV6-3
1,0347	RRSt 13 [RRSt 3]	DC03 [Fe P03]	1,3243	S6-5-2-5	S 6-5-2-5	1,4878	X12CrNiTi 18 9	X10CrNiTi18-10	1,8821	StE 355 TM	P355M
1,0348	UH I	P195GH	1,3343	S6-5-2	S 6-5-2	1,4903	-	X10CrMoVNb9-1	1,8824	StE 420 TM	P420M
1,0350	St 03Z	DX52D	1,3344	S6-5-3	S 6-5-3	1,5026	55 Si 7	55Si7	1,8826	StE 460 TM	P460M
1,0355	St 05Z	DX53D	1,40	X6Cr 13	X6Cr13	1,5131	50 MnSi 4	50MnSi4	1,8828	ESTE 420 TM	P420ML2
1,0356	TTSt 35 N	P215NL	1,4002	X6CrAl 13	X6CrAl13	1,5415	15 Mo 3	16Mo3	1,8831	ESTE 460 TM	P460ML2
1,0358	St 05 Z	-	1,4003	X2Cr 11	X2CrNi12	1,553	21 MnB 5	20MnB5	1,8832	TSIE 355 TM	P355ML1
1,0401	C 15	-	1,4005	-	X12CrS13	1,5531	30 MnB 5	30MnB5	1,8835	TSIE 420 TM	P420ML1
1,0402	C 22	C22	1,4006	X10Cr 13	X12Cr13	1,5532	38 MnB 5	38MnB5	1,8837	TSIE 460 TM	P460ML1
1,0403	C 15 Pb	-	1,4016	X6Cr 17	X6Cr17	1,5637	10 Ni 14	12Ni14	1,8879	StE ...	P690Q
1,0406	C 25	C25	1,4021	X20Cr 13	X20Cr13	1,5662	-	X11CrMo5+I	1,888	WSIE ...	P690QH
1,0419	St 52.0	L355	1,4028	X30Cr 13	X30Cr13	1,568	-	X12Ni5	1,8881	TSIE ...	P690QL1
1,0424	St 45.8	P265	1,4031	X38Cr 13	X38Cr13	1,571	36 NiCr 6	36NiCr6	1,8882	10 MnTi 3	10MnTi3
1,0424	St 42.8	P265	1,4034	X46Cr 13	X46Cr13	1,5715	-	16NiCrS4	1,8888	ESTE ...	P690QL2
1,0425	H2	P265GH	1,4037	X65Cr13	X65Cr13	1,5752	14 NiCr 14	15NiCr13	1,89	StE 380	S380N
1,0429	StE 290.7 TM	L290MB	1,4057	X20CrNi 17 2	X17CrNi16-2	1,621	15 MnNi 6 3	15MnNi6-3	1,8901	StE 460	S460N
1,0457	StE 240.7	L245NB	1,4104	X12CrMoS 17	X14CrMoS17	1,6211	16 MnNi 6 3	16MnNi6-3	1,8902	StE 420	S420N
1,0459	RRStE 240.7	L245GA	1,4105	X4CrMoS 18	X6CrMoS17	1,631	20 MnMoNi 5 5	20MnMoNi5-5	1,8903	TSIE 460	S460NL
1,0461	StE 255	S255N	1,4109	X65CrMo 14	X70CrMo15	1,6311	20 MnMoNi 4 5	20MnMoNi4-5	1,8905	StE 460	P460N
1,0473	19 Mn 6	P355GH	1,411	X55CrMo 14	X55CrMo14	1,6341	11 NiMoV 5 3	11NiMoV5-3	1,8907	StE 500	S500N
1,0481	17 Mn 4	P295GH	1,4112	X90CrMoV 18	X90CrMoV18	1,6368	15 NiCuMoNb 5	15NiCuMoNb5	1,891	TSIE 380	S380NL
1,0484	StE 290.7	L290NB	1,4113	X6CrMo 17 1	X6CrMo17-1	1,6511	36 CrNiMo 4	36CrNiMo4	1,8911	ESTE 380	S380NL1
1,0486	StE 285	P275N	1,4116	X45CrMoV 15	X50CrMoV15	1,6523	21 NiCrMo 2	21NiCrMo2-2	1,8912	TSIE 420	S420NL
1,0501	C 35	C35	1,412	X20CrMo 13	X20CrMo13	1,6526	21 NiCrMoS 2	21NiCrMoS2-2	1,8913	ESTE 420	S420NL1
1,0503	C 45	C45	1,4122	X35CrMo 17	X39CrMo17-1	1,658	30 CrNiMo 8	30CrNiMo8	1,8915	TSIE 460	P460NL1
1,0505	StE 315	P315N	1,4125	X105CrMo 17	X105CrMo17	1,6582	34 CrNiMo 6	34CrNiMo6	1,8917	WSIE 500	S500NL
1,0511	C 40	C40	1,4301	X5CrNi 18 10	X5CrNi18-10	1,6587	17 CrNiMo 6	18CrNiMo7-6	1,8918	ESTE 460	P460NL2
1,0528	C 30	C30	1,4303	X5CrNi 18 12	X4CrNi18-12	1,7003	38 Cr 2	38Cr2	1,8919	ESTE 500	S500NL1
1,0529	StE 350 -3Z	S350GD	1,4305	X10CrNiS 18 9	X8CrNiS18-9	1,7006	46 Cr 2	46Cr2	1,893	WSIE 380	P380NH
1,0535	C 55	C55	1,4306	X2CrNi 19 11	X2CrNi19-11	1,7016	17 Cr 3	17Cr3	1,8932	WSIE 420	P420NH
1,0539	StE 355N	S355NH	1,431	X12CrNi 17 7	X10CrNi18-8	1,7023	38 CrS 2	38CrS2	1,8935	WSIE 460	P460NH
1,0540	C 50	C50	1,4311	X2CrNiN 18 10	X2CrNiN18-10	1,7025	46 CrS 2	46CrS2	1,8937	StE 500	P500NH
1,0547	St 52 -3U	S355J0H	1,4313	X4CrNi 13 4	X3CrNiMo13-4	1,7030	28 Cr 4	28Cr4	1,8972	StE 415.7 TM	L415NB
1,0582	StE 360.7	L360NB	1,4318	X2CrNiN 18 7	X2CrNiN18-7	1,7033	34 Cr 4	34Cr4	1,8973	StE 415.7 TM	L415MB
1,0601	C 60	C60	1,4335	X1CrNi 25 21	X1CrNi25-21	1,7034	37 Cr 4	37Cr4	1,8975	StE 445.7 TM	L450MB
1,0710	15 S 10	-	1,4361	X1CrNiSi 18 15	X1CrNiSi18-15-4	1,7035	41 Cr 4	41Cr4	1,8977	StE 480.7 TM	L485MB
1,0715	9 SMn 28	11SMn30	1,4362	X2CrNiN 23 4	X2CrNiN23-4	1,7036	28 CrS 4	28CrS4	1,8978	StE 550.7 TM	L555MB
1,0718	9 SMnPb 28	11SMnPb30	1,4401	X5CrNiMo 17 12 2	X5CrNiMo17-12-2	1,7037	34 CrS 4	34CrS4			
1,0721	10 S 20	10S20	1,4404	X2CrNiMo 17 13 2	X2CrNiMo17-12-2	1,7038	37 CrS 4	37CrS4			
1,0722	10 S Pb 20	10SPb20	1,441	X10CrNiMo 18 9	X2CrNiMoN25-7-4	1,7039	41 CrS 4	41CrS4			
1,0726	35 S 20	35S20	1,4418	X4CrNiMo 16 5	X4CrNiMo16-5-1	1,7131	16 MnCr 5	16MnCr5			
1,0727	45 S 20	46S20	1,4435	X2CrNiMo 18 14 3	X2CrNiMo18-14-3	1,7139	16 MnCrS 5	16MnCrS5			



HARTNER

Tolerancias en Ø

Tolerancias ISO

tolerancias estandar para la producción de brocas DIN 1414 corresponden a las tablas de tolerancias h8 de las normas ISO. Para brocas con tolerancias h7, h6 y h5 ver listas de recargos.

Rango Ø mm		Valores mm (medidas entre fajas diámetros exteriores)				
		h8	h7	h6	h5	m7
de	1,0	0	0	0		
hasta	3,0	-0,014	-0,010	-0,006	-0,004	
encima	3,0	0	0	0	0	+0,016
hasta	6,0	-0,018	-0,012	-0,008	-0,005	+0,004
encima	6,0	0	0	0	0	+0,021
hasta	10,0	-0,022	-0,015	-0,009	-0,006	+0,006
encima	10,0	0	0	0	0	+0,025
hasta	18,0	-0,027	-0,018	-0,011	-0,008	+0,007
encima	18,0	0	0	0	0	+0,029
hasta	30,0	-0,033	-0,021	-0,013	-0,009	+0,008
encima	30,0	0	0	0	0	
hasta	50,0	-0,039	-0,025	-0,016	-0,011	
encima	50,0	0	0	0	0	
hasta	80,0	-0,046	-0,030	-0,019	-0,013	
encima	80,0	0	0	0	0	
hasta	100,0	-0,054	-0,035	-0,022	-0,015	

Tolerancias de las microbrocas DIN 1899

Las tolerancias de las microbrocas hasta 1,5 de diámetro según DIN 1899

Tolerancia Ø exterior	= 0/- 0,004 mm
Tolerancia Ø del mango h8	= 0/- 0,014 mm

Variaciones admisibles para dimensiones sin torelancia según DIN-ISO 2768

Valores para largos en mm

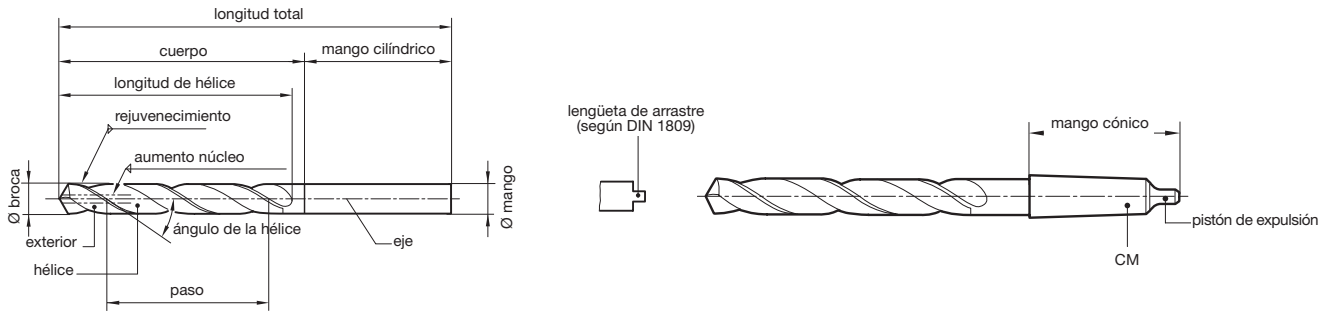
grado de exactitud	Gama							
	0.5 hasta 3	por encima 3 hasta 6	por encima 6 hasta 30	por encima 30 hasta 120	p. encima 120 hasta 400	p. encima 400 hasta 1000	p. encima 1000 hasta 2000	p. encima 2000 hasta 4000
fino	± 0,05	± 0,05	± 0,1	± 0,15	± 0,2	± 0,3	± 0,5	-
medio	± 0,1	± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2
basto	± 0,15	± 0,2	± 0,5	± 0,8	± 1,2	± 2	± 3	± 4
muy basto	-	± 0,5	± 1	± 1,5	± 2,5	± 4	± 6	± 8

Valores para ángulo (Valores en grados y minutos)

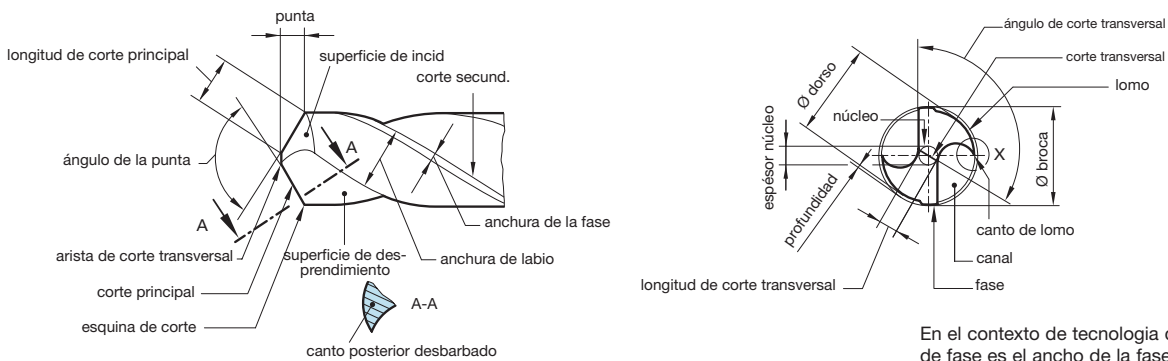
grado de exactitud	Gama					
	hasta 10	por encima 10 hasta 50	por encima 50 hasta 120	p. encima 120 hasta 400	p. encima 400	
fino, medio	± 1°	± 0° 30'	± 0° 20'	± 0° 10'	± 0° 5'	
basto	± 1° 30'	± 1°	± 0° 30'	± 0° 15'	± 0° 10'	
muy basto	± 3°	± 2°	± 1°	± 0° 30'	± 0° 20'	



Brocas mango cilíndrico / cónico

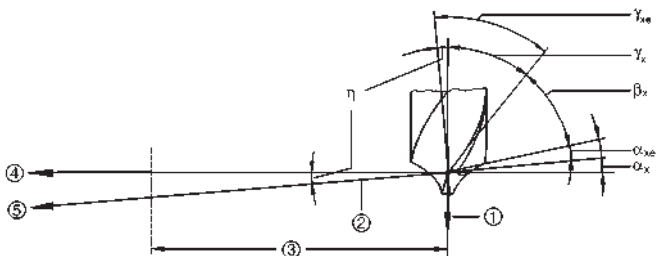


Sección de corte



En el contexto de tecnología de corte, el ancho de fase es el ancho de la fase de desahogo del cuerpo que se denomina b_{fan} , ver DIN 6518.

Ángulos de los filos cortantes



α_x	ángulo de incisión lateral (alpha)	γ_x	ángulo de desalajo lateral (gamma)
α_{xe}	ángulo de incisión lateral que trabaja	γ_{xe}	ángulo de desalajo lateral que trabaja
β_x	ángulo de cuña lateral (beta)	η	ángulo de dir. de trabajo (eta)

Definiciones.

1. Dirección de avance
2. Avance
3. Avance por revolución
4. Dirección de corte

*) el ángulo de incisión lateral α , el ángulo de cuña lateral β y el ángulo de desalajo lateral se miden en la plana ortogonal. Para detalles, véase DIN 6581.

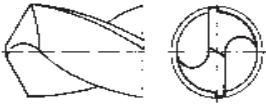


HARTNER

Geometría de punta

según norma Hartner

según DIN 1412 (extracto, edición 03/01)

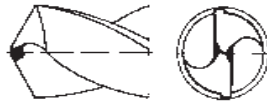


Punta estándar

Aplicación: Para todos los trabajos estándar en operaciones en acero, metales no ferreos y plásticos. El ángulo de punta depende de la mecanización de los materiales.

Ventajas: Labios fuertes, fuerte resistencia a impactos laterales, reafilado simple y puede ser de forma manual.

Desventajas: El amplio borde del cinceal requiere gran presión de avance.

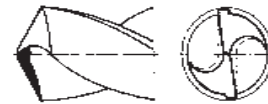


Vaciado de punta según DIN 1412 A

Aplicación: Para todas las operaciones estándar de perforación en material sólido con taladros de gran diámetro.

Ventajas: Buen centrado debido a la reducción del cinceal y la reducción de presión del refrigerante.

Inconvenientes: Agrandar el agujero tras el reafilado.

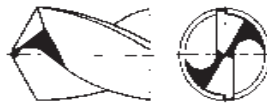


con caras del cinceal rebajadas con modificación del labio según norma DIN 1412 B

Aplicaciones: Para aceros duros, Aceros con 10% manganeso, aceros duros para muelles y alargamiento de agujeros existentes.

Ventajas: Resistencia al impacto, una carga unilateral y fuerza lateral. No retirar en piezas de pared delegada

Inconvenientes: Alta presión, tendencia a descentrarse; agrandar al reafilar

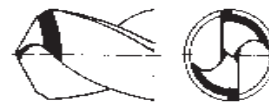


Punta Split según DIN 1412 C

Aplicación: Para materiales difíciles y agujeros muy profundos.

Ventajas: Buen centraje, poco avance y facilidad para la extracción de viruta.

Inconvenientes: Puede agrandar el agujero tras el afilado

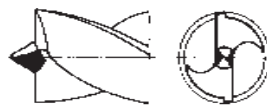


doble ángulo de punta para fundición según norma DIN 1412 D

Aplicación: Para taladrar materiales de fundición gris y fundición maleable y material de forja.

Ventajas: protege las esquinas debido a la longitud incrementada del labio, resistente al impacto, buena conducción del calor que incrementan la vida de la herramienta.

Inconvenientes: Agrandar el agujero tras el reafilado.



Punto de centro de acuerdo con norma DIN 1412 E

Aplicaciones: Para trabajar materiales blandos

Ventajas: Buen centraje, precisión en el trabajo en láminas y tubos. Disponible por encima de Ø2,5.

Inconvenientes. Sensible al impacto y carga unilateral. Solamente es correcto el reafilado en máquinas



Ángulo de salida del labio / Frecuencia de desahogo

Ángulo de salida del labio para brocas HSS y HSS-E

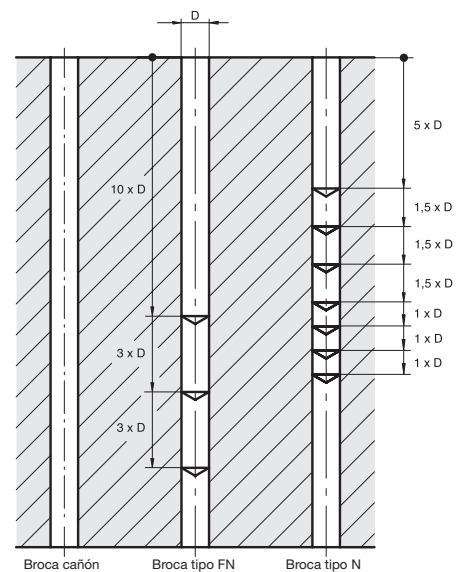
diámetro gama encima por	tipo N, tipo H y brocas de centro		tipo W, tipo FN, tipo FW, tipo S, tipo IS		Tipo V	
	ángulo de salida del labio	ángulo de punta	ángulo de salida del labio	ángulo de punta	ángulo de salida del labio	ángulo de punta
0,14 – 0,24	28°	118°	28°	130°	28°	130°
0,24 – 0,48	25°	118°	25°	130°	25°	130°
0,48 – 0,95	23°	118°	23°	130°	23°	130°
0,95 – 2,36	20°	118°	20°	130°	20°	130°
2,36 – 6,00	15°	118°	15°	130°	15°	130°
6,00 – 15,00	13°	118°	13°	130°	13°	130°
15,00 – 37,50	10°	118°	10°	130°	10°	130°
37,50 – 100,00	8°	118°	8°	130°	8°	130°

Ángulo de salida del labio en avellanado para: brocas de paso y brocas de centro

diámetro gama encima por	tipo N, tipo S, ángulo avellanado 20 - 160° 161 - 180°		tipo W, tipo H, ángulo del avellanado 20 - 160° 161 - 180°		ángulo de salida del labio a través del diám. del mango	broca de centro
	ángulo de salida del labio	ángulo de salida del labio	ángulo de salida del labio	ángulo de salida del labio		
0,48 – 0,95	-	-	-	-	7°	
0,95 – 2,36	14,0°	8°	16°	9°	7°	
2,36 – 3,75	13,0°	7°	15°	8°	6°	
3,75 – 6,00	12,5°	6,5°	14°	7°	5°	
6,00 – 9,50	11,0°	6°	13°	7°	4°	
9,50 – 15,00	10,0°	5°	12°	6°	4°	
15,00 – 23,60	9,5°	5°	11°	6°	-	
23,60 – 37,50	9,0°	4,5°	11°	5°	-	
37,50 – 60,00	8,0°	4°	10°	5°	-	

Efectuar desahogos con frecuencia cuando se taladre un agujero profundo

Quando taladras un agujero profundo, hay que tener especial cuidado para suministrar suficiente refrigerante a la broca. La broca se enfría mediante la eliminación de virutas desahogando varias veces desde el agujero. La frecuencia de eliminación de virutas depende principalmente del material, el taladro y la profundidad del agujero. Existe una reducción considerable en la viruta cuando se utilizan brocas tipo FN para agujeros profundos. En algunos materiales, el ángulo de la punta puede influir en la forma de las virutas. La forma correcta de la viruta mejora su eliminación y la entrada del refrigerante. El uso de petróleo es muy recomendado para agujeros profundos o cuando la perforación es horizontal. Los datos que figuran son orientativos.

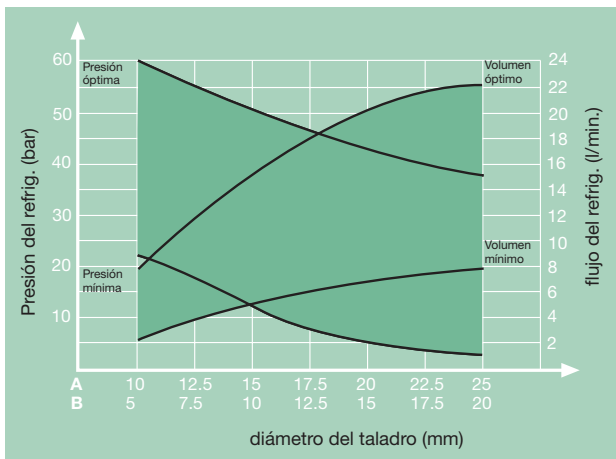




HARTNER

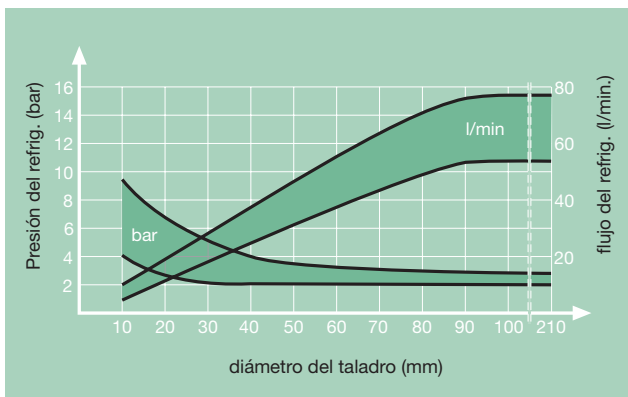
Diagrama de lubricación presión y flujo

Para brocas integrales de metal duro con canal de refrigeración interior



A = Gama de diámetros para herramientas con canal central de refrigeración interior
 B Gama de diámetros para herramientas con canal helicoidal de refrigeración interior

Para sistema Multiplex con canal de refrigeración interior



Emulsión puede ser utilizado como refrigerante cuando la perforación es con plaquitas intercambiables de HSS-Co y metal duro, que puede ser utilizado en la habitual

proporción de 1:20. Es absolutamente esencial que usted use un alto caudal del refrigerante. Si no hay suficiente presión y cantidad del refrigerante la perforación de

la superficie puede ser pobre o la herramienta puede dañarse. Si es posible, las partículas sólidas en el refrigerante no deben ser mayor de 50 micras.



Aplicaciones recomendadas brocas espirales

Artículo no.

Artículo no.

Norma/DIN

Material de corte

Acabado

Tipo

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



Aplicaciones recomendadas brocas espirales

Artículo no.

Artículo no.

Norma/DIN

Material de corte

Acabado

Tipo

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



Aplicaciones recomendadas brocas espirales

Artículo no.

Artículo no.

Norma/DIN

Material de corte

Acabado

Tipo

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



Aplicaciones recomendadas brocas espirales

Artículo no.

Artículo no.

Norma/DIN

Material de corte

Acabado

Tipo

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



HARTNER

≤5xD

81011	82011	81041	81061	81013	82012	81012
338	345	338	338	338	345	338
HSS-E						M42
N	N	FN	S	IS	IS	N
47	161	49	57	55	162	65

84800	84859	84807
338		338
HSS-E		
FN	N	S
51	164	61

84504	84505
338	338
HSS-E	
FN	S
51	61



V _c m/min	N° de serie de avance					
35	5	5	5	5	5	5
30	5	5	5	5	5	5
40	5	5	5	5	5	5
40	5	5	5	5	5	5
40	5	5	5	5	5	5
40	5	5	5	5	5	5
35	4	4	4	4	4	4
20	4	4	4	4	4	4
16	3	3	3	3	3	3
36	6	6	6	6	6	6
20	4	4	4	4	4	4
15	3	3	3	3	3	3
16	4	4	4	4	4	4
12	3	3	3	3	3	3
15	4	4	4	4	4	4
12	3	3	3	3	3	3
15	3	3	3	3	3	3
8	2	2	2	2	2	2
4						1
18	4	4	4	4	4	3
14	3	3	2	3	3	3
16	3	3	3	3	3	3
35	6	6	6	6	6	5
30	6	6	6	6	6	5
30	6	6	6	6	6	5
28	6	6	6	6	6	5
10	3	3	3	3	3	3
8			1			1
10			2	2	2	2
6			2	2	2	2
90			7	7	7	7
90			7	7	7	7
80		7	7	7	7	7
70		6	6	6	6	6
70			6	6	6	6
40	5	5	5	5	5	5
60			5	5	5	5
40	5	5	4	5	5	5
35	4	4		4	4	4
33	4	4		4	4	4
20	4	4	4	4	4	4
15	4	4	4	1	1	4
20	4	4	4			

V _c m/min	N° de serie de avance		
38	6	6	6
33	5	5	5
44	5	5	5
38	5	5	5
44	5	5	5
38	4	4	4
27	4	4	4
22	3	3	3
44	4	4	4
22	4	4	4
18	3	3	3
22	4	4	4
18	3	3	3
19	4	4	4
14	3	3	3
14	3	3	3
9		2	2
20	4	4	4
15		3	3
18	3		3
40	6	6	6
35	6	6	6
33	6	6	6
27	6	6	6
12			3
6			2
11			2
7			2
88	5	5	5
40		4	
22	4	4	4
17	4	4	4
22	4	4	4

V _c m/min	N° de serie de avance	
42	6	6
36	5	5
48	6	6
42	6	6
48	6	6
42	5	5
30	5	5
34	4	4
48	6	6
24	5	5
20	4	4
24	5	5
20	4	4
21	5	5
16	4	4
17	4	4
11	3	3
6	1	1
22	5	5
17	4	4
20	4	4
45	7	7
40	7	7
36	7	7
29	7	7
14	4	4
7		2
12		2
8		2
85	8	8
72	7	7
96	6	6
25	5	5
20	5	5
24	5	5



Aplicaciones recomendadas brocas espirales

Artículo no.

Artículo no.

Norma/DIN

Material de corte

Acabado

Tipo

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



≤5xD

84804
338
HSS-E
○
FU 500 DZ
53

84802
338
HSS-E
Ⓣ
FU 500 DZ
53

84801
Est.
HSS-E
Ⓣ
FU 500
94

84660
345
HSS-E
ⓐ
FN
163

81062
338
HSS-E
●
P2000
59



V _c m/min	N° de serie de avance
35	6
30	5
40	6
30	6
32	6
28	6
20	5
15	4
13	3
30	6
16	4
12	3
15	4
10	3
15	4
10	3
10	3
14	4
10	4
12	4
36	6
30	6
30	6
22	6
50	7
50	7
65	7
60	6
60	6
70	5
45	5
30	5
36	4
30	4
30	4
25	4
20	4
15	4

V _c m/min	N° de serie de avance
45	6
35	5
50	6
40	6
44	6
44	6
40	5
27	4
22	3
44	6
22	4
18	3
22	4
16	3
20	4
15	3
13	3
9	2
20	4
16	4
18	4
45	6
40	6
40	6
30	6
70	7
70	7
85	7
70	6
80	6
80	6
80	5
77	5
44	5
50	4
40	4
32	4
28	4
25	4
27	4

V _c m/min	N° de serie de avance
45	6
35	5
50	6
40	5
44	6
44	6
40	5
27	4
22	3
44	6
22	4
18	3
22	4
16	3
20	4
15	3
13	3
9	2
20	4
16	4
18	4
45	6
40	6
40	6
30	6
70	7
70	7
85	7
70	6
80	6
88	5
77	5
44	5
50	4
40	4
32	4
28	4
25	4
27	4

V _c m/min	N° de serie de avance
42	5
45	7
40	7
36	7
29	7
85	7
96	7
25	5
20	5
24	5

V _c m/min	N° de serie de avance
35	6
30	5
40	6
40	5
40	5
40	5
35	4
25	4
20	3
40	6
20	4
15	3
20	4
15	3
18	4
12	3
12	3
8	2
14	4
10	3
12	3
38	6
30	6
30	6
25	6
10	3
5	2
90	7
90	7
80	7
70	6
85	6
80	5
70	5
40	5
40	4
30	4
25	4
15	4
20	4
25	5



Aplicaciones recomendadas brocas espirales

Artículo no.

Norma/DIN

Material de corte

Acabado

Tipo

Refrigeración

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



≤5xD

84811
338
HSS-E-PM
T
FN 500 DZ
64

84507
Est.
HSS-E-PM
F
FN 500
96

82761
Est.
HSS-E
○
FN
axial
108

84461
Est.
HSS-E
T
FN
axial
108

89244
Est.
MD
○
N
67



V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance
40	6	42	6	48	7	60	7	80	4
32	5	37	5	38	6	48	6	70	4
45	6	47	6	48	7	60	7	80	5
40	5	44	6	38	6	48	6	70	4
42	6	47	6	48	6	60	6	80	4
40	5	47	6	48	6	60	6	70	4
28	4	44	5	45	5	50	5	60	4
25	4	30	4	30	5	33	5	60	4
20	3	25	3	28	4	31	4	80	5
40	4	47	3	50	7	55	7	60	4
22	4	25	4	25	5	31	5	60	4
18	3	20	3	25	4	31	4	50	4
20	4	25	4	25	5	30	5	50	3
15	3	18	4	20	4	24	4		
25	4	22	5	24	5	30	5		
15	3	17	4	17	4	20	4		
15	3	14	4	14	4	18	4		
10	2	12	2	12	3	15	3	25	2
				4	3	5	3	20	2
15	4	22	4	20	5	25	5	25	2
10	3	18	3	14	4	18	4	15	1
12	3	20	3	16	4	20	4	25	2
50	6	50	7	48	7	60	7	90	4
40	6	40	7	38	7	48	7	80	4
45	6	44	7	42	7	52	7	70	4
32	6	33	7	35	7	40	7	80	4
8	3	16	4	12	4	15	4		
5	2	6	2	10	2	12	2	15	2
				14	3	18	3	15	1
				10	3	12	3	15	1
								200	7
								200	7
				95	7	120	7	150	6
				75	8	95	8	120	6
								180	5
50	5	50	5	90	6	100	6	80	5
60	5	60	5	50	6	55	6	180	5
50	5	50	5	50	6	55	6	180	5
45	4	44	5	48	5	60	5	120	5
40	4	33	5	45	5	55	5	120	5
32	4	28	5	38	5	45	5	70	4
25	4	25	4	38	6	48	6	50	3
								50	3
								40	3
								80	3



Aplicaciones recomendadas brocas espirales

Artículo no.

Artículo no.

Norma/DIN

Material de corte

Acabado

Tipo

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



Aplicaciones recomendadas brocas espirales

Artículo no.

Norma/DIN

Material de corte

Acabado

Tipo

Refrigeración

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



HARTNER

≤10xD

81311	82211	81341	81361
340	341	340	340
HSS-E			
N	N	FN	S
126	169	127	129

81362
340
HSS-E
S
129

89286
Est.
MD
N
133

82710	82521	82535
Est.	Est.	Est.
HSS		
FN	N	FN
axial	axial	axial
107	180	179

82525
Est.
HSS-E
FN
axial
181

82515
Est.
HSS-E
FN
axial
182



V _c m/min	N° de serie de avance				V _c m/min	N° de avance	V _c m/min	N° de avance	V _c m/min	N° de serie de avance			V _c m/min	N° de avance	V _c m/min	N° de avance
33	5	O5	5						26	6	6	6	35	6	30	5
27	5	5	5						22	5	5	5	30	5	25	4
36	5	5	5						30	6	6	6	30	6	30	5
32	5	5	5						30	5	5	5	30	5	25	4
36	5	5	5						24	5	5	5	35	5	30	4
36	5	5	5						24	5	5	5	29	5	25	4
22	4	4	4						22	4	4	4	22	4	18	3
18	4	4	4						20	4	4	4	18	4	16	3
14	3	3	3	3	15	3			14	3	3	3	14	3	12	2
32	5	5	5						30	6	6	6	35	6	30	5
18	4	4	4						17	4	4	4	18	4	16	3
13	3	3	3		13	3			12	3	3	3	14	3	12	2
14	4	4	4						14	4	4	4	14	4	12	3
10	3	3	3		10	3			10	3	3	3	12	3	10	2
13	4	4	4						15	4	4	4	15	4	13	3
10	3	3	3		10	3			10	3	3	3	11	3	9	2
12	3	3	3		10	3			10	3	3	3	11	3	9	2
6	2	2	2		8	2			7	2	2	2	8	2	6	2
4			1										4	2	4	1
12	4	4	4	4	15	4							14	4	12	3
8	3	3	2	3	10	3							10	3	8	2
10	3	3	3	3	13	3							12	3	12	2
32	6	6	6						30	6	6	6	30	6	28	5
27	6	6	6						30	6	6	6	24	6	22	5
26	6	6	6						24	6	6	6	24	6	22	5
24	6	6	6						20	6	6	6	20	6	18	5
6	3	3	3	3	6	3			7	3	3	3	8	3	6	2
5	1	1		1	6	1							8	1	6	1
8				2	10	2							10	2	8	2
5				2	6	2							8	2	6	2
70			7						80	6						
60			6						50	7	7	7	60	7	55	6
60				5					50	6	6	6	50	6	44	5
36	5	5	5													
54			5						60	5	5	5	38	5	35	4
36	5	5	5										55	5	50	4
30	4	4	5						40	5	5	5	36	5	33	4
24	4	4	5													
18	4	4	4						24	4	4	4	24	4	22	4
13	4	4	4	4	25	4			24	4	4	4	20	4	18	4
16	4	4	4						22	4	4	4	14	4	12	4
26			4					50								
				4				40					25	5	25	4
								80								



Aplicaciones recomendadas brocas espirales

Artículo no.

Norma/DIN

Material de corte

Acabado

Tipo

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



Aplicaciones recomendadas microbrocas

Artículo no.

Artículo no.

Norma/DIN

Material de corte

Calidad de metal duro

Acabado

Tipo

Refrigeración

Dimens. página

Hta. Ø mm	N° de serie de avance								
	101	102	103	104	105	106	107	108	109
	f (mm/vuelta)								
0,10	0,002	0,003	0,003	0,004	0,006	0,007	0,010	0,013	0,016
0,16	0,002	0,003	0,004	0,005	0,007	0,009	0,012	0,016	0,022
0,25	0,003	0,004	0,005	0,007	0,009	0,011	0,014	0,019	0,024
0,30	0,004	0,005	0,007	0,009	0,011	0,015	0,019	0,025	0,033
0,50	0,005	0,007	0,008	0,011	0,014	0,019	0,024	0,031	0,041
0,63	0,007	0,009	0,012	0,015	0,020	0,026	0,034	0,044	0,057
0,80	0,010	0,013	0,016	0,020	0,024	0,031	0,038	0,048	0,060
1,00	0,020	0,024	0,029	0,035	0,041	0,050	0,060	0,072	0,086
1,50	0,030	0,035	0,040	0,046	0,052	0,060	0,069	0,080	0,092
2,00	0,040	0,046	0,053	0,061	0,070	0,080	0,093	0,106	0,122

Hta. Ø mm	N° de serie de avance Art.-no. 6400/6401/6408/6412												
	56	57	58	59	60	61	62	63	64	65	66	67	68
	f (mm/vuelta)												
0,80	0,008	0,016	0,024	0,032	0,04	0,05	0,06	0,07	0,08	0,08	0,08	0,09	0,09
1,00	0,012	0,022	0,032	0,042	0,06	0,07	0,08	0,09	0,10	0,10	0,11	0,11	0,12
1,50	0,021	0,036	0,051	0,066	0,09	0,10	0,12	0,13	0,15	0,15	0,16	0,17	0,18
2,00	0,032	0,052	0,072	0,092	0,12	0,14	0,16	0,18	0,20	0,21	0,22	0,23	0,24
2,50	0,045	0,070	0,095	0,120	0,15	0,17	0,20	0,22	0,25	0,26	0,27	0,28	0,30
3,00	0,060	0,090	0,120	0,150	0,18	0,21	0,24	0,27	0,30	0,31	0,33	0,34	0,36

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185 (St33), 1.0486 P275N (StE285), 1.0345 P235GH (H1), 1.0425 P265GH (H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	
Aceros templados	-		≤48 HRC ≤66 HRC	
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		
martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	
Fundición dura	-		≤350 HB	
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		
> 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		
Materiales sintéticos	Kevlar	≤1000		
Fibras de vidrio/carbón	GFK/CFK	≤1000		



Aplicaciones recomendadas TS-Drills

Artículo no.

Norma/DIN

Material de corte

Calidad de metal duro

Acabado

Tipo

Forma del mango

Refrigeración

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



HARTNER

≤3xD

89306	89264	89237	89422	89413	89402	89401	89450	89550	89266
6538K	6537K	6539	6537K	6537K	6537K	6539	6537K	6537K	6537K
MD	MD		MD	MD			MD	MD	MD
T	K/P	K/P	Y	K/P	K/P	K/P	K/P	K/P	K/P
T	T	T	Y	F	F	F	a	a	T
80U	100U	100U	100H	100U	100U	100U	100INOX	100INOX	100U
HE	HE	DZ	HA	HA	HE	DZ	HA	HE	HE
	axial	axial					axial	axial	axial
208	196	200	198	194	194	200	209	209	207



V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance			V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance	
95	6	100	6	130	7	130	7	7	7		110	6		
80	5	85	5	110	6	110	6	6	6		90	5		
95	7	110	7	145	8	145	8	8	8		130	7		
75	6	85	6	110	7	110	7	7	7		110	7		
80	6	90	6	120	7	120	7	7	7		100	7		
75	6	85	6	110	7	110	7	7	7		95	6		
70	6	80	6	105	7	105	7	7	7		90	6		
75	6	80	6	105	7	105	7	7	7		90	6		
60	5	75	5	100	6	100	6	6	6		80	6		
90	7	100	7	130	8	130	8	8	8		110	7		
75	6	90	6	120	7	120	7	7	7		90	6		
60	5	65	4	85	5	85	5	5	5		65	4		
75	6	75	5	100	6	100	6	6	6		85	6		
60	5	70	4	90	5	90	5	5	5		80	5		
45	5	50	5	65	6	65	6	6	6		60	5		
35	5	40	4	55	5	55	5	5	5		50	4		
40	4			55	4						45	3		
		35	2	45	3	45	3	3	3		45	2		
		35	1	40	1	40	1	1	1		40	2		
		20	1	20	1	20	1	1	1		20	1		
40	2	40	2	40	2	40	2	2	2	80	5	45	4	
35	2	15	1	15	1	15	1	1	1	60	2-3	40	2	
35	2	35	2	35	2	35	2	2	2	80	5	35	4	
150	7	160	7			210	8	8	8			160	8	
110	7	120	7			155	8	8	8			120	8	
110	7	120	6			155	7	7	7			100	8	
90	6	95	6			125	7	7	7			95	7	
		25	2			35	3	3	3			30	2	
		20	3	25	4	25	4	4	4	30	4	4	25	3
		15	1	15	1	15	1	1	1	45	4	4	35	3
		15	1	15	1	15	1	1	1	40	3	3	30	2
200	8	200	8			260	9	9	9			240	8	
200	8	200	8			260	9	9	9			240	8	
170	8	170	8			220	8	8	8			200	8	
140	7	140	7			180	8	8	8			170	8	
		200	7			260	8	8	8			230	7	
		80	6			105	7	7	7			95	6	
		210	7			270	8	8	8			250	7	
		140	6			180	7	7	7			170	6	
		80	5			105	6	6	6			95	6	
		65	5			85	6	6	6			80	5	
		60	4			80	5	5	5			70	5	
		45	4			60	5	5	5			60	5	



Aplicaciones recomendadas TS-Drills

Artículo no.

Norma/DIN

Material de corte

Calidad de metal duro

Acabado

Tipo

Forma del mango

Refrigeración

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



Aplicaciones recomendadas TS-Drills

Artículo no.

Norma/DIN

Material de corte

Calidad de metal duro

Acabado

Tipo

Forma del mango

Refrigeración

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



HARTNER

≤5xD

89275
WN
MD
K/P
T
100U
DZ
204

89414	89417
6537L	6537L
MD	MD
K/P	K/P
F	F
100U	100U
HA	HE
202	202

89272
6537L
MD
K/P
T
100U
HE
axial
214

89411	89408
6537L	6537L
MD	MD
K/P	K/P
F	F
100U	100U
HA	HE
axial	axial
215	215

89425	89426
6537L	6537L
MD	MD
Y	Y
100H	100H
HA	HE
axial	axial
220	220



V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance		V _c m/min	N° de serie de avance	V _c m/min	N° de serie de avance		V _c m/min	N° de serie de avance	
100	6	130	7	7	110	6	145	7	7	145	7	7
85	5	110	6	6	90	5	120	6	6	120	6	6
110	7	145	8	8	130	7	170	8	8	170	8	8
85	6	110	7	7	110	7	145	8	8	145	8	8
90	6	120	7	7	100	7	130	8	8	130	8	8
85	6	110	7	7	95	6	125	7	7	125	7	7
80	6	105	7	7	90	6	120	7	7	120	7	7
80	6	105	7	7	90	6	120	7	7	120	7	7
75	5	100	6	6	80	6	105	7	7	105	7	7
100	7	130	8	8	110	7	145	8	8	145	8	8
90	6	120	7	7	90	6	120	7	7	120	7	7
65	4	85	5	5	65	4	85	5	5	85	5	5
75	5	100	6	6	85	6	105	7	7	110	7	7
70	4	90	5	5	80	5	100	5	5	105	5	5
50	5	65	6	6	60	5	70	6	6	80	6	6
40	4	55	5	5	50	4	55	5	5	65	5	5
					45	4	60	5	5	60	4	4
35	2	45	3	3	45	2	60	3	3	60	3	3
35	1	35	1	1	40	2	55	2	2	55	3	3
20	1	20	1	1	25	1	35	2	2	35	2	2
40	2	40	2	2	45	4	60	5	5			
15	1	15	1	1	40	2	55	5	5			
35	2	35	2	2	35	4	45	5	5			
160	7	210	8	8	160	8	195	9	9			
120	7	155	8	8	120	8	160	9	9			
120	6	145	7	7	100	8	140	9	9			
95	6	125	7	7	95	7	130	8	8			
25	2	35	3	3	30	2	40	3	3			
20	3	25	4	4	25	3	35	4	4	35	4	4
15	1	15	1	1	35	3	45	4	4	45	4	4
15	1	15	1	1	30	2	40	3	3	40	3	3
200	8	260	9	9	240	8	310	9	9			
200	8	260	9	9	240	8	310	9	9			
170	8	235	9	9	200	8	260	9	9			
140	7	170	8	8	170	8	220	9	9			
200	7	260	8	8	230	7	280	8	8			
80	6	105	7	7	95	6	125	7	7			
210	7	270	8	8	250	7	325	8	8			
140	6	180	7	7	170	6	220	7	7			
80	5	105	6	6	95	6	125	7	7			
65	5	85	6	6	80	5	105	6	6			
60	4	80	5	5	70	5	90	6	6			
45	4	60	5	5	60	5	80	6	6			



Aplicaciones recomendadas TS-Drills

Artículo no.

Norma/DIN

Material de corte

Calidad de metal duro

Acabado

Tipo

Forma del mango

Refrigeración

Dimens. página

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		<input type="radio"/> <input type="radio"/>
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		<input type="radio"/> <input type="radio"/> <input type="radio"/>
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		<input type="radio"/>
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		<input type="radio"/> <input checked="" type="radio"/>
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		<input type="radio"/> <input type="radio"/>
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		<input checked="" type="radio"/>
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	<input checked="" type="radio"/>
Aceros templados	-		≤48 HRC ≤66 HRC	<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aceros inox., sulfurados martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		<input checked="" type="radio"/>
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	<input type="radio"/> <input type="radio"/>
Fundición dura	-		≤350 HB	<input type="radio"/>
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	<input type="radio"/> <input type="radio"/>
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		<input type="radio"/> <input type="radio"/>
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		<input checked="" type="radio"/>
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		<input checked="" type="radio"/> <input checked="" type="radio"/>
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		<input type="radio"/>
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		<input type="radio"/>
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		<input type="radio"/>
Aleac. fund. de Al > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		<input type="radio"/>
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		<input type="radio"/>
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		<input type="radio"/>
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		<input type="radio"/>
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		<input type="radio"/>
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		<input type="radio"/> <input checked="" type="radio"/>
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		<input checked="" type="radio"/> <input checked="" type="radio"/>
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		<input type="radio"/>
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		<input type="radio"/>
Materiales sintéticos	Kevlar	≤1000		<input type="radio"/>
Fibras de vidrio/carbón	GFK/CFK	≤1000		<input type="radio"/>



Aplicaciones recomendadas TS-Drills

Artículo no.

Norma/DIN

Material de corte

Calidad de metal duro

Tipó

Acabado

Refrigeración

Dimens. página

Procedimiento:

- La superficie debe ser mecanizada para facilitar la operación de taladrado.
- Realizar agujero piloto (Tolerancia F9) con una profundidad de perforación mínima de 1 x D.
- Perforar en el agujero piloto a una velocidad de aprox. 300 rev / min y con una velocidad de avance de aprox. 500 mm / min.
- Ajuste de la presión y velocidad del refrigerante.
- Continuidad de perforación.
- A través de los agujeros con salida oblicua, reducir la velocidad de alimentación vf al 40% aprox. 1 mm antes del desahogo.
- Retirar el anillo tras llegar al tope de profundidad.

Las herramientas con n° de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- corte a derechas
- corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	
Aceros templados	-		≤48 HRC ≤66 HRC	
Aceros inox., sulfurados austeníticos martensíticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A) 1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤900 ≤1100 ≤1500		
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	
Fundición dura	-		≤350 HB	
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		
Aleac. fund. de Al ≤ 10 % Si > 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		
Latón, viruta corta viruta larga	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600 ≤600		
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		
Materiales sintéticos	Kevlar	≤1000		
Fibras de vidrio/carbón	GFK/CFK	≤1000		



Aplicaciones recomendadas Brocas para agujeros profundos

Las operaciones para taladrar agujeros profundos

- Ejecución de un taladro piloto (L = 1,5 x D, tolerancia H8)
- Entrada con velocidad baja, aprox. 200 rpm, avance aprox. 500 mm/min
- Ajuste de la presión del lubricante refrigerador y de la velocidad de giro
- Taladrado continuo a la profundidad de taladro sin eliminación de virutas. Para el uso de brocas cañón con una gran proporción largo-diámetro (p. ej. EB 100 longitud de ranura 160 mm) recomendamos trabajar hasta una profundidad de taladro de aprox. 25 mm con parámetros de corte reducidos (aprox. 75% de la velocidad de corte óptima).
- Desconexión de la alimentación de lub. refrigerador al alcanzar la prof. de taladro
- Retirada en marcha rápida con el cabezal parado.

Broca Ø mm desde	Nº de serie de avance							
	11	12	13	14	15	16	17	18
	f (mm/rev.)							
1,50	0,002	0,004	0,006	0,008	0,012	0,020	0,032	0,045
2,00	0,003	0,005	0,007	0,010	0,016	0,028	0,046	0,055
2,50	0,004	0,006	0,008	0,012	0,018	0,030	0,054	0,070
4,00	0,005	0,007	0,010	0,016	0,025	0,043	0,065	0,085
6,00	0,007	0,009	0,013	0,024	0,035	0,061	0,085	0,120
8,00	0,010	0,014	0,022	0,032	0,045	0,068	0,100	0,150
10,00	0,012	0,016	0,028	0,040	0,055	0,075	0,120	0,160
14,00	0,020	0,025	0,035	0,050	0,065	0,085	0,130	0,180
18,00	0,025	0,030	0,040	0,055	0,070	0,095	0,145	0,200
20,00	0,026	0,035	0,045	0,060	0,080	0,110	0,180	0,250
24,00	0,027	0,036	0,047	0,065	0,085	0,130	0,185	0,300
28,00	0,028	0,038	0,049	0,068	0,090	0,140	0,195	0,350
30,00	0,030	0,040	0,050	0,070	0,100	0,150	0,200	0,400
35,00	0,035	0,045	0,055	0,075	0,120	0,180	0,250	0,450
40,00	0,040	0,050	0,060	0,080	0,150	0,200	0,300	0,500

Refrigerante:

- Emulsión
- Aceite
- Aire

E100

Broca de un labio

Enterizo MD

0,9 ... 12,0

253

Dimens. página



* Los valores de avance se refieren siempre a las herramientas con el recubrimiento recomendado. En algunos casos, el funcionamiento de las herramientas sin recubrimiento no se puede garantizar.

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resist. N/mm²	Dureza	Refriger.	capa recom.*	<35xD		>35xD	
						v _c m/min	Código VR	v _c m/min	Código VR
Aceros de construcción generales	1.0035 S185, 1.0486 P275N, 1.0345 P235GH, 1.0425	≤500		○	○	100	15	100	15
	1.0050 E295, 1.0070 E360, 1.8937 P500NH	≤1000		○		85	15	85	15
Aceros para autómatas	1.0718 11SMnPb30, 1.0736 11SMn37	≤850		○	○	90	15	90	15
	1.0727 46S20, 1.0728 60S20, 1.0757 46SPb20	≤1000		○		80	15	80	15
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E	≤700		○	○	80	14	80	14
	1.0503 C45, 1.1191 C45E	≤850		○		75	14	75	14
	1.0601 C60, 1.1221 C60E	≤1000		○		75	14	75	14
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4	≤1000		○	○	75	14	75	14
	1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1400		○		65	14	65	14
Aceros de cementación no aleados	1.0301, 1.1121 C10E	≤850		○	○	80	15	80	15
Aceros de cementación aleados	1.7276 10CrMo11, 1.5125 11MnSi6	≤1000		●	○	75	14	75	14
	1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1400		●		65	14	65	14
Aceros de nitruración	1.8504 34CrAl6	≤1000		○	○	75	14	75	14
	1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1400		○		65	14	65	14
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9	≤850		○	○	75	13	75	13
	1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419, 1.2767	≤1400		○		65	13	65	13
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		○	○	55	12	55	12
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4		≤350 HB	●	○	65	13	65	13
Aceros templados	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105		≤48 HRC	●	○	30	13	30	13
	1.4301 X5CrNi18-10, 1.4541 X6CrNi18-10, 1.4571		≤66 HRC	●		25	10	25	14
Aceros inox., sulfurados austeníticos martensíticos	1.4057 X20CrNi172, 1.4122 X39CrMo17-1, 1.4521	≤900		●	○	40	14	40	14
	-	≤1100		●		35	14	35	14
	-	≤1500		●		35	14	35	14
Hierro fundido	Nimonic, Inconel, Monel, Hastelloy		≤240 HB	○	○	85	16	85	16
	0.6010 EN-GJL-100, 0.6020 EN-GJL-200		≤350 HB	○		80	16	85	16
Fundición de grafito esférico y fundición maleable	0.6025 EN-GJL-250, 0.6035 EN-GJL-350		≤240 HB	○	○	80	15	80	15
	0.7050 EN-GJS-500-7, 0.8035 EN-GJMW-350-4		≤350 HB	○		70	15	70	15
Fundición dura	0.7070 EN-GJS-700-2, 0.8170 EN-GJMB-700-2		≤350 HB	○	○	55	14	55	14
Nuevos mat. de fundición GGV	-		≤220 HB	○	○				
	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2		≤300 HB	○					
Nuevos mat. de fundición ADI	3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184	≤1000		○	○				
	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤1400		○					
Aleaciones especiales	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245, 3.4365	≤2000		○	○	20	12	20	12
Titanio y aleaciones de titanio	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤850		○	○	35	12	35	12
	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, G-AlSi12CuNiMg	≤1400		○		30	12	30	12
Aluminio y aleaciones de Al	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05	≤400		○	○	150	17	150	17
Aleaciones maleables de Al	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤650		○	○	120	19	120	19
Aleac. fund. de Al ≤ 10 % Si > 10 % Si	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410	≤600		○	○	120	20	120	20
	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		○		130	18	130	18
Aleaciones de magnesio	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176	≤400		○	○	110	17	110	17
Cobre de baja aleación	2.0790 CuNi18Zn19Pb	≤500		○	○	75	15	75	15
Latón, viruta corta viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤600		○	○	120	18	120	18
	2.0980 CuAl11Ni, 2.1247 CuBe2	≤600		○		90	18	90	18
Bronces, viruta corta	Resina epoxidica, Resopal, Pertinax, Moltopren	≤600		○	○	95	17	95	17
	Plexiglas, Hostalen, Novodur, Makralon	≤850		○		75	17	75	17
Bronces, viruta larga	EN-GJV250 (GGV25), EN-GJV350 (GGV35)	≤850		○	○	70	17	70	17
	EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6	≤1000		○		60	17	60	17
	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000)	≤150		○		75	15	75	15
Duroplásticos	EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤100		○	○	70	15	70	15
Termoplásticos	Kevlar	≤1000		○	○	60	14	60	14
Materiales sintéticos	GFK/CFK	≤1000		○	○	50	14	50	14
Fibras de vidrio/carbón		≤1000		○	○				

Aplicaciones recomendadas Multiplex

Artículo no.
Gama de diámetros
Material de corte
Clase de metal duro
Calidad de metal duro
Acabado
Dimens. página

Las herramientas con nº de código de series de avance impreso en negrita (código VR) se deberían elegir con preferencia.

Hta. Ø mm	Nº de serie de avance					
	1	2	3	4	5	6
	f (mm/vuelta)					
10,00	0,08	0,09	0,11	0,14	0,19	0,24
12,50	0,09	0,11	0,13	0,17	0,22	0,28
16,00	0,11	0,13	0,16	0,21	0,27	0,34
20,00	0,13	0,15	0,19	0,25	0,32	0,40
25,00	0,16	0,18	0,23	0,29	0,38	0,48
31,50	0,19	0,22	0,27	0,35	0,45	0,57
40,00	0,23	0,26	0,33	0,42	0,54	0,69
50,00	0,27	0,31	0,39	0,50	0,64	0,82
63,00	0,32	0,38	0,47	0,60	0,77	0,98
102,00	0,40	0,48	0,59	0,74	0,95	1,20
150,00	0,59	0,70	0,87	1,09	1,25	1,76
100,00	0,78	0,93	1,16	1,45	1,67	2,35

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Sentido de corte:

- Ⓜ corte a derechas
- Ⓛ corte a izquierdas

Grupo de materiales	Ejemplos Cifras en negrita = nº de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		○
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		○
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		○
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		○
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		○
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		●
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		○
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		○
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		●
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	○
Aceros templados	-		≤48 HRC ≤66 HRC	○
Aceros inox., sulfurados austeníticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A)	≤900 ≤1100		○
martensíticos	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		○
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	○
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	○
Fundición dura	-		≤350 HB	○
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	○
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		○
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		○
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		○
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		○
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		○
Aleac. fund. de Al ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		○
> 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		○
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		○
Latón, viruta corta	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		○
viruta larga	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600		○
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		○
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl1Ni, 2.1247 CuBe2	≤850 ≤1000		○
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		○
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		○
Materiales sintéticos	Kevlar	≤1000		○
Fibras de vidrio/carbón	GFK/CFK	≤1000		○

Aplicaciones recomendadas Multiplex HPC

Artículo no.
Norma/DIN
Material de corte
Calidad de metal duro
Profundidad
Acabado
Tipo
Dimens. página

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250

Refrigerante según material:

- Aire
- Aceite
- ◐ Emulsión

Todas las indicaciones son valores orientativos. Las condiciones de velocidad de corte y avance a conseguir dependerán de las condiciones de trabajo. Recomendamos pruebas de taladrado.

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		○ ○
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		○ ○
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		○ ○ ○
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		○ ○
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		○
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		● ●
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		○ ●
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		○ ○
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		●
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	●
Aceros templados	-		≤48 HRC ≤66 HRC	● ●
Aceros inox., sulfurados austeníticos martensíticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.86681 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A) 1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤900 ≤1100 ≤1500		● ● ●
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	○ ○
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMw-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	○ ○
Fundición dura	-		≤350 HB	○
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	○ ○
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		○ ○
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		○ ○
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		○
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		○
Aleac. fund. de Al ≤ 10 % Si > 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		○ ○
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		○
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤600		○
Latón, viruta corta viruta larga	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600 ≤600		○ ○
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		○ ○
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		○ ○
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		○
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		○
Materiales sintéticos	Kevlar	≤1000		○
Fibras de vidrio/carbón	GFK/CFK	≤1000		○

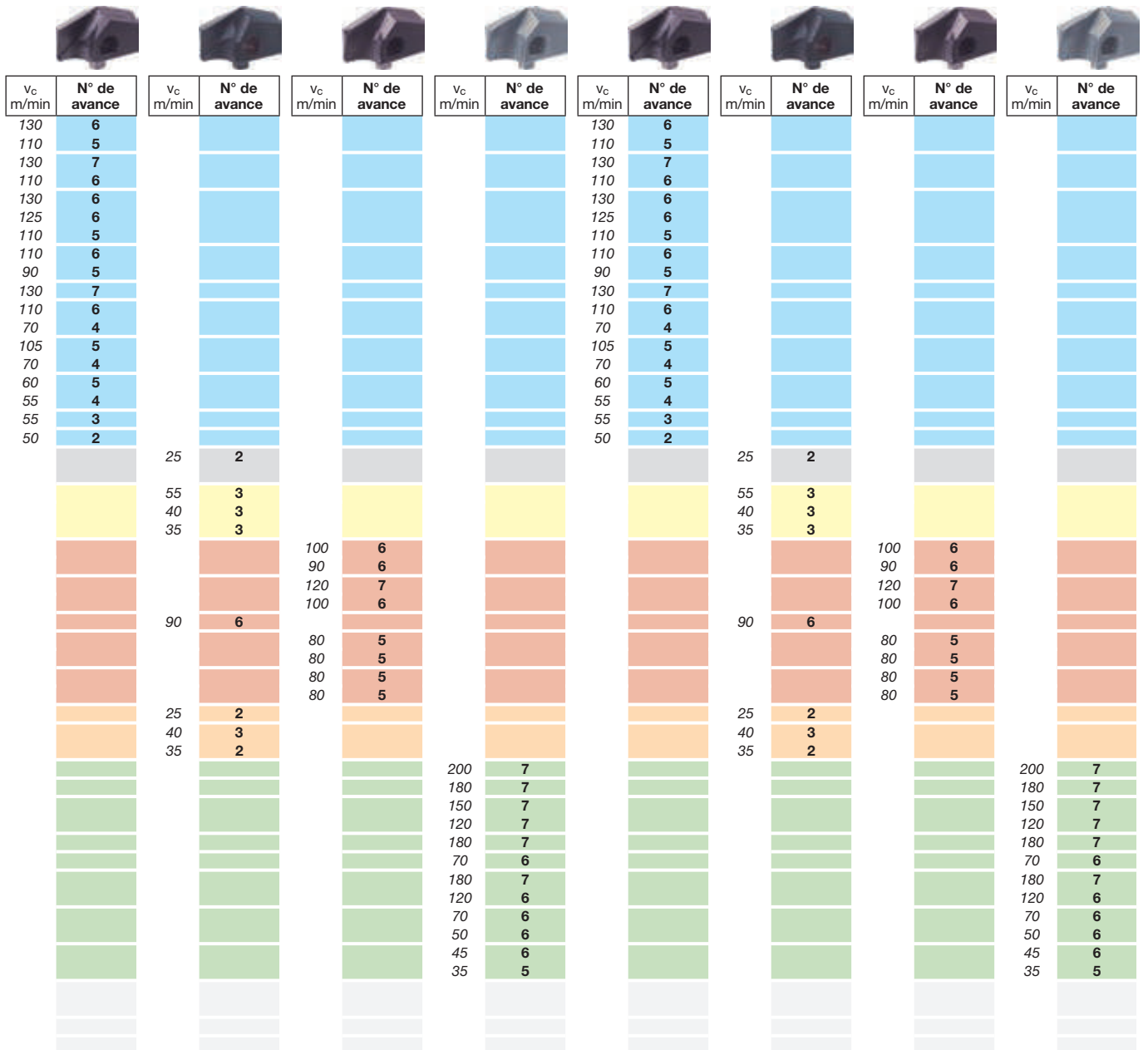


HARTNER

≤1,5xD

≤3xD

86722	86725	86723	86724	86722	86725	86723	86724
N. d. f.	N. d. f.	N. d. f.	N. d. f.	N. d. f.	N. d. f.	N. d. f.	N. d. f.
MD	MD	MD	MD	MD	MD	MD	MD
K/P	K/P	K/P	K/P	K/P	K/P	K/P	K/P
1,5xD	1,5xD	1,5xD	1,5xD	3xD	3xD	3xD	3xD
aceros	ac. inox.	fundición	Al y aleac.	aceros	ac. inox.	fundición	Al y aleac.
392	401	395	398	392	401	395	398



Aplicaciones recomendadas Multiplex HPC

Artículo no.
Norma/DIN
Material de corte
Calidad de metal duro
Profundidad
Acabado
Tipo
Dimens. página

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Todas las indicaciones son valores orientativos. Las condiciones de velocidad de corte y avance a conseguir dependerán de las condiciones de trabajo. Recomendamos pruebas de taladrado.

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		○ ○
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		○ ○
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		○ ○ ○
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		○ ○
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		○
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		● ●
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		○ ●
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		○ ●
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		●
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	●
Aceros templados	-		≤48 HRC ≤66 HRC	● ●
Aceros inox., sulfurados austeníticos martensíticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.86681 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A) 1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤900 ≤1100 ≤1500		● ● ●
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	○ ○
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMw-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	○ ○
Fundición dura	-		≤350 HB	○
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	○ ○
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		○ ○
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		● ●
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		○
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		○
Aleac. fund. de Al ≤ 10 % Si > 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		○ ○
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		○
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤600		○
Latón, viruta corta viruta larga	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600 ≤600		○ ○
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		○ ○
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl1Ni, 2.1247 CuBe2	≤850 ≤1000		○ ○
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		○
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		○
Materiales sintéticos	Kevlar	≤1000		○
Fibras de vidrio/carbón	GFK/CFK	≤1000		○



HARTNER

≤5xD

≤7xD

86722
N. d. f.
MD
K/P
1,5xD
F
aceros
392

86725
N. d. f.
MD
K/P
1,5xD
a
ac. inox.
401

86723
N. d. f.
MD
K/P
1,5xD
F
fundición
395

86724
N. d. f.
MD
K/P
1,5xD
○
Al y aleac.
398

86722
N. d. f.
MD
K/P
3xD
F
aceros
392

86725
N. d. f.
MD
K/P
3xD
a
ac. inox.
401

86723
N. d. f.
MD
K/P
3xD
F
fundición
395

86724
N. d. f.
MD
K/P
3xD
○
Al y aleac.
398



V _c m/min	Nº de avance	V _c m/min	Nº de avance	V _c m/min	Nº de avance	V _c m/min	Nº de avance	V _c m/min	Nº de avance	V _c m/min	Nº de avance	V _c m/min	Nº de avance	V _c m/min	Nº de avance	V _c m/min	Nº de avance
125	6							120	5								
105	5							105	4								
125	7							120	6								
105	6							105	5								
125	6							120	5								
120	6							110	5								
105	5							100	4								
105	6							100	5								
85	5							85	4								
125	7							120	6								
105	6							100	5								
70	4							70	4								
105	5							105	4								
70	4							70	3								
55	5							55	4								
50	4							50	3								
55	3							55	2								
50	2							50	2								
		25	2							25	1						
		55	3							55	2						
		40	3							40	2						
		35	3							35	2						
				100	6							80	6				
				90	6							70	6				
				120	7							100	7				
				100	6							80	6				
		90	6							70	6						
				80	5							60	5				
				80	5							60	5				
				80	5							60	5				
				80	5							60	5				
		25	2							25	1						
		40	3							40	2						
		35	2							35	1						
								180	7							180	6
								180	7							180	6
								140	7							140	6
								110	7							110	6
								180	7							180	6
								70	6							70	5
								180	7							180	6
								120	6							120	5
								70	6							70	5
								50	6							50	5
								45	6							45	5
								35	5							35	4

Aplicaciones recomendadas Multiplex HPC

Artículo no.
Norma/DIN
Material de corte
Calidad de metal duro
Profundidad
Acabado
Tipo
Dimens. página

Hta. Ø mm	N° de serie de avance								
	1	2	3	4	5	6	7	8	9
	f (mm/vuelta)								
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250

Refrigerante según material:

- Aire
- Aceite
- Emulsión

Todas las indicaciones son valores orientativos. Las condiciones de velocidad de corte y avance a conseguir dependerán de las condiciones de trabajo. Recomendamos pruebas de taladrado.

Grupo de materiales	Ejemplos Cifras en negrita = n° de mat. según DIN EN 10 027	Resistencia N/mm ²	Dureza	Refriger.
Aceros de construcción generales	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2) 1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤500 ≤1000		○ ○
Aceros para autómatas	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36) 1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤850 ≤1000		○ ○
Aceros de bonificación no aleados	1.0402 C22, 1.1178 C30E (Ck30) 1.0503 C45, 1.1191 C45E (Ck45) 1.0601 C60, 1.1221 C60E (Ck60)	≤700 ≤850 ≤1000		○ ○ ○
Aceros de bonificación aleados	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400		○ ○
Aceros cementación aleados	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		○
Aceros cementación no aleados	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400		● ●
Aceros de nitruración	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1000 ≤1400		○ ●
Aceros para herramientas	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤850 ≤1400		○ ○
Aceros rápidos	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		●
Aceros para muelles	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	●
Aceros templados	-		≤48 HRC ≤66 HRC	● ●
Aceros inox., sulfurados austeníticos martensíticos	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.86681 X6CrMoS17, 1.4305 X8CrNiS18-9 1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi 17-12-2 (V4A) 1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤900 ≤1100 ≤1500		● ● ●
Hierro fundido	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20) 0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤240 HB ≤350 HB	○ ○
Fundición de grafito esférico y fundición maleable	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMw-350-4 (GTW35) 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤240 HB ≤350 HB	○ ○
Fundición dura	-		≤350 HB	○
Nuevos mat. de fundición GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤220 HB ≤300 HB	○ ○
Nuevos mat. de fundición ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400		○ ○
Aleaciones especiales	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio y aleaciones de titanio	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 ≤1400		○ ○
Aluminio y aleaciones de Al	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		○
Aleaciones maleables de Al	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	≤650		○
Aleac. fund. de Al ≤ 10 % Si > 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		○ ○
Aleaciones de magnesio	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		○
Cobre de baja aleación	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤600		○
Latón, viruta corta viruta larga	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600 ≤600		○ ○
Bronces, viruta corta	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 ≤850		○ ○
Bronces, viruta larga	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000		○ ○
Duroplásticos	Resina epoxídica, Resopal, Pertinax, Moltopren	≤150		○
Termoplásticos	Plexiglas, Hostalen, Novodur, Makralon	≤100		○
Materiales sintéticos	Kevlar	≤1000		○
Fibras de vidrio/carbón	GFK/CFK	≤1000		○

HARTNER dispone de su propia red de ventas, tanto en Alemania como a nivel mundial. Asimismo dispone de un cualificado departamento de ventas que le darán soporte técnico y el mejor asesoramiento para las herramientas HARTNER.

Encontrará su distribuidor HARTNER más cercano en internet, con una base de datos actualizada.

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