HARTNER

Precision Cutting Tools

OUTILS DE **PERÇAGE**

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Precision Cutting Tools

Désignation

Type	Utilisation	Angle de coupe latéral	Angle de pointe	Affûtage de pointe	
N	Pour matières faciles à usine (Ex. aciers, GS, GG)	20°-30°	118°	Affûtage à dépouille conique Affûtage standard	Forets aciers rapides
H	Pour matières dures à copeaux courts (Ex. MS, bronze, elektron)	12°-16°	118°	Affûtage à dépouille conique Affûtage standard	
W	Pour matières tendres et à copeaux longs (Ex. alliages d'Al., cuivre)	35°-40°	130°	Affûtage à dépouille conique Affûtage standard	
FN	Pour matières faciles à usine Pour perçages particulièrement profonds	35°	130°	Affûtage à dépouille conique Affûtage standard	
FN 500	Pour matières tenaces à copeaux longs (Ex. aciers fortement alliés, aciers trempés et de cémentation)	20°-30°	130°	Affûtage à dépouille conique Affûtage standard	
FU 500 FU 500 DZ	Pour applications universelles (Ex. pour aciers alliés ou non jusqu'à 800 mm^2) DZ = queue cylindrique	35°	118°	Pointe 2 faces à géométrie spéciale	
FW	Pour matières tendres et à copeaux longs Pour perçages particulièrement profonds	35°-40°	130°	Affûtage à dépouille conique Affûtage standard	
S	Pour matières difficiles à usiner (Ex. aciers inox et thermorésistants)	35°	130°	Affûtage à dépouille conique Affûtage standard	
IS	Pour aciers tenaces, inox., résistants aux acides et à la chaleur	40°	130°	Affûtage à dépouille conique Affûtage standard	
HX500	Pour les matériaux résistants à l'usure tels que Hardox	22°	135°	Affûtage 2 pentes spécial	
V	Pour matières dures difficiles à usiner (Ex. aciers à ressort)	20°-30°	130°	Affûtage à dépouille conique Affûtage standard	
TS 3 G	Pour perçages précis, position et forme de qualité	28°	150°	Affûtage spécial	Forets carbures
TS 80 U	Pour application universelle (Ex. GG, GGG, aciers jusqu'à 1000 N/mm^2)	20°-30°	140°	Affûtage à dépouille con. Amincissement de l'âme particulier type U	
TS 100 U	Pour aciers jusqu'à 1000 N/mm^2 Pour application universelle	25°-35°	140°	Affûtage des faces	
TS 100 HPC	Pour l'usinage haute performance dans les aciers de constr. et cément. jusqu'à 1400 N/mm^2, aciers inox., Titane, ainsi que des alliages spéciaux	25°-30°	140°	Optimisation affûtage tronconique	
TS 150 GG	Pour fontes à copeaux courts, aluminium et alliages d'aluminium avec haut % de Si	0° (rainures droites)	120°	Affûtage des faces Amincissement de l'âme particulier type GG	
TS 100 R	Pour nouvelles matières en fonte GGV et ADI, fonte de fer, fonte à graphite sphéroïdal et fonte malléable	30°	–	Affûtage radial	
TS 100 T	Pour perçages profonds dans l'acier et la fonte	30°	135°	Affûtage à dépouille conique	
TS 100 INOX	Pour aciers inox.	30°	140°	Affûtage des faces	
TS 100 H	Pour aciers durs et résistants comme les alliages spéciaux	30°	140°	Affûtage à dépouille conique	
TS 100 EG	Outils d´ébavurage				Outils d'ébavurage
TS 100 VR	Ebavureur avant et arrière 90°				
TLB E80	Foret une lèvre pour forages profonds avec tête de perçage brasée				Outils de forage
TLB E100	Foret une lèvre pour forages profonds en carbure monobloc				
TLB E800	Foret une lèvre pour forages profonds avec plaquettes interchangeables				
TLB Z80	Foret deux lèvres pour forages profonds avec tête de perçage brasée				

Code ISO

P	Aciers communs, aciers hautement alliés
M	Aciers inoxydables
K	Fontes grises, fontes à graphite sphéroïdal et fontes malléables
N	Aluminium et ses alliages ainsi que d´autres métaux non ferreux
S	Alliages de titane, spéciaux et superalliages
H	Aciers trempés et fontes dures

Pictogrammes

Matériaux de coupe

HSS, HSS-E, M42, HSS-E-PM — Aciers rapides

VHM — Carbures monoblocs

HM — CW

Version

poli	traité vapeur	listels nitrurés	Bronze-Oxid	TiAlN	AlTiN nano	AlTiN	TiCN	FIRE
TiN	MolyGlide	TiAlSiN	nickelé	bruni				

Type

Explication de la logotypie au verso de la page à clapet

N	H	W	FN	FN 500	FU 500	FU 500 DZ	FW	S	IS
HX 500	V	TS 3 G	TS 80 U	TS 100 U	TS 100 HPC	TS 150 GG	TS 100 R	TS 100 T	TS 100 INOX
TS 100 H	TS 100 EG	TS 100 VR	TLB E 80	TLB E 100	TLB E 800	TLB Z 80			

Forme

R, A, B, C

Profondeur

3xD	5xD	....	~3xD	~5xD	....	SPL 45,00	SPL 80,00	....
						mm	mm	

Norme

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 6537 K	DIN 6537 L	DIN 6527 K	selon DIN

WN — selon standard Hartner

Angle d'affûtage

90°, 118°, 120°, 130°, 135°, 140°, 142°, 150°

Ø-Tolérance

m7, h5, h6, h7, h8, 0/-0,004

Sens de coupe

R, L — à droite à gauche

Forme de la queue

HA, HB, HE — selon norme DIN 6535

Cyl — cylindrique

MK — Cône Morse

SK — Cône DIN 69871

Aminc. de l'âme

Amincissement de l'âme

Lubrification intérieure

avec LI sans LI

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Façons de commander

Lors de votre commande, veuillez indiquer
le n° d'article et le diamètre d1, ex.:
„Foret hélicoïdal court, avec diamètre nominal Ø 0,20mm"
= 81010 0,200

N° d'article

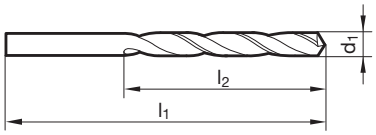
Forets hélicoïdaux courts

N° d'article 81010

P	M	K	N	S	H
●		●	○		

HSS | >Ø 2,36 | N | ~5xD | DIN 338 | 118° | h8 | R | Cyl

Amin. de l'âme ≥ Ø 1.000 • affûtage à dépouille tronconique
acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



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

Diamètre nominal

Le type de préconisation selon les applications est indiqué de la manière suivante sur les pages des programmes:
● particulièrement adapté
○ sous réserve

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Informations importants

Conditions générales de vente

Nous livrons seulement selon nos conditions générales de livraison et de paiement.
Sur demande, ces conditions seront mises à votre disposition.

Lors d´une commande d´outils spéciaux, les quantités d´outils livrés peuvent variées de plus ou moins 10%, dans le pire des cas de deux pièces minimum par rapport à la quantité commandée. Ainsi, nous vous facturons selon la quantité livrée.

Conditions de livraison des quantités minimum

Dans le cas d´une commande avec une valeur inférieure à 100,00 € net, nous nous réservons le droit de vous facturer un supplément convenable.

Types d'outils	Norme	Nombre de pièces/conditionnement
Forets HSS queue cylindrique en acier rapide	DIN 338 DIN 1897 et semblable Norme Usine	≤ Ø 7,50 mm pochettes de 10 pièces > Ø 7,50 ... Ø 10,60 mm pochettes de 5 pièces > Ø 10,60 mm emballage à l'unité
	DIN 339 DIN 340 et semblable Norme Usine	≤ Ø 6,70 mm pochettes de 10 pièces > Ø 6,70 ... Ø 10,60 mm pochettes de 5 pièces > Ø 10,60 mm emballage à l'unité
	DIN 1869	≤ Ø 7,50 mm pochettes de 10 pièces > Ø 7,50 ... Ø 10,60 mm pochettes de 5 pièces > Ø 10,60 mm emballage à l'unité
Forets HSS queue cône Morse en acier rapide	toutes les normes DIN et Norme Usine	tous les diamètres, emballage à l'unité
Forets en CW mono ou avec CW rapporté	toutes les normes DIN et Norme Usine	tous les diamètres, emballage à l'unité
Micro-forets	DIN 1899	tous les diamètres, pochettes de 10 pièces
Forets à centrer	DIN 333 forme A, forme R	≤ Ø 4,00 mm pochettes de 10 pièces > Ø 4,00 mm emballage à l'unité
	DIN 333 forme B	≤ Ø 2,50 mm pochettes de 10 pièces > Ø 2,50 mm emballage à l'unité

Coordonnées bancaires

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

BW Bank
IBAN DE45 6005 0101 0002 5924 44
BIC SOLADEST600

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Résumé

N° d'article	Page	Prof. de perçage	Norme	Surface	Désignation	Matière de coupe	Type
80495	388		Norme usine	AlTiN nano	Ebavureur en avant et en arrière 90°	CW monobloc	TS 100 VR
81000	104	3xD	Norme usine	TiAlZrN	HX 500	M42	HX 500
81010	53	~5xD	DIN 338	traité vapeur	Forets hélicoïdaux courts	HSS	N
81011	83	~5xD	DIN 338	traité vapeur	Forets hélicoïdaux courts	HSS-E	N
81012	77	~5xD	DIN 338	poli	Forets hélicoïdaux courts	M42	N
81013	85	~5xD	DIN 338	poli	Forets hélicoïdaux courts	HSS-E	IS
81015	57	~5xD	DIN 338	traité vapeur	Forets hélicoïdaux courts	HSS	N
81017	59	~5xD	DIN 338	traité vapeur	Forets hélicoïdaux courts	HSS	N
81018	79	~5xD	DIN 338	Bronze-Oxid	Forets hélicoïdaux courts	M42	N
81019	81	~5xD	DIN 338	nanoFIRE	Forets hélicoïdaux courts	M42	N
81020	60	~5xD	DIN 338	poli	Forets hélicoïdaux courts	HSS	H
81025	62	~5xD	DIN 338	poli	Forets hélicoïdaux courts	HSS	H
81030	64	~5xD	DIN 338	poli	Forets hélicoïdaux courts	HSS	W
81035	66	~5xD	DIN 338	poli	Forets hélicoïdaux courts	HSS	W
81040	67	~5xD	DIN 338	listels nitrurés	Forets hélicoïdaux courts	HSS	FN
81041	87	~5xD	DIN 338	listels nitrurés	Forets hélicoïdaux courts	HSS-E	FN
81045	69	~5xD	DIN 338	listels nitrurés	Forets hélicoïdaux courts	HSS	FN
81061	89	~5xD	DIN 338	poli	Forets hélicoïdaux courts	HSS-E	S
81078	97	~5xD	DIN 338	AlTiZrN	Forets hélicoïdaux courts	HSS-E	IS
81110	24	~3xD	DIN 1897	traité vapeur	Forets hélicoïdaux extra-courts	HSS	N
81112	35	~3xD	DIN 1897	poli	Forets hélicoïdaux extra-courts	M42	N
81115	26	~3xD	DIN 1897	poli	Forets hélicoïdaux extra-courts	HSS	N
81120	28	~3xD	DIN 1897	poli	Forets hélicoïdaux extra-courts	HSS	H
81130	29	~3xD	DIN 1897	poli	Forets hélicoïdaux extra-courts	HSS	W
81140	30	~3xD	DIN 1897	listels nitrurés	Forets hélicoïdaux extra-courts	HSS	FN
81145	31	~3xD	DIN 1897	listels nitrurés	Forets hélicoïdaux extra-courts	HSS	FN
81171	37	~3xD	DIN 1897	traité vapeur	Forets hélicoïdaux extra-courts	HSS-E	V
81173	39	~3xD	DIN 1897	poli	Forets hélicoïdaux extra-courts	HSS-E	IS
81178	44	~3xD	DIN 1897	AlTiZrN	Forets hélicoïdaux extra-courts	HSS-E	IS
81190	119		Norme usine	traité vapeur	Forets carrosseries	HSS	N
81191	115		Norme usine	poli	Forets NC	HSS	N
81192	116		Norme usine	poli	Forets NC	HSS	N
81210	122	~10xD	DIN 339	traité vapeur	Forets pour perçage par canon	HSS	N
81310	124	~10xD	DIN 340	traité vapeur	Forets hélicoïdaux longs	HSS	N
81311	138	~10xD	DIN 340	traité vapeur	Forets hélicoïdaux longs	HSS-E	N
81315	126	~10xD	DIN 340	traité vapeur	Forets hélicoïdaux longs	HSS	N
81317	127	~10xD	DIN 340	traité vapeur	Forets hélicoïdaux longs	HSS	N
81320	128	~10xD	DIN 340	poli	Forets hélicoïdaux longs	HSS	H
81330	129	~10xD	DIN 340	poli	Forets hélicoïdaux longs	HSS	W
81340	131	~10xD	DIN 340	listels nitrurés	Forets hélicoïdaux longs	HSS	FN
81341	139	~10xD	DIN 340	listels nitrurés	Forets hélicoïdaux longs	HSS-E	FN
81350	133	~10xD	DIN 340	poli	Forets hélicoïdaux longs	HSS	FW
81361	141	~10xD	DIN 340	poli	Forets hélicoïdaux longs	HSS-E	S
81362	141	~10xD	DIN 340	TiN	Forets hélicoïdaux longs	HSS-E	S
81410	147	~15xD	DIN 1869	traité vapeur	Forets hélicoïdaux extra-longs, série 1	HSS	N
81440	148	~15xD	DIN 1869	listels nitrurés	Forets hélicoïdaux extra-longs, série 1	HSS	FN
81441	151	~15xD	DIN 1869	listels nitrurés	Forets hélicoïdaux extra-longs, série 1	HSS-E	FN
81450	149	~15xD	DIN 1869	poli	Forets hélicoïdaux extra-longs, série 1	HSS	FW
81510	152	~20xD	DIN 1869	traité vapeur	Forets hélicoïdaux extra-longs, série 2	HSS	N
81540	153	~20xD	DIN 1869	listels nitrurés	Forets hélicoïdaux extra-longs, série 2	HSS	FN
81541	155	~20xD	DIN 1869	listels nitrurés	Forets hélicoïdaux extra-longs, série 2	HSS-E	FN
81610	156	~25xD	DIN 1869	traité vapeur	Forets hélicoïdaux extra-longs, série 3	HSS	N
81640	157	~25xD	DIN 1869	listels nitrurés	Forets hélicoïdaux extra-longs, série 3	HSS	FN
81641	158	~25xD	DIN 1869	listels nitrurés	Forets hélicoïdaux extra-longs, série 3	HSS-E	FN
81740	159	>25xD	Norme usine	listels nitrurés	Forets hélicoïdaux extra-longs	HSS	FN
81750	160	>25xD	Norme usine	poli	Forets hélicoïdaux extra-longs	HSS	FN
81760	161	>25xD	Norme usine	poli	Forets hélicoïdaux extra-longs	HSS	FN
81810	162		DIN 1898	traité vapeur	Forets de chaudronnerie	HSS	N
82010	173	~5xD	DIN 345	traité vapeur	Forets hélicoïdaux	HSS	N
82011	177	~5xD	DIN 345	traité vapeur	Forets hélicoïdaux	HSS-E	N
82012	178	~5xD	DIN 345	poli	Forets hélicoïdaux à queue CM	HSS-E	IS
82030	175	~5xD	DIN 345	poli	Forets hélicoïdaux	HSS	W
82191	183		Norme usine	traité vapeur	Forets NC	HSS	N
82192	183		Norme usine	traité vapeur	Forets NC	HSS	N
82210	184	~10xD	DIN 341	traité vapeur	Forets hélicoïdaux longs	HSS	N
82211	185	~10xD	DIN 341	traité vapeur	Forets hélicoïdaux longs	HSS-E	N

N° d'article	Page	Prof. de perçage	Norme	Surface	Désignation	Matière de coupe	Type
82310	186	~15xD	DIN 1870	traité vapeur	Forets hélicoïdaux extra-longs, série 1	HSS	N
82340	187	~15xD	DIN 1870	listels nitrurés	Forets hélicoïdaux extra-longs, série 1	HSS	FN
82341	188	~15xD	DIN 1870	listels nitrurés	Forets hélicoïdaux extra-longs, série 1	HSS-E	FN
82410	189	~20xD	DIN 1870	traité vapeur	Forets hélicoïdaux extra-longs, série 2	HSS	N
82440	190	~20xD	DIN 1870	listels nitrurés	Forets hélicoïdaux extra-longs, série 2	HSS	FN
82466	191	>20xD	Norme usine	listels nitrurés	Forets hélicoïdaux extra-longs	HSS	FN
82467	192	20xD	Norme usine	listels nitrurés	Forets hélicoïdaux extra-longs	HSS	FN
82468	193	>20xD	Norme usine	poli	Forets hélicoïdaux extra-longs	HSS	FN
82469	194	>20xD	Norme usine	poli	Forets hélicoïdaux extra-longs	HSS	FN
82515	198	~15xD	Norme usine	traité vapeur	Forets avec canaux de refroidissment, extra longs	HSS-E	FN
82521	195	~10xD	Norme usine	traité vapeur	Forets avec canaux de refroidissment, longs	HSS	N
82525	197	~10xD	Norme usine	traité vapeur	Forets avec canaux de refroidissment, longs	HSS-E	FN
82535	196	~10xD	Norme usine	traité vapeur	Forets avec canaux de refroidissment, longs	HSS	FN
82571	423		Norme usine	traité vapeur	Tube d'adduction		
82578	424		Norme usine		Déconnexion rapide		
82710	121	~10xD	Norme usine	poli	Forets avec canaux de refroidissment	HSS	FN
82761	120	~5xD	Norme usine	poli	Forets avec canaux de refroidissment	HSS-E	FN
82810	202		DIN 1898	traité vapeur	Forets de chaudronnerie	HSS	N
82971	181	~3xD	Norme usine	traité vapeur	Forets hélicoïdaux courts	HSS-E	V
82972	182	~3xD	Norme usine	poli	Forets hélicoïdaux à queue CM	HSS-E	IS
83000	368		DIN 333	poli	Forets à centrer sans méplat	HSS	N
83005	371		DIN 333	poli	Forets à centrer sans méplat	HSS	N
83100	366		DIN 333	poli	Forets à centrer sans méplat	HSS	N
83101	373		DIN 333	poli	Forets à centrer sans méplat	HSS-E	N
83102	374		DIN 333	nanoFIRE	Forets à centrer sans méplat	HSS-E	N
83105	367		DIN 333	poli	Forets à centrer sans méplat	HSS	N
83110	372		Norme usine	poli	Forets à centrer sans méplat	HSS	N
83200	370		DIN 333	poli	Forets à centrer sans méplat	HSS	N
83300	369		DIN 333	poli	Forets à centrer sans méplat	HSS	N
83370	375		Norme usine	poli	Forets à centrer sans méplat	CW monobloc	N
83500	376		DIN 333	poli	Forets à centrer avec méplat	HSS	N
83600	376		DIN 333	poli	Forets à centrer avec méplat	HSS	N
83700	377		DIN 333	poli	Forets à centrer avec méplat	HSS	N
84100	386		Norme usine	poli	Outils d´ébavurage	CW monobloc	TS 100 EG
84101	387		Norme usine	poli	Outils d´ébavurage	CW monobloc	TS 100 EG
84400	33	~3xD	DIN 1897	TiN	Forets hélicoïdaux extra-courts	HSS	N
84405	71	~5xD	DIN 338	TiN	Forets hélicoïdaux courts	HSS	N
84406	73	~5xD	DIN 338	sommet rev. TiN	Forets hélicoïdaux courts	HSS	N
84415	75	~5xD	DIN 338	TiN	Forets hélicoïdaux courts	HSS	FN
84418	135	~10xD	DIN 340	TiN	Forets hélicoïdaux longs	HSS	N
84423	136	~10xD	DIN 340	TiN	Forets hélicoïdaux longs	HSS	FN
84425	150	~15xD	DIN 1869	TiN	Forets hélicoïdaux extra-longs, série 1	HSS	FN
84426	154	~20xD	DIN 1869	TiN	Forets hélicoïdaux extra-longs, série 2	HSS	FN
84434	115		Norme usine	TiN	Forets NC	HSS	N
84435	116		Norme usine	TiN	Forets NC	HSS	N
84445	348		Norme usine	TiN	Forets étagés à queue cylindrique, courts	HSS	N
84448	368		DIN 333	TiN	Forets à centrer sans méplat	HSS	N
84450	366		DIN 333	TiN	Forets à centrer sans méplat	HSS	N
84460	176	~5xD	DIN 345	TiN	Forets hélicoïdaux	HSS	N
84461	120	~5xD	Norme usine	TiN	Forets avec canaux de refroidissment	HSS-E	FN
84501	33	~3xD	DIN 1897	nanoFIRE	Forets hélicoïdaux extra-courts	HSS	N
84502	75	~5xD	DIN 338	nanoFIRE	Forets hélicoïdaux courts	HSS	FN
84503	40	~3xD	DIN 1897	nanoFIRE	Forets hélicoïdaux extra-courts	HSS-E	V
84504	91	~5xD	DIN 338	nanoFIRE	Forets hélicoïdaux courts	HSS-E	FN
84505	95	~5xD	DIN 338	nanoFIRE	Forets hélicoïdaux courts	HSS-E	S
84506	136	~10xD	DIN 340	nanoFIRE	Forets hélicoïdaux longs	HSS	FN
84507	109	~5xD	Norme usine	nanoFIRE	Forets hélicoïd. à queue cylind. renforcée	HSS-E-PM	FN 500
84508	145	~10xD	DIN 340	nanoFIRE	Forets hélicoïdaux longs	HSS-E	FN
84511	46	~3xD	DIN 1897	nanoFIRE	Forets hélicoïdaux extra-courts	HSS-E-PM	FN 500
84660	179	~5xD	DIN 345	TiAlN	Forets hélicoïdaux	HSS-E	FN
84800	91	~5xD	DIN 338	TiN	Forets hélicoïdaux courts	HSS-E	FN
84801	107	~5xD	Norme usine	nanoFIRE	Forets hélicoïd. à queue cylind. renforcée	HSS-E-PM	FU 500
84802	93	~5xD	DIN 338	TiN	Forets hélicoïdaux courts	HSS-E	FU 500 DZ
84803	40	~3xD	DIN 1897	TiN	Forets hélicoïdaux extra-courts	HSS-E	V
84804	93	~5xD	DIN 338	poli	Forets hélicoïdaux courts	HSS-E	FU 500 DZ
84805	105	~3xD	Norme usine	nanoFIRE	Forets hélicoïd. à queue cylind. renforcée	HSS-E-PM	FU 500

N° d'article	Page	Prof. de perçage	Norme	Surface	Désignation	Matière de coupe	Type
84806	42	~3xD	DIN 1897	TiN	Forets hélicoïdaux extra-courts	HSS-E	FU 500 DZ
84807	95	~5xD	DIN 338	TiN	Forets hélicoïdaux courts	HSS-E	S
84808	42	~3xD	DIN 1897	poli	Forets hélicoïdaux extra-courts	HSS-E	FU 500 DZ
84810	332	~5xD	DIN 1899	TiN	Microforets sans trou d'huile	HSS-E-PM	N
84811	99	~5xD	DIN 338	TiN	Forets hélicoïdaux courts	HSS-E-PM	FN 500 DZ
84812	143	~10xD	DIN 340	TiN	Forets hélicoïdaux longs	HSS-E	FU 500 DZ
84814	143	~10xD	DIN 340	poli	Forets hélicoïdaux longs	HSS-E	FU 500 DZ
84859	180	~5xD	DIN 345	TiN	Forets hélicoïdaux	HSS-E	N
85010	354		DIN 8374	traité vapeur	Forets étagés à listels continus, queue cyl.	HSS	N
85110	358		Norme usine	traité vapeur	Forets étagés à listels continus, queue cyl.	HSS	N
85210	356		DIN 8376	traité vapeur	Forets étagés à listels continus, queue cyl.	HSS	N
85216	359		Norme usine	traité vapeur	Forets étagés à listels continus, queue cyl.	HSS	N
85218	355		DIN 8374	traité vapeur	Forets étagés à listels continus, queue cyl.	HSS	N
85310	357		DIN 8378	traité vapeur	Forets étagés à listels continus, queue cyl.	HSS	N
85510	364		Norme usine	traité vapeur	Forets étagés à listels continus, queue CM	HSS	N
85610	362		DIN 8377	traité vapeur	Forets étagés à listels continus, queue CM	HSS	N
85616	365		Norme usine	traité vapeur	Forets étagés à listels continus, queue CM	HSS	N
85619	361		DIN 8375	traité vapeur	Forets étagés à listels continus, queue CM	HSS	N
85710	363		DIN 8379	traité vapeur	Forets étagés à listels continus, queue CM	HSS	N
85910	345		Norme usine	traité vapeur	Forets étagés pour centres int.selon DIN 332	HSS	N
85911	345		Norme usine	traité vapeur	Forets étagés pour centres int.selon DIN 332	HSS	N
85912	346		Norme usine	traité vapeur	Forets étagés pour centres int.selon DIN 332	HSS	N
85914	347		Norme usine	traité vapeur	Forets étagés pour centres int.selon DIN 332	HSS	N
85916	349		Norme usine	poli	Forets étagés à queue cylindrique, courts	HSS	N
85917	350		Norme usine	poli	Forets étagés à queue cylindrique, courts	HSS	N
85918	351		Norme usine	poli	Forets étagés à queue cylindrique, courts	HSS	N
85920	352		Norme usine	poli	Forets étagés à queue cylindrique, courts	HSS	N
86010	165		DIN 344	traité vapeur	Forets aléseurs, queue cylindrique	HSS	N
86110	200		DIN 343	traité vapeur	Forets aléseurs, queue CM	HSS	N
86111	201		DIN 343	traité vapeur	Forets aléseurs, queue CM	HSS-E	N
86400	334	4xD	Norme usine	AlTiN	Microforets sans trou d'huile	CW monobloc	N
86401	336	7xD	Norme usine	AlTiN	Microforets sans trou d'huile	CW monobloc	N
86402	333		Norme usine	TiAlN	Microforets sans trou d'huile	CW monobloc	N
86405	337	5xD	Norme usine	TiAlN	Microforets à trous d'huile	CW monobloc	N
86408	338	8xD	Norme usine	TiAlN	Microforets à trous d'huile	CW monobloc	N
86412	339	15xD	Norme usine	sommet rev. TiAlN	Microforets à trous d'huile	CW monobloc	N
86509	257	15xD	Norme usine	TiAlN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 T
86511	258	20xD	Norme usine	sommet rev. TiAlN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 T
86512	259	25xD	Norme usine	sommet rev. TiAlN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 T
86513	260	30xD	Norme usine	sommet rev. TiAlN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 T
86514	261	40xD	Norme usine	sommet rev. TiAlN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 T
86602	411		Norme usine	TiN	Plaquettes interchangeables	HSS-E-PM	
86605	412		Norme usine	TiN	Plaquettes interchangeables	HSS-E	
86608	413		Norme usine	FIRE	Plaquettes interchangeables	HSS-E-PM	
86609	414		Norme usine	AlTiN	Plaquettes interchangeables	HSS-E-PM	
86611	415		Norme usine	AlTiN	Plaquettes interchangeables	HSS-E-PM	
86612	399	3xD	Norme usine	nickelé	Porte-outils Multiplex avec queue cylindrique		
86622	400	5xD	Norme usine	nickelé	Porte-outils Multiplex avec queue cylindrique		
86624	401	7xD	Norme usine	nickelé	Porte-outils Multiplex avec queue cylindrique		
86628	402		Norme usine	nickelé	Porte-outils Multiplex avec queue cylindrique		
86630	404		Norme usine	nickelé	Porte-outils Multiplex avec queue cône morse		
86650	405		Norme usine	nickelé	Porte-outils Multiplex avec queue cône morse		
86670	406		Norme usine	bruni	Porte-outils Multiplex avec queue cône morse		
86678	408		Norme usine	nickelé	Porte-outils Multiplex avec queue cône morse		
86680	407		Norme usine	bruni	Porte-outils Multiplex avec queue cône morse		
86681	432	1xD	Norme usine	nickelé	Porte-outils Multiplex HPC		
86682	433	1,5xD	Norme usine	nickelé	Porte-outils Multiplex HPC		HPC
86683	435	3xD	Norme usine	nickelé	Porte-outils Multiplex HPC		HPC
86684	437	5xD	Norme usine	nickelé	Porte-outils Multiplex HPC		HPC
86685	439	7xD	Norme usine	nickelé	Porte-outils Multiplex HPC		HPC
86686	441	10xD	Norme usine	nickelé	Porte-outils Multiplex HPC		HPC
86690	422		Norme usine		Bagues d´alimentation du liquide de refroidissement		
86691	426		Norme usine	bruni	Mandrin avec arrosage pour Multiplex		
86692	427		Norme usine	bruni	Mandrin avec arrosage pour Multiplex		
86693	428		Norme usine	bruni	Mandrin avec arrosage pour Multiplex		
86694	429		Norme usine	bruni	Mandrin avec arrosage pour Multiplex		

N° d'article	Page	Prof. de perçage	Norme	Surface	Désignation	Matière de coupe	Type
86699	430		Norme usine	bruni	Douille de réduction pour queue cylindrique		
86701	417		Norme usine	FIRE	Plaquettes interchangeables	CW monobloc	
86702	418		Norme usine	FIRE	Plaquettes interchangeables	CW monobloc	
86708	419		Norme usine	TiN	Plaquettes interchangeables	CW monobloc	
86709	420		Norme usine	TiN	Plaquettes interchangeables	CW monobloc	
86711	421		Norme usine	poli	Plaquettes interchangeables	CW monobloc	
86721	443		Norme usine	AlTiN nano	Plaquettes interchangeables Multiplex HPC	CW monobloc	HPC
86722	446		Norme usine	nanoFIRE	Plaquettes interchangeables Multiplex HPC	CW monobloc	HPC
86723	449		Norme usine	TiAlSiN	Plaquettes interchangeables Multiplex HPC	CW monobloc	HPC
86724	452		Norme usine	poli	Plaquettes interchangeables Multiplex HPC	CW monobloc	HPC
86725	455		Norme usine	AlTiN nano	Plaquettes interchangeables Multiplex HPC	CW monobloc	HPC
86726	459		Norme usine	TiAlN	Plaquette de lamage Multiplex HPC	CW monobloc	
86727	459		Norme usine	poli	Plaquette de lamage Multiplex HPC	CW monobloc	
86728	460		Norme usine	TiN	Plaquette de lamage Multiplex HPC	CW monobloc	
86729	458		Norme usine	nanoFIRE	Plaquettes interchangeables Multiplex HPC	CW monobloc	
86842	425		Norme usine		Tournevis Torx		
86843	461		Norme usine		Vis de serrage p. porte-outils Multiplex HPC 1,5-10xD		
86844	462		Norme usine		Clés dynamométriques		
86845	463		Norme usine		Embouts pour vis Torx		
86846	464		Norme usine		Vis de serrage p. porte-outil de lamage Multiplex HPC		
87011	329	~5xD	DIN 1899	poli	Microforets sans trou d'huile	HSS-E-PM	N
87016	331	~5xD	DIN 1899	poli	Microforets sans trou d'huile	HSS-E-PM	N
88013	112	~5xD	DIN 338	traité vapeur	Coffrets de forets hélicoïdaux	HSS	N
88014	113	~5xD	DIN 338	poli	Coffrets de forets hélicoïdaux	HSS-E	S
88015	112	~3xD	DIN 1897	MolyGlide	Coffrets de forets hélicoïdaux	HSS-E	P2000
88016	113	~5xD	DIN 338	sommet rev. TiN	Coffrets de forets hélicoïdaux	HSS	N
88018	114	~5xD	DIN 338	Bronze-Oxid	Coffrets de forets hélicoïdaux	M42	N
88021	384		DIN 335	poli	Coffrets de fraises à chanfreiner 90°	HSS	
88022	385		DIN 335	TiAlN	Coffrets de fraises à chanfreiner, hélicoïdales 90°	HSS-E	
88026	114	~5xD	DIN 338	traité vapeur	Coffrets de forets hélicoïdaux	HSS-E	N
88200	382		DIN 335	poli	Fraises à chanfreiner 90°	HSS	
88201	383		DIN 335	TiAlN	Fraises à chanfreiner, hélicoïdales 90°	HSS-E	
88303	111		Norme usine		Coffrets de forets hélicoïdaux		
89235	48	~3xD	DIN 6539	poli	Forets hélicoïdaux extra-courts	CW monobloc	N
89237	216	3xD	DIN 6539	TiN	TS-Drills sans trous d'huile	CW monobloc	TS 100 U
89239	263	5xD	DIN 6539	poli	Forets TS, 3 lèvres	CW monobloc	TS 3 G
89242	117		Norme usine	poli	Forets NC	CW monobloc	N
89243	118		Norme usine	poli	Forets NC	CW monobloc	N
89244	100	~5xD	Norme usine	poli	Forets hélicoïdaux courts	CW monobloc	N
89246	52	~3xD	Norme usine	poli	Forets hélicoïdaux extra-courts	CW monobloc	N
89247	262	5xD	DIN 6537L	poli	Forets TS, 3 lèvres	CW monobloc	TS 3 G
89249	117		Norme usine	poli	Forets NC	CW monobloc	N
89252	360			poli	Forets étagés à listels continus, queue cyl.	CW monobloc	N
89253	50	~3xD	Norme usine	nanoFIRE	Forets hélicoïdaux extra-courts	CW monobloc	N
89254	353		Norme usine	poli	Forets étagés à queue cylindrique, courts	CW monobloc	N
89261	102	~5xD	Norme usine	nanoFIRE	Forets hélicoïdaux courts	CW monobloc	N
89264	210	3xD	DIN 6537K	TiN	TS-Drills sans trous d'huile	CW monobloc	TS 100 U
89266	222	3xD	DIN 6537K	TiN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 U
89272	231	5xD	DIN 6537L	TiN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 U
89275	220	5xD	Norme usine	TiN	TS-Drills sans trous d'huile	CW monobloc	TS 100 U
89281	335	~5xD	Norme usine	poli	Microforets sans trou d'huile	CW monobloc	N
89286	146	~10xD	Norme usine	poli	Forets hélicoïdaux longs	CW monobloc	N
89292	229	4xD	Norme usine	poli	TS-Drills avec refroidissement interne	CW monobloc	TS 150 GG
89293	253	10xD	Norme usine	poli	TS-Drills avec refroidissement interne	CW monobloc	TS 150 GG
89294	245	7xD	Norme usine	poli	TS-Drills avec refroidissement interne	CW monobloc	TS 150 GG
89295	253	10xD	Norme usine	poli	TS-Drills avec refroidissement interne	CW monobloc	TS 150 GG
89301	163		DIN 8037	poli	Forets spéciaux avec arêtes de coupe CW	CW	N
89302	199		DIN 8041	poli	Forets spéciaux avec arêtes de coupe CW	CW	N
89303	164		DIN 8038	poli	Forets spéciaux avec arêtes de coupe CW	CW	N
89306	221	3xD	DIN 6538K	TiN	TS-Drills avec refroidissement interne	CW	TS 80 U
89307	230	5xD	DIN 6538M	TiN	TS-Drills avec refroidissement interne	CW	TS 80 U
89308	244	7xD	DIN 6538L	TiN	TS-Drills avec refroidissement interne	CW	TS 80 U
89401	216	3xD	DIN 6539	nanoFIRE	TS-Drills sans trous d'huile	CW monobloc	TS 100 U
89402	212	3xD	DIN 6537K	nanoFIRE	TS-Drills sans trous d'huile	CW monobloc	TS 100 U
89408	232	5xD	DIN 6537L	nanoFIRE	TS-Drills avec refroidissement interne	CW monobloc	TS 100 U
89410	223	3xD	DIN 6537K	nanoFIRE	TS-Drills avec refroidissement interne	CW monobloc	TS 100 U

N° d'article	Page	Prof. de perçage	Norme	Surface	Désignation	Matière de coupe	Type
89411	232	5xD	DIN 6537L	nanoFIRE	TS-Drills avec refroidissement interne	CW monobloc	TS 100 U
89412	246	7xD	Norme usine	nanoFIRE	TS-Drills avec refroidissement interne	CW monobloc	TS 100 U
89413	212	3xD	DIN 6537K	nanoFIRE	TS-Drills sans trous d'huile	CW monobloc	TS 100 U
89414	218	5xD	DIN 6537L	nanoFIRE	TS-Drills sans trous d'huile	CW monobloc	TS 100 U
89415	223	3xD	DIN 6537K	nanoFIRE	TS-Drills avec refroidissement interne	CW monobloc	TS 100 U
89416	246	7xD	Norme usine	nanoFIRE	TS-Drills avec refroidissement interne	CW monobloc	TS 100 U
89417	218	5xD	DIN 6537L	nanoFIRE	TS-Drills sans trous d'huile	CW monobloc	TS 100 U
89418	255	12xD	Norme usine	pointe rev. nanoFIRE	TS-Drills avec refroidissement interne	CW monobloc	TS 100 U
89420	234	5xD	DIN 6537L	FIRE	TS-Drills avec refroidissement interne	CW monobloc	TS 100 R
89421	248	7xD	Norme usine	FIRE	TS-Drills avec refroidissement interne	CW monobloc	TS 100 R
89422	214	3xD	DIN 6537K	TiAlSiN	TS-Drills sans trous d'huile	CW monobloc	TS 100 H
89423	225	3xD	DIN 6537K	TiAlSiN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 H
89424	225	3xD	DIN 6537K	TiAlSiN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 H
89425	236	5xD	DIN 6537L	TiAlSiN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 H
89426	236	5xD	DIN 6537L	TiAlSiN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 H
89427	250	7xD	Norme usine	TiAlSiN	TS-Drills avec refroidissement interne	CW monobloc	TS 100 H
89450	227	3xD	DIN 6537K	AlTiN nano	TS-Drills avec refroidissement interne	CW monobloc	TS 100 INOX
89451	238	5xD	DIN 6537L	AlTiN nano	TS-Drills avec refroidissement interne	CW monobloc	TS 100 INOX
89460	242	5xD	DIN 6537L	nanoFIRE	TS 100 HPC	CW monobloc	TS 100 HPC
89461	251	7xD	Norme usine	nanoFIRE	TS 100 HPC	CW monobloc	TS 100 HPC
89501	277	80.000	Norme usine	poli	Forets à une lèvre E 100	CW monobloc	TLB E 100
89502	279	160.000	Norme usine	poli	Forets à une lèvre E 100	CW monobloc	TLB E 100
89503	276	45.000	Norme usine	poli	Forets à une lèvre E 100	CW monobloc	TLB E 100
89504	278	120.000	Norme usine	poli	Forets à une lèvre E 100	CW monobloc	TLB E 100
89505	280	20xD	Norme usine	TiN	Forets à une lèvre E 80	CW	TLB E 80
89506	282	40xD	Norme usine	TiN	Forets à une lèvre E 80	CW	TLB E 80
89507	283	80xD	Norme usine	TiN	Forets à une lèvre E 80	CW	TLB E 80
89508	295	30xD	Norme usine	poli	Outils de forage à deux lèvres Z 80	CW	TLB Z 80
89509	281	30xD	Norme usine	TiN	Forets à une lèvre E 80	CW	TLB E 80
89510	276	45.000	Norme usine	AlTiN	Forets à une lèvre E 100	CW monobloc	TLB E 100
89511	277	80.000	Norme usine	AlTiN	Forets à une lèvre E 100	CW monobloc	TLB E 100
89512	278	120.000	Norme usine	AlTiN	Forets à une lèvre E 100	CW monobloc	TLB E 100
89513	279	160.000	Norme usine	AlTiN	Forets à une lèvre E 100	CW monobloc	TLB E 100
89514	280	20xD	Norme usine	TiCN	Forets à une lèvre E 80	CW	TLB E 80
89515	281	30xD	Norme usine	TiCN	Forets à une lèvre E 80	CW	TLB E 80
89516	282	40xD	Norme usine	TiCN	Forets à une lèvre E 80	CW	TLB E 80
89517	283	80xD	Norme usine	TiCN	Forets à une lèvre E 80	CW	TLB E 80
89518	295	30xD	Norme usine	poli	Outils de forage à deux lèvres Z 80	CW	TLB Z 80
89520	271	25xD	Norme usine	AlTiN nano	Forets à une lèvre E 100	CW monobloc	TLB E 100
89521	273	50xD	Norme usine	AlTiN nano	Forets à une lèvre E 100	CW monobloc	TLB E 100
89522	275	75xD	Norme usine	AlTiN nano	Forets à une lèvre E 100	CW monobloc	TLB E 100
89523	271	25xD	Norme usine	poli	Forets à une lèvre E 100	CW monobloc	TLB E 100
89524	273	50xD	Norme usine	poli	Forets à une lèvre E 100	CW monobloc	TLB E 100
89525	275	75xD	Norme usine	poli	Forets à une lèvre E 100	CW monobloc	TLB E 100
89530	292	30xD	Norme usine	TiN	Forets à une lèvre E 800 avec plaquettes interchangeables	CW	TLB E 800
89535	293		Norme usine	TiN	Plaquettes de coupe pour forets à une lèvre E 800	CW monobloc	
89536	294		Norme usine	TiN	Patins de guidage pour les forets à une lèvre E 800	CW monobloc	
89539	284	GL 600	Norme usine	TiN	Forets à une lèvre E 80 XXL	CW	TLB E 80
89540	285	GL 800	Norme usine	TiN	Forets à une lèvre E 80 XXL	CW	TLB E 80
89541	287	GL1200	Norme usine	TiN	Forets à une lèvre E 80 XXL	CW	TLB E 80
89542	289	GL1600	Norme usine	TiN	Forets à une lèvre E 80 XXL	CW	TLB E 80
89543	291	GL2000	Norme usine	TiN	Forets à une lèvre E 80 XXL	CW	TLB E 80
89544	286	GL1000	Norme usine	TiN	Forets à une lèvre E 80 XXL	CW	TLB E 80
89545	288	GL1400	Norme usine	TiN	Forets à une lèvre E 80 XXL	CW	TLB E 80
89546	290	GL1800	Norme usine	TiN	Forets à une lèvre E 80 XXL	CW	TLB E 80
89550	227	3xD	DIN 6537K	AlTiN nano	TS-Drills avec refroidissement interne	CW monobloc	TS 100 INOX
89551	238	5xD	DIN 6537L	AlTiN nano	TS-Drills avec refroidissement interne	CW monobloc	TS 100 INOX
89560	240	5xD	DIN 6537L	poli	TS-Drills avec refroidissement interne	CW monobloc	TS 100 ALU

LES DISTRIBTEURS D'OUTILS HARTNER

Les automates et armoires

TM 326

TM 426

Des solutions individuelles pour un stockage et une gestion efficaces des outils.

Les quatre distributeurs d'outils TM 326, TM 426, TM 526 et TM 626 offrent des possibilités flexibles pour un stockage d'outils sur mesure. Selon vos besoins et la taille de votre entreprise, vous pouvez sélectionner différents niveaux d'automatisation. Les distributions individuelles sont possibles avec des tiroirs ou des systèmes en spirale. Nous adaptons le distributeur d'outils Hartner selon vos envies ou les besoins de votre entreprise. Profitez pleinement de ces possibilités. De nombreux clients satisfaits en témoignent.

LE LOGICIEL DE GESTION DES OUTILS DE HARTNER

Intelligence intégrée

Tous les systèmes de distribution d'outils de Hartner sont contrôlés par le logiciel TM très facile d'utilisation. L'utilisation est simple, rapide et intuitive grâce à l'écran tactile intégré.

Le logiciel fournit des possibilités d'application et de réglage personnalisées aux clients de tous les domaines de la production.

Grâce à sa structure modulaire, les processus de fabrication peuvent être simulés avec exactitude et l'intégralité des étapes du cycle de vie de l'outillage, allant du stockage jusqu'à l'élimination en passant par la mise à disposition, sont clairement représentées.

Le logiciel documente toutes les données pertinentes de mouvement du stock, propose des commandes et permet l'évaluation selon divers critères.

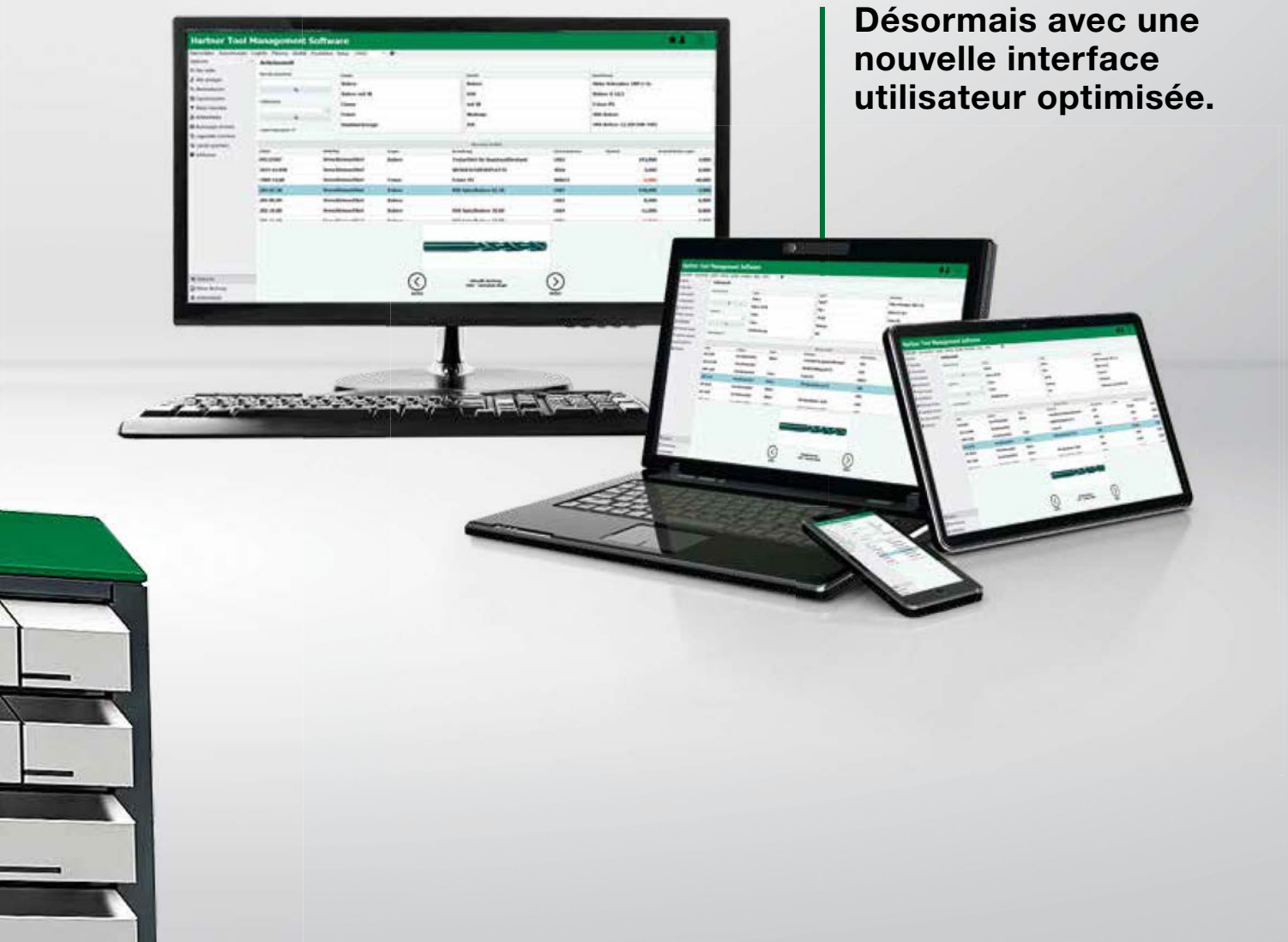
Ces rapports exhaustifs mettent en valeur de nombreux points potentiels d'optimisation dans le cycle de vie de l'outillage de votre entreprise.

En outre, les interfaces permettent la connexion à divers systèmes de gestion des marchandises, ainsi que la prise de contact en ligne avec vos fournisseurs par le biais de processus automatisés de commande.

LE LOGICIEL DE GESTION DES OUTILS DE HARTNER

Prestations et avantages clients

- Interface utilisateur et navigation dans le menu simples et intuitives
- Création d'un tableau de bord personnalisé
- Création de listes d'outils
- Demande directe de systèmes CAO et de programmes graphiques pour le traitement et la représentation de schémas d'outils
- Fonctions exhaustives de gestion des stocks permettant également de contrôler les automates d'outillage TM de Hartner
- Affichage de l'organisation des clients pour une imputation claire des coûts liés au prélèvement d'outils
- Analyses précises de consommation selon divers critères tels que la consommation d'outil par pièce, machine ou domaine de production
- Des solutions individuelles peuvent être programmées selon les souhaits du client
- Connexion à tous les systèmes usuels ERP/PPS, gestion d'outils et systèmes d'élévateurs paternoster grâce à la programmation d'interfaces adaptées
- Logiciel multilingue
- Création de formulaires clients personnalisés



Désormais avec une nouvelle interface utilisateur optimisée.

HARTNER

Precision Cutting Tools

FORETS À QUEUE CYLINDRIQUE

HSS, HSS-E, HSS-E-PM, CW
polis et revêtus

Forets hélicoïdaux extra-courts

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
															
●		●	○			DIN 1897	N	HSS	>Ø 2,36	à droite	cyl.	~3xD	0,500 - 39,500	**81110**	24
															
●		●	○			DIN 1897	N	HSS	>Ø 5,00	à gauche	cyl.	~3xD	0,500 - 36,500	**81115**	26
															
●			●			DIN 1897	H	HSS	○	à droite	cyl.	~3xD	1,200 - 16,000	**81120**	28
															
●			●			DIN 1897	W	HSS	○	à droite	cyl.	~3xD	1,500 - 16,000	**81130**	29
															
●	○	○	●			DIN 1897	FN	HSS	<Ø 2,36 >Ø 16,0	à droite	cyl.	~3xD	1,500 - 15,500	**81140**	30
															
●	○	○	●			DIN 1897	FN	HSS	<Ø 2,36 >Ø 16,0	à gauche	cyl.	~3xD	1,000 - 12,500	**81145**	31
															
●		●	○			DIN 1897	N	HSS	T	à droite	cyl.	~3xD	1,000 - 25,000	**84400**	33
															
●		●	●			DIN 1897	N	HSS	F	à droite	cyl.	~3xD	1,000 - 25,000	**84501**	33
															
●	○	○	●	●	○	DIN 1897	N	M42	○	à droite	cyl.	~3xD	1,000 - 15,000	**81112**	35
															
●	●	●	○	●	○	DIN 1897	V	HSS-E	>Ø 2,36	à droite	cyl.	~3xD	0,400 - 25,000	**81171**	37
															
○	●		○	○		DIN 1897	IS	HSS-E	○	à droite	cyl.	~3xD	1,000 - 12,000	**81173**	39
															
●	●	●	○	●	○	DIN 1897	V	HSS-E	F	à droite	cyl.	~3xD	0,500 - 15,000	**84503**	40
															
●	●	●	○	●	○	DIN 1897	V	HSS-E	T	à droite	cyl.	~3xD	0,500 - 15,000	**84803**	40
															
●	●	●	●			DIN 1897	FU 500 DZ	HSS-E	T	à droite	cyl.	~3xD	1,000 - 14,000	**84806**	42

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
Forets hélicoïdaux extra-courts															
															
●	●	●	●			DIN 1897	FU 500 DZ	**HSS-E**	◯	à droite	cyl.	~3xD	1,000 - 14,000	**84808**	42
															
○	●	○	○	●		DIN 1897	IS	**HSS-E**	S	à droite	cyl.	~3xD	1,000 - 13,000	**81178**	44
															
●	○	●	○	○	○	DIN 1897	FN 500	**HSS-E-PM**	F	à droite	cyl.	~3xD	1,000 - 13,500	**84511**	46
															
○	○	○	●	○		DIN 6539	N	**CW monobloc**	◯	à droite	cyl.	~3xD	0,800 - 16,000	**89235**	48
															
○	○	○	●	○		Norme usine	N	**CW monobloc**	F	à droite	cyl.	~3xD	1,000 - 16,000	**89253**	50
															
○	○	○	○	○	○	Norme usine	N	**CW monobloc**	◯	à droite	cyl.	~3xD	0,500 - 6,100	**89246**	52
Forets hélicoïdaux courts															
															
●		●	○			DIN 338	N	**HSS**	≥Ø 2,36	à droite	cyl.	~5xD	0,200 - 20,000	**81010**	53
															
●		●	○			DIN 338	N	**HSS**	≥Ø 6,00	à gauche	cyl.	~5xD	0,250 - 17,000	**81015**	57
															
●		●	○			DIN 338	N	**HSS**	●	à droite	cyl.	~5xD	3,000 - 13,000	**81017**	59
															
			●			DIN 338	H	**HSS**	◯	à droite	cyl.	~5xD	0,300 - 20,000	**81020**	60
															
			●			DIN 338	H	**HSS**	◯	à gauche	cyl.	~5xD	0,500 - 16,000	**81025**	62
															
			●			DIN 338	W	**HSS**	◯	à droite	cyl.	~5xD	0,250 - 16,500	**81030**	64
															
			●			DIN 338	W	**HSS**	◯	à gauche	cyl.	~5xD	0,500 - 15,000	**81035**	66

Forets hélicoïdaux courts

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
															
●		●	●			DIN 338	FN	HSS	≥Ø 2,36	à droite	cyl.	~5xD	0,800 - 16,000	**81040**	67
															
●		●	●			DIN 338	FN	HSS	≥Ø 2,36	à gauche	cyl.	~5xD	1,400 - 16,000	**81045**	69
															
●		●	●			DIN 338	N	HSS	T	à droite	cyl.	~5xD	0,400 - 19,500	**84405**	71
															
●		●	○			DIN 338	N	HSS	T	à droite	cyl.	~5xD	1,000 - 16,000	**84406**	73
															
●		●	●			DIN 338	FN	HSS	T	à droite	cyl.	~5xD	1,000 - 16,000	**84415**	75
															
●		●	●			DIN 338	FN	HSS	F	à droite	cyl.	~5xD	1,000 - 16,000	**84502**	75
															
●	○	○	●	●	○	DIN 338	N	M42	○	à droite	cyl.	~5xD	1,000 - 14,000	**81012**	77
															
●	●	●	●	●	○	DIN 338	N	M42	●	à droite	cyl.	~5xD	1,000 - 13,000	**81018**	79
															
●	●	●	○	●	○	DIN 338	N	M42	F	à droite	cyl.	~5xD	1,000 - 16,000	**81019**	81
															
●	○	●	○			DIN 338	N	HSS-E	≥Ø 2,36	à droite	cyl.	~5xD	0,200 - 20,000	**81011**	83
															
○	●		○	○		DIN 338	IS	HSS-E	○	à droite	cyl.	~5xD	1,000 - 13,000	**81013**	85
															
●	○	●	●			DIN 338	FN	HSS-E	≥Ø 2,36	à droite	cyl.	~5xD	1,000 - 13,000	**81041**	87
															
○	●			●		DIN 338	S	HSS-E	○	à droite	cyl.	~5xD	0,200 - 17,500	**81061**	89
															
●	○	●	○			DIN 338	FN	HSS-E	T	à droite	cyl.	~5xD	1,000 - 13,000	**84800**	91

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
Forets hélicoïdaux courts															
															
●	○	●	●		○	DIN 338	FN	**HSS-E**	F	à droite	cyl.	~5xD	1,000 - 13,000	**84504**	91
															
●	●	●	●			DIN 338	FU 500 DZ	**HSS-E**	◯	à droite	cyl.	~5xD	1,000 - 14,000	**84804**	93
															
●	●	●	●			DIN 338	FU 500 DZ	**HSS-E**	T	à droite	cyl.	~5xD	1,000 - 14,000	**84802**	93
															
○	●			●		DIN 338	S	**HSS-E**	T	à droite	cyl.	~5xD	0,500 - 13,000	**84807**	95
															
○	●			●		DIN 338	S	**HSS-E**	F	à droite	cyl.	~5xD	0,500 - 13,000	**84505**	95
															
○	●	○	○	○		DIN 338	IS	**HSS-E**	S	à droite	cyl.	~5xD	1,000 - 13,000	**81078**	97
															
●	○	●	○	○	○	DIN 338	FN 500 DZ	**HSS-E-PM**	T	à droite	cyl.	~5xD	1,000 - 14,000	**84811**	99
															
○	○	○	●	○		Norme usine	N	**CW monobloc**	◯	à droite	cyl.	~5xD	1,000 - 12,000	**89244**	100
															
○	○	○	●	○		Norme usine	N	**CW monobloc**	F	à droite	cyl.	~5xD	1,000 - 12,000	**89261**	102
HX 500															
															
●	○	●	○	●	○	Norme usine	HX 500	**M42**	Z	à droite	cyl.	3xD	1,000 - 13,000	**81000**	104
Forets hélicoïd. à queue cylind. renforcée															
															
●	●	●	●			Norme usine	FU 500	**HSS-E-PM**	F	à droite	HA	~3xD	1,000 - 20,000	**84805**	105
															
●	●	●	●			Norme usine	FU 500	**HSS-E-PM**	F	à droite	HA	~5xD	2,000 - 20,000	**84801**	107

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page

Forets hélicoïd. à queue cylind. renforcée

●	○	●	○	○	○	Norme usine	FN 500	**HSS-E-PM**	F	à droite	HA	~5xD	2,000 - 13,000	**84507**	109

Coffrets de forets hélicoïdaux

						Norme usine								**88303**	111

●	○	○	○			DIN 1897	P2000	**HSS-E**	M	à droite	cyl.	~3xD		**88015**	112

●		●	○			DIN 338	N	**HSS**		à droite	cyl.	~5xD		**88013**	112

●		●	○			DIN 338	N	**HSS**	T	à droite	cyl.	~5xD		**88016**	113

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page

Coffrets de forets hélicoïdaux

○	●			●		DIN 338	S	**HSS-E**	◯	à droite	cyl.	~5xD		**88014**	113

●		●	○			DIN 338	N	**HSS-E**	◯	à droite	cyl.	~5xD		**88026**	114

●	●	●	●	●	○	DIN 338	N	**M42**	◯	à droite	cyl.	~5xD		**88018**	114

Forets NC

●	○	●	●	○		Norme usine	N	**HSS**	◯	à droite	cyl.		3,000 - 25,000	**81191**	115

●	○	●	●	○		Norme usine	N	**HSS**	Ⓣ	à droite	cyl.		3,000 - 25,000	**84434**	115

●	○	●	●	●		Norme usine	N	**HSS**	◯	à droite	cyl.		3,000 - 25,000	**81192**	116

●	○	●	●	○		Norme usine	N	**HSS**	Ⓣ	à droite	cyl.		3,000 - 25,000	**84435**	116

○	○	○	○	○	○	Norme usine	N	**CW monobloc**	◯	à droite	cyl.		4,000 - 20,000	**89242**	117

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
Forets NC															
															
○	○	○	○	○	○	Norme usine	N	**CW monobloc**	◯	à droite	HB		4,000 - 20,000	**89249**	117
															
○	○	○	○	○	○	Norme usine	N	**CW monobloc**	◯	à droite	HA		4,000 - 20,000	**89243**	118
Forets carrosseries															
															
●	○	●	●	●		Norme usine	N	**HSS**	◯ ≥Ø 2,36	à droite	cyl.		2,000 - 10,000	**81190**	119
Forets avec canaux de refroidissment															
															
●	●	●	●	●		Norme usine	FN	**HSS-E**	◯	à droite	HE	~5xD	5,000 - 20,000	**82761**	120
															
●	●	●	●	●	○	Norme usine	FN	**HSS-E**	Ⓣ	à droite	HE	~5xD	5,000 - 20,000	**84461**	120
															
●	○	●	●	○		Norme usine	FN	**HSS**	◯	à droite	cyl.	~10xD	3,000 - 13,000	**82710**	121
Forets pour perçage par canon															
															
●		●	○			DIN 339	N	**HSS**	◯ ≥Ø 2,36	à droite	cyl.	~10xD	0,800 - 19,000	**81210**	122
Forets hélicoïdaux longs															
															
●		●	○			DIN 340	N	**HSS**	◯ ≥Ø 2,36	à droite	cyl.	~10xD	0,400 - 22,000	**81310**	124
															
●		●	○			DIN 340	N	**HSS**	◯ ≥Ø 6,00	à gauche	cyl.	~10xD	0,900 - 12,000	**81315**	126
															
●		●	○			DIN 340	N	**HSS**	◯	à droite	cyl.	~10xD	3,100 - 12,200	**81317**	127

Forets hélicoïdaux longs

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
															
●			●			DIN 340	H	HSS	◯	à droite	cyl.	~10xD	0,500 - 14,500	**81320**	128
															
●			●			DIN 340	W	HSS	◯	à droite	cyl.	~10xD	0,500 - 17,000	**81330**	129
															
●		●	●			DIN 340	FN	HSS	≥Ø 2,36	à droite	cyl.	~10xD	0,900 - 14,000	**81340**	131
															
○			●			DIN 340	FW	HSS	◯	à droite	cyl.	~10xD	1,000 - 14,000	**81350**	133
															
●		●	○			DIN 340	N	HSS	T	à droite	cyl.	~10xD	0,500 - 16,000	**84418**	135
															
●		●	●			DIN 340	FN	HSS	T	à droite	cyl.	~10xD	1,000 - 14,000	**84423**	136
															
●		●	●			DIN 340	FN	HSS	F	à droite	cyl.	~10xD	1,000 - 14,000	**84506**	136
															
●	○	●	●	○		DIN 340	N	HSS-E	≥Ø 2,36	à droite	cyl.	~10xD	0,500 - 12,500	**81311**	138
															
●	●	●	●		○	DIN 340	FN	HSS-E	≥Ø 2,36	à droite	cyl.	~10xD	1,000 - 16,000	**81341**	139
															
○	●			●		DIN 340	S	HSS-E	◯	à droite	cyl.	~10xD	1,000 - 13,000	**81361**	141
															
○	●			●		DIN 340	S	HSS-E	T	à droite	cyl.	~10xD	1,000 - 13,000	**81362**	141
															
●	●	●	●			DIN 340	FU 500 DZ	HSS-E	◯	à droite	cyl.	~10xD	1,000 - 14,000	**84814**	143
															
●	●	●	●			DIN 340	FU 500 DZ	HSS-E	T	à droite	cyl.	~10xD	1,000 - 14,000	**84812**	143
															
●	●	●	●		○	DIN 340	FN	HSS-E	F	à droite	cyl.	~10xD	1,000 - 12,000	**84508**	145

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'ar-ticle	Progr. page
Forets hélicoïdaux longs															
															
○		○			○	Norme usine	N	**CW monobloc**	◯	à droite	cyl.	~10xD	0,500 - 1,500	**89286**	146
Forets hélicoïdaux extra-longs, série 1															
															
●		●	○			DIN 1869	N	**HSS**	◯ ≥Ø 2,36	à droite	cyl.	~15xD	1,600 - 13,000	**81410**	147
															
●		●	●			DIN 1869	FN	**HSS**	◓ ≥Ø 2,36	à droite	cyl.	~15xD	2,000 - 13,000	**81440**	148
															
○			●			DIN 1869	FW	**HSS**	◯	à droite	cyl.	~15xD	2,000 - 9,500	**81450**	149
															
●		●	●			DIN 1869	FN	**HSS**	Ⓣ	à droite	cyl.	~15xD	2,000 - 12,000	**84425**	150
															
●	●	●	●	●	○	DIN 1869	FN	**HSS-E**	◓	à droite	cyl.	~15xD	3,000 - 10,000	**81441**	151
Forets hélicoïdaux extra-longs, série 2															
															
●		●	○			DIN 1869	N	**HSS**	◯	à droite	cyl.	~20xD	3,000 - 12,000	**81510**	152
															
●		●	●			DIN 1869	FN	**HSS**	◓ ≥Ø 2,36	à droite	cyl.	~20xD	2,000 - 13,000	**81540**	153
															
●		●	●	○		DIN 1869	FN	**HSS**	Ⓣ	à droite	cyl.	~20xD	3,000 - 8,500	**84426**	154
															
●	●	●	●		○	DIN 1869	FN	**HSS-E**	◓	à droite	cyl.	~20xD	3,000 - 10,000	**81541**	155
Forets hélicoïdaux extra-longs, série 3															
															
●		●	○			DIN 1869	N	**HSS**	◯	à droite	cyl.	~25xD	3,500 - 12,000	**81610**	156

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
Forets hélicoïdaux extra-longs, série 3															
															
●		●	●			DIN 1869	FN	**HSS**	◓	à droite	cyl.	~25xD	2,500 - 13,000	**81640**	157
															
●	●		●	●		DIN 1869	FN	**HSS-E**	◓	à droite	cyl.	~25xD	2,500 - 13,000	**81641**	158
Forets hélicoïdaux extra-longs															
															
●		●	●			Norme usine	FN	**HSS**	◓	à droite	cyl.	>25xD	6,000 - 12,000	**81740**	159
															
●		●	●			Norme usine	FN	**HSS**	○	à droite	cyl.	>25xD	8,000 - 12,000	**81750**	160
															
●		●	●			Norme usine	FN	**HSS**	○	à droite	cyl.	>25xD	10,000 - 12,000	**81760**	161
Forets de chaudronnerie															
															
●	○	●	○			DIN 1898	N	**HSS**	○ ≥Ø 2,36	à droite	cyl.		2,000 - 12,000	**81810**	162
Forets spéciaux avec arêtes de coupe CW															
															
○		○			○	DIN 8037	N	**CW rapportée**	○	à droite	cyl.		2,600 - 20,000	**89301**	163
															
○		○			○	DIN 8038	N	**CW rapportée**	○	à droite	cyl.		3,100 - 19,000	**89303**	164
Forets aléseurs, queue cylindrique															
															
●	○	●	○			DIN 344	N	**HSS**	●	à droite	cyl.		3,800 - 15,000	**86010**	165

HARTNER

Forets hélicoïdaux extra-courts

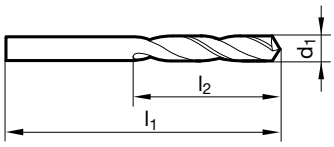
N° d'article 81110

P	M	K	N	S	H
●		●	○		

HSS | >Ø 2,36 | N | ~3xD | DIN 1897 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • pour tours automatiques/révolvers • aussi pour machines portatives

matériaux minces • acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



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

Forets hélicoïdaux extra-courts

d1 mm	inch	l1 mm	l2 mm
6,100		70,000	31,000
6,150		70,000	31,000
6,200		70,000	31,000
6,250		70,000	31,000
6,300		70,000	31,000
6,350	1/4	70,000	31,000
6,500		70,000	31,000
6,600		70,000	31,000
6,700		70,000	31,000
6,750	17/64	74,000	34,000
6,800		74,000	34,000
6,900		74,000	34,000
7,000		74,000	34,000
7,100		74,000	34,000
7,400		74,000	34,000
7,500		74,000	34,000
7,600		79,000	37,000
7,700		79,000	37,000
7,750		79,000	37,000
7,800		79,000	37,000
7,900		79,000	37,000
8,000		79,000	37,000
8,100		79,000	37,000
8,200		79,000	37,000
8,250		79,000	37,000
8,300		79,000	37,000
8,350		79,000	37,000
8,400		79,000	37,000
8,500		79,000	37,000
8,600		84,000	40,000
8,700		84,000	40,000
8,750		84,000	40,000
8,800		84,000	40,000
8,900		84,000	40,000
9,000		84,000	40,000
9,100		84,000	40,000
9,200		84,000	40,000
9,250		84,000	40,000
9,300		84,000	40,000
9,500		84,000	40,000
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
10,250		89,000	43,000
10,300		89,000	43,000
10,400		89,000	43,000
10,500		89,000	43,000
10,600		89,000	43,000
10,700		95,000	47,000
10,750		95,000	47,000
10,800		95,000	47,000
10,900		95,000	47,000
11,000		95,000	47,000
11,100		95,000	47,000
11,200		95,000	47,000
11,400		95,000	47,000
11,500		95,000	47,000
11,700		95,000	47,000
11,750		95,000	47,000
11,800		95,000	47,000
12,000		102,000	51,000
12,050		102,000	51,000
12,200		102,000	51,000
12,300	31/64	102,000	51,000
12,500		102,000	51,000
12,600		102,000	51,000
12,700	1/2	102,000	51,000
12,750		102,000	51,000
12,900		102,000	51,000
13,000		102,000	51,000
13,100	33/64	102,000	51,000
13,200		102,000	51,000
13,500		107,000	54,000
13,600		107,000	54,000
13,750		107,000	54,000
14,000		107,000	54,000
14,200		111,000	56,000
14,250		111,000	56,000
14,300		111,000	56,000
14,500		111,000	56,000
14,750		111,000	56,000
15,000		111,000	56,000
15,100		115,000	58,000
15,250		115,000	58,000
15,500		115,000	58,000
15,750		115,000	58,000
16,000		115,000	58,000
16,250		119,000	60,000
16,270	41/64	119,000	60,000
16,500		119,000	60,000
17,000		119,000	60,000
17,500		123,000	62,000
18,000		123,000	62,000
18,200		127,000	64,000
18,500		127,000	64,000
18,750		127,000	64,000
19,000		127,000	64,000
19,100		131,000	66,000
19,500		131,000	66,000
20,000		131,000	66,000
20,500		136,000	68,000
21,000		136,000	68,000
21,500		141,000	70,000
22,000		141,000	70,000
22,500		146,000	72,000
23,000		146,000	72,000
23,500		146,000	72,000
24,000		151,000	75,000
24,500		151,000	75,000
25,000	63/64	151,000	75,000
26,000		156,000	78,000
26,500		156,000	78,000
27,000		162,000	81,000
27,500		162,000	81,000
28,000		162,000	81,000
28,750		168,000	84,000
29,000		168,000	84,000
30,000		168,000	84,000
31,000		174,000	87,000
32,000		180,000	90,000
39,500		200,000	100,000

HARTNER

Forets hélicoïdaux extra-courts

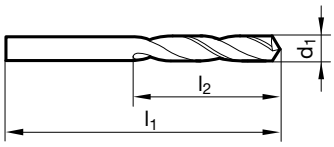
N° d'article 81115

P	M	K	N	S	H
●		●	○		

HSS | >Ø 5,00 | N | ~3xD | DIN 1897 | 118° | h8 | L | Cyl

amin. de l'âme ≥ Ø 14,200 • affûtage à dépouille conique • pour tours automatiques/révolvers

matériaux minces • acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,500		20,000	3,000	3,500		52,000	20,000
0,550		21,000	3,500	3,700		52,000	20,000
0,700		23,000	4,500	3,750		52,000	20,000
0,750		23,000	4,500	3,800		55,000	22,000
0,800		24,000	5,000	3,900		55,000	22,000
0,850		24,000	5,000	4,000		55,000	22,000
0,950		25,000	5,500	4,100		55,000	22,000
1,000		26,000	6,000	4,250		55,000	22,000
1,150		28,000	7,000	4,300		58,000	24,000
1,250		30,000	8,000	4,400		58,000	24,000
1,330		32,000	9,000	4,500		58,000	24,000
1,350		32,000	9,000	4,600		58,000	24,000
1,500		32,000	9,000	4,700		58,000	24,000
1,550		34,000	10,000	4,750		58,000	24,000
1,600		34,000	10,000	4,800		62,000	26,000
1,710		36,000	11,000	4,900		62,000	26,000
1,800		36,000	11,000	5,000		62,000	26,000
1,830		36,000	11,000	5,100		62,000	26,000
1,900		36,000	11,000	5,200		62,000	26,000
1,980	5/64	38,000	12,000	5,300		62,000	26,000
2,000		38,000	12,000	5,400		66,000	28,000
2,100		38,000	12,000	5,500		66,000	28,000
2,200		40,000	13,000	5,600		66,000	28,000
2,400		43,000	14,000	5,700		66,000	28,000
2,420		43,000	14,000	5,750		66,000	28,000
2,500		43,000	14,000	5,800		66,000	28,000
2,550		43,000	14,000	5,900		66,000	28,000
2,600		43,000	14,000	6,000		66,000	28,000
2,720		46,000	16,000	6,100		70,000	31,000
2,750		46,000	16,000	6,150		70,000	31,000
2,820		46,000	16,000	6,200		70,000	31,000
2,850		46,000	16,000	6,400		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	6,750	17/64	74,000	34,000
3,010		49,000	18,000	6,800		74,000	34,000
3,050		49,000	18,000	6,900		74,000	34,000
3,100		49,000	18,000	7,000		74,000	34,000
3,200		49,000	18,000	7,100		74,000	34,000
3,350		49,000	18,000	7,200		74,000	34,000
3,400		52,000	20,000	7,300		74,000	34,000
3,450		52,000	20,000	7,400		74,000	34,000

HARTNER

Forets hélicoïdaux extra-courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
7,600		79,000	37,000	11,800		95,000	47,000
7,700		79,000	37,000	11,900		102,000	51,000
7,750		79,000	37,000	12,000		102,000	51,000
7,900		79,000	37,000	12,100		102,000	51,000
8,000		79,000	37,000	12,250		102,000	51,000
8,100		79,000	37,000	12,400		102,000	51,000
8,200		79,000	37,000	12,500		102,000	51,000
8,250		79,000	37,000	12,600		102,000	51,000
8,300		79,000	37,000	12,750		102,000	51,000
8,400		79,000	37,000	12,800		102,000	51,000
8,500		79,000	37,000	12,900		102,000	51,000
8,600		84,000	40,000	13,000		102,000	51,000
8,700		84,000	40,000	13,200		102,000	51,000
8,750		84,000	40,000	13,250		107,000	54,000
8,800		84,000	40,000	13,400		107,000	54,000
8,900		84,000	40,000	13,500		107,000	54,000
9,000		84,000	40,000	13,600		107,000	54,000
9,100		84,000	40,000	13,750		107,000	54,000
9,200		84,000	40,000	13,800		107,000	54,000
9,250		84,000	40,000	14,000		107,000	54,000
9,400		84,000	40,000	14,200		111,000	56,000
9,500		84,000	40,000	14,300		111,000	56,000
9,600		89,000	43,000	14,400		111,000	56,000
9,700		89,000	43,000	14,500		111,000	56,000
9,750		89,000	43,000	14,700		111,000	56,000
10,000		89,000	43,000	14,750		111,000	56,000
10,100		89,000	43,000	15,000		111,000	56,000
10,200		89,000	43,000	15,500		115,000	58,000
10,300		89,000	43,000	16,000		115,000	58,000
10,500		89,000	43,000	16,500		119,000	60,000
10,600		89,000	43,000	17,000		119,000	60,000
10,700		95,000	47,000	18,000		123,000	62,000
10,750		95,000	47,000	19,000		127,000	64,000
10,800		95,000	47,000	20,000		131,000	66,000
11,000		95,000	47,000	21,000		136,000	68,000
11,100		95,000	47,000	22,000		141,000	70,000
11,200		95,000	47,000	29,750		168,000	84,000
11,250		95,000	47,000	30,000		168,000	84,000
11,300		95,000	47,000	31,500		174,000	87,000
11,400		95,000	47,000	36,000		193,000	96,000
11,500		95,000	47,000	36,500		193,000	96,000
11,750		95,000	47,000				

HARTNER

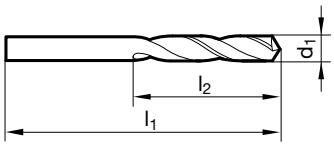
Forets hélicoïdaux extra-courts

N° d'article 81120

P	M	K	N	S	H
			•		

HSS | ○ | H | ~3xD | DIN 1897 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 15,000 • affûtage à dépouille conique
matières dures et friables • laitons, alliages de magnésium • bronze, bronze phosphoreux • ardoise, 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	5,100		62,000	26,000
1,500		32,000	9,000	5,200		62,000	26,000
1,600		34,000	10,000	5,300		62,000	26,000
1,700		34,000	10,000	5,400		66,000	28,000
1,900		36,000	11,000	5,500		66,000	28,000
2,000		38,000	12,000	5,600		66,000	28,000
2,350		40,000	13,000	5,700		66,000	28,000
2,380	3/32	43,000	14,000	5,800		66,000	28,000
2,400		43,000	14,000	6,000		66,000	28,000
2,500		43,000	14,000	6,100		70,000	31,000
2,600		43,000	14,000	6,200		70,000	31,000
2,700		46,000	16,000	6,500		70,000	31,000
2,800		46,000	16,000	7,000		74,000	34,000
2,900		46,000	16,000	7,500		74,000	34,000
2,950		46,000	16,000	8,000		79,000	37,000
3,000		46,000	16,000	8,500		79,000	37,000
3,100		49,000	18,000	8,600		84,000	40,000
3,200		49,000	18,000	8,700		84,000	40,000
3,250		49,000	18,000	9,000		84,000	40,000
3,300		49,000	18,000	10,000		89,000	43,000
3,400		52,000	20,000	10,200		89,000	43,000
3,500		52,000	20,000	10,500		89,000	43,000
3,600		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	16,000		115,000	58,000
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				

HARTNER

Forets hélicoïdaux extra-courts

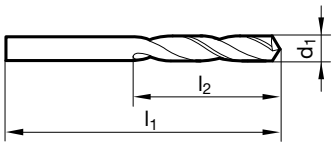
N° d'article 81130

P	M	K	N	S	H
			•		

HSS | ○ | W | ~3xD | DIN 1897 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,500 • affûtage à dépouille conique

matières tendres et à copeaux longs • aluminium/alliages d'aluminium à copeaux longs • zinc, cuivre de 1ère fusion, Alpax, électrode • thermoplastiques, bois



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

HARTNER

Forets hélicoïdaux extra-courts

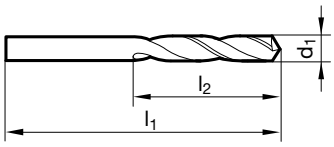
N° d'article 81140

P	M	K	N	S	H
●	○	○	●		

HSS | <Ø 2,36 >Ø 16,0 | FN | ~3xD | DIN 1897 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,500 • affûtage à dépouille conique • pour les aciers durs

aciers de décolletage • aciers inoxydables, inaltérables aux acides • aciers de cémentation et d'amélioration jusqu'à 800 N/mm² • Al, alliages Cu, à copeaux courts, assez courts



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

HARTNER

Forets hélicoïdaux extra-courts

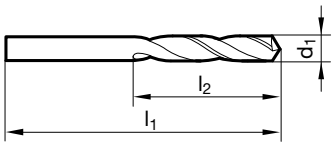
N° d'article 81145

P	M	K	N	S	H
●	○	○	●		

HSS | <Ø 2,36 >Ø 16,0 | FN | ~3xD | DIN 1897 | 130° | h8 | L | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • pour les aciers durs

aciers de décolletage • aciers inoxydables, inaltérables aux acides • aciers de cémentation et d'amélioration jusqu'à 800 N/mm² • Al, alliages Cu, à copeaux courts, assez courts



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		26,000	6,000	4,300		58,000	24,000
1,100		28,000	7,000	4,400		58,000	24,000
1,250		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	4,650		58,000	24,000
1,500		32,000	9,000	4,700		58,000	24,000
1,600		34,000	10,000	4,800		62,000	26,000
1,650		34,000	10,000	4,900		62,000	26,000
1,700		34,000	10,000	5,000		62,000	26,000
1,800		36,000	11,000	5,100		62,000	26,000
1,850		36,000	11,000	5,200		62,000	26,000
1,900		36,000	11,000	5,300		62,000	26,000
2,100		38,000	12,000	5,500		66,000	28,000
2,200		40,000	13,000	5,600		66,000	28,000
2,250		40,000	13,000	5,700		66,000	28,000
2,300		40,000	13,000	5,800		66,000	28,000
2,350		40,000	13,000	5,900		66,000	28,000
2,400		43,000	14,000	6,000		66,000	28,000
2,500		43,000	14,000	6,200		70,000	31,000
2,550		43,000	14,000	6,300		70,000	31,000
2,600		43,000	14,000	6,500		70,000	31,000
2,650		43,000	14,000	6,600		70,000	31,000
2,700		46,000	16,000	6,700		70,000	31,000
2,780	7/64	46,000	16,000	6,800		74,000	34,000
2,800		46,000	16,000	6,900		74,000	34,000
2,850		46,000	16,000	7,000		74,000	34,000
2,900		46,000	16,000	7,500		74,000	34,000
2,950		46,000	16,000	7,800		79,000	37,000
3,000		46,000	16,000	7,900		79,000	37,000
3,150		49,000	18,000	8,000		79,000	37,000
3,170	1/8	49,000	18,000	8,100		79,000	37,000
3,250		49,000	18,000	8,200		79,000	37,000
3,300		49,000	18,000	8,300		79,000	37,000
3,500		52,000	20,000	8,400		79,000	37,000
3,650		52,000	20,000	8,500		79,000	37,000
3,680		52,000	20,000	8,600		84,000	40,000
3,700		52,000	20,000	8,700		84,000	40,000
3,800		55,000	22,000	8,800		84,000	40,000
3,900		55,000	22,000	9,000		84,000	40,000
4,000		55,000	22,000	9,200		84,000	40,000
4,100		55,000	22,000	9,500		84,000	40,000
4,200		55,000	22,000	9,700		89,000	43,000

HARTNER

Forets hélicoïdaux extra-courts

d1 mm		l1 mm	l2 mm	d1 mm		l1 mm	l2 mm
10,000		89,000	43,000				
10,500		89,000	43,000				
11,000		95,000	47,000				
11,500		95,000	47,000				
12,500		102,000	51,000				

Forets hélicoïdaux extra-courts

N° d'article 84400

P	M	K	N	S	H
●		●	○		

HSS | T | N | ~3xD | DIN 1897 | 118° | h8 | R | Cyl

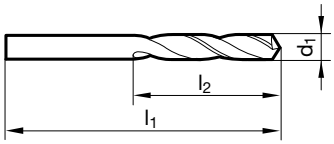
amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • pour tours automatiques/révolvers • aussi pour machines portatives
matériaux minces • acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite

N° d'article 84501

P	M	K	N	S	H
●		●	●		

HSS | F | N | ~3xD | DIN 1897 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • pour tours automatiques/révolvers • aussi pour machines portatives
matériaux minces • acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



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

Forets hélicoïdaux extra-courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
6,700		70,000	31,000	11,000		95,000	47,000
6,800		74,000	34,000	11,200		95,000	47,000
6,900		74,000	34,000	11,300		95,000	47,000
7,000		74,000	34,000	11,400		95,000	47,000
7,100		74,000	34,000	11,500		95,000	47,000
7,200		74,000	34,000	11,700		95,000	47,000
7,300		74,000	34,000	11,800		95,000	47,000
7,400		74,000	34,000	11,900		102,000	51,000
7,500		74,000	34,000	12,000		102,000	51,000
7,600		79,000	37,000	12,100		102,000	51,000
7,700		79,000	37,000	12,200		102,000	51,000
7,800		79,000	37,000	12,300	31/64	102,000	51,000
7,900		79,000	37,000	12,500		102,000	51,000
8,000		79,000	37,000	12,700	1/2	102,000	51,000
8,100		79,000	37,000	12,800		102,000	51,000
8,200		79,000	37,000	13,000		102,000	51,000
8,300		79,000	37,000	13,200		102,000	51,000
8,400		79,000	37,000	13,500		107,000	54,000
8,500		79,000	37,000	13,800		107,000	54,000
8,600		84,000	40,000	14,000		107,000	54,000
8,700		84,000	40,000	14,200		111,000	56,000
8,800		84,000	40,000	14,800		111,000	56,000
8,900		84,000	40,000	15,000		111,000	56,000
9,000		84,000	40,000	15,300		115,000	58,000
9,100		84,000	40,000	15,500		115,000	58,000
9,200		84,000	40,000	16,000		115,000	58,000
9,300		84,000	40,000	17,000		119,000	60,000
9,400		84,000	40,000	17,500		123,000	62,000
9,500		84,000	40,000	18,000		123,000	62,000
9,600		89,000	43,000	18,500		127,000	64,000
9,700		89,000	43,000	19,500		131,000	66,000
9,800		89,000	43,000	20,000		131,000	66,000
9,900		89,000	43,000	25,000	63/64	151,000	75,000
10,000		89,000	43,000				
10,100		89,000	43,000				
10,200		89,000	43,000				
10,300		89,000	43,000				
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				

HARTNER

Forets hélicoïdaux extra-courts

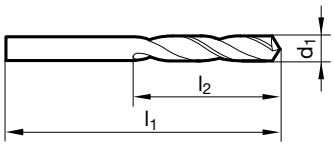
N° d'article 81112

P	M	K	N	S	H
●	○	○	●	●	○

M42 | ◯ | N | ~3xD | DIN 1897 | 135° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • haut % de Co & Mo • résistance à l'usure particulièrement élevée

alliages durs/alliages à haute résistance à base de chrome-nickel • Hastelloy, Inconel, Nimonic • aciers inox., inaltérables aux acides et réfractaires • tôles résistantes à l´usure • aciers/bronzes < 1400 N/mm²



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		26,000	6,000	4,800		62,000	26,000
1,100		28,000	7,000	4,900		62,000	26,000
1,200		30,000	8,000	5,000		62,000	26,000
1,300		30,000	8,000	5,100		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
1,800		36,000	11,000	5,560	7/32	66,000	28,000
1,900		36,000	11,000	5,600		66,000	28,000
2,000		38,000	12,000	5,800		66,000	28,000
2,100		38,000	12,000	6,000		66,000	28,000
2,200		40,000	13,000	6,100		70,000	31,000
2,300		40,000	13,000	6,200		70,000	31,000
2,380	3/32	43,000	14,000	6,300		70,000	31,000
2,400		43,000	14,000	6,350	1/4	70,000	31,000
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	6,600		70,000	31,000
2,780	7/64	46,000	16,000	6,800		74,000	34,000
2,800		46,000	16,000	6,900		74,000	34,000
2,900		46,000	16,000	7,000		74,000	34,000
3,000		46,000	16,000	7,100		74,000	34,000
3,100		49,000	18,000	7,200		74,000	34,000
3,170	1/8	49,000	18,000	7,300		74,000	34,000
3,200		49,000	18,000	7,400		74,000	34,000
3,300		49,000	18,000	7,500		74,000	34,000
3,400		52,000	20,000	7,540	19/64	79,000	37,000
3,500		52,000	20,000	7,600		79,000	37,000
3,600		52,000	20,000	7,700		79,000	37,000
3,700		52,000	20,000	7,800		79,000	37,000
3,800		55,000	22,000	7,900		79,000	37,000
3,900		55,000	22,000	8,000		79,000	37,000
3,970	5/32	55,000	22,000	8,100		79,000	37,000
4,000		55,000	22,000	8,200		79,000	37,000
4,100		55,000	22,000	8,300		79,000	37,000
4,200		55,000	22,000	8,500		79,000	37,000
4,300		58,000	24,000	8,600		84,000	40,000
4,400		58,000	24,000	8,700		84,000	40,000
4,500		58,000	24,000	9,000		84,000	40,000
4,600		58,000	24,000	9,200		84,000	40,000
4,700		58,000	24,000	9,300		84,000	40,000

Forets hélicoïdaux extra-courts

d1 mm	inch	l1 mm	l2 mm
9,500		84,000	40,000
9,700		89,000	43,000
9,800		89,000	43,000
9,900		89,000	43,000
10,000		89,000	43,000
10,500		89,000	43,000
11,000		95,000	47,000
11,500		95,000	47,000
12,000		102,000	51,000
12,500		102,000	51,000
12,700	1/2	102,000	51,000
13,000		102,000	51,000

d1 mm	inch	l1 mm	l2 mm
13,500		107,000	54,000
14,000		107,000	54,000
14,500		111,000	56,000
15,000		111,000	56,000

HARTNER

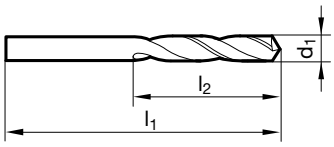
Forets hélicoïdaux extra-courts

N° d'article 81171

P	M	K	N	S	H
●	●	●	○	●	○

HSS-E | >Ø 2,36 | V | ~3xD | DIN 1897 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure
aciers inoxydables, inaltérables aux acides • aciers à ressorts • aciers austénitiques • Hastelloy, Inconel, Nimonic



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

Forets hélicoïdaux extra-courts

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

HARTNER

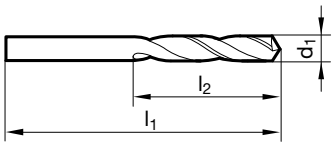
Forets hélicoïdaux extra-courts

N° d'article 81173

P	M	K	N	S	H
○	●		○	○	

HSS-E | ◯ | IS | ~3xD | DIN 1897 | 130° | h8 | R | Cyl

forets INOX • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure
aciers austénit., inox., inaltérablesaux acides, réfractaires (V2A et V4A)



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

Forets hélicoïdaux extra-courts

N° d'article 84503

P	M	K	N	S	H
●	●	●	○	●	○

HSS-E | F | V | ~3xD | DIN 1897 | 130° | h8 | R | Cyl

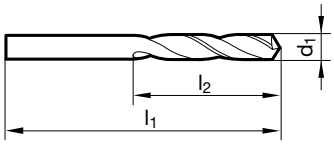
amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure
aciers inoxydables, inaltérables aux acides • aciers à ressorts • aciers austénitiques • Hastelloy, Inconel, Nimonic

N° d'article 84803

P	M	K	N	S	H
●	●	●	○	●	○

HSS-E | T | V | ~3xD | DIN 1897 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure
aciers inoxydables, inaltérables aux acides • aciers à ressorts • aciers austénitiques • Hastelloy, Inconel, Nimonic



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,500		20,000	3,000	3,050		49,000	18,000
0,700		23,000	4,500	3,100		49,000	18,000
0,900		25,000	5,500	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

Forets hélicoïdaux extra-courts

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

HARTNER

Forets hélicoïdaux extra-courts

N° d'article 84806

P	M	K	N	S	H
•	•	•	•		

HSS-E | T | FU 500 DZ | ~3xD | DIN 1897 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage en pente • acier rapide au Co • faible effort d'avance nécessaire • faible effort de couple nécessaire • pour applications universelles

aciers alliés ou non alliés < 800 N/mm² • aciers à outils, travail à froid ou à chaud • aciers à roulement • métaux non ferreux • fontes • aciers inoxydables • matériaux synthétiques

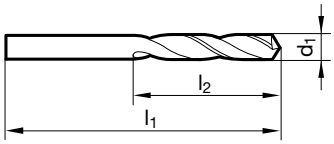
N° d'article 84808

P	M	K	N	S	H
•	•	•	•		

HSS-E | ○ | FU 500 DZ | ~3xD | DIN 1897 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage en pente • acier rapide au Co • faible effort d'avance nécessaire • faible effort de couple nécessaire • pour applications universelles

aciers alliés ou non alliés < 800 N/mm² • aciers à outils, travail à froid ou à chaud • aciers à roulement • métaux non ferreux • fontes • aciers inoxydables • matériaux synthétiques



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 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

Forets hélicoïdaux extra-courts

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				

HARTNER

Forets hélicoïdaux extra-courts

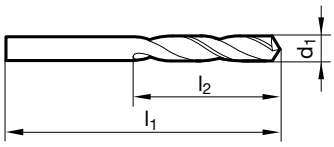
N° d'article 81178

P	M	K	N	S	H
○	●	○	○	●	

HSS-E | S | IS | ~3xD | DIN 1897 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille tronconique avec amincissement de l´âme optimisé • acier rapide au Co • meilleure résistance à l´usure

aciers austénit., inox., inaltérablesaux acides, réfractaires (V2A et V4A) • alliages spéciaux



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		26,000	6,000	5,100		62,000	26,000
1,100		28,000	7,000	5,200		62,000	26,000
1,200		30,000	8,000	5,300		62,000	26,000
1,300		30,000	8,000	5,400		66,000	28,000
1,400		32,000	9,000	5,500		66,000	28,000
1,500		32,000	9,000	5,550		66,000	28,000
1,600		34,000	10,000	5,600		66,000	28,000
1,700		34,000	10,000	5,700		66,000	28,000
1,800		36,000	11,000	5,800		66,000	28,000
1,900		36,000	11,000	5,900		66,000	28,000
2,000		38,000	12,000	6,000		66,000	28,000
2,100		38,000	12,000	6,100		70,000	31,000
2,200		40,000	13,000	6,200		70,000	31,000
2,300		40,000	13,000	6,300		70,000	31,000
2,400		43,000	14,000	6,400		70,000	31,000
2,500		43,000	14,000	6,500		70,000	31,000
2,600		43,000	14,000	6,600		70,000	31,000
2,700		46,000	16,000	6,700		70,000	31,000
2,800		46,000	16,000	6,800		74,000	34,000
2,900		46,000	16,000	6,900		74,000	34,000
3,000		46,000	16,000	7,000		74,000	34,000
3,100		49,000	18,000	7,100		74,000	34,000
3,200		49,000	18,000	7,200		74,000	34,000
3,300		49,000	18,000	7,300		74,000	34,000
3,400		52,000	20,000	7,400		74,000	34,000
3,500		52,000	20,000	7,450		74,000	34,000
3,600		52,000	20,000	7,500		74,000	34,000
3,700		52,000	20,000	7,600		79,000	37,000
3,800		55,000	22,000	7,700		79,000	37,000
3,900		55,000	22,000	7,800		79,000	37,000
4,000		55,000	22,000	7,900		79,000	37,000
4,100		55,000	22,000	8,000		79,000	37,000
4,200		55,000	22,000	8,100		79,000	37,000
4,300		58,000	24,000	8,200		79,000	37,000
4,400		58,000	24,000	8,300		79,000	37,000
4,500		58,000	24,000	8,400		79,000	37,000
4,600		58,000	24,000	8,500		79,000	37,000
4,650		58,000	24,000	8,600		84,000	40,000
4,700		58,000	24,000	8,700		84,000	40,000
4,800		62,000	26,000	8,800		84,000	40,000
4,900		62,000	26,000	8,900		84,000	40,000
5,000		62,000	26,000	9,000		84,000	40,000

HARTNER

Forets hélicoïdaux extra-courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
9,100		84,000	40,000	10,500		89,000	43,000
9,200		84,000	40,000	11,000		95,000	47,000
9,250		84,000	40,000	11,200		95,000	47,000
9,300		84,000	40,000	11,500		95,000	47,000
9,400		84,000	40,000	11,800		95,000	47,000
9,500		84,000	40,000	12,000		102,000	51,000
9,600		89,000	43,000	12,500		102,000	51,000
9,700		89,000	43,000	13,000		102,000	51,000
9,800		89,000	43,000				
9,900		89,000	43,000				
10,000		89,000	43,000				
10,200		89,000	43,000				

HARTNER

Forets hélicoïdaux extra-courts

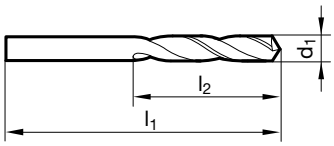
N° d'article 84511

P	M	K	N	S	H
●	○	●	○	○	○

HSS-E-PM | F | FN 500 | ~3xD | DIN 1897 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier PM HSS fritté et allié au Co • particulièrement rigide • résistance à l'usure particulièrement élevée

mat. haute résistance, aciers hautement alliés • aciers de cémentation et d'amélioration • fontes, laitons, bronzes



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		26,000	6,000	5,560	7/32	66,000	28,000
1,200		30,000	8,000	5,700		66,000	28,000
1,500		32,000	9,000	5,800		66,000	28,000
2,000		38,000	12,000	5,900		66,000	28,000
2,200		40,000	13,000	6,000		66,000	28,000
2,300		40,000	13,000	6,200		70,000	31,000
2,400		43,000	14,000	6,300		70,000	31,000
2,500		43,000	14,000	6,350	1/4	70,000	31,000
2,600		43,000	14,000	6,400		70,000	31,000
2,700		46,000	16,000	6,500		70,000	31,000
2,780	7/64	46,000	16,000	6,600		70,000	31,000
3,000		46,000	16,000	6,700		70,000	31,000
3,100		49,000	18,000	6,750	17/64	74,000	34,000
3,170	1/8	49,000	18,000	6,800		74,000	34,000
3,200		49,000	18,000	6,900		74,000	34,000
3,260		49,000	18,000	7,100		74,000	34,000
3,300		49,000	18,000	7,140	9/32	74,000	34,000
3,500		52,000	20,000	7,200		74,000	34,000
3,570	9/64	52,000	20,000	7,300		74,000	34,000
3,600		52,000	20,000	7,370		74,000	34,000
3,700		52,000	20,000	7,400		74,000	34,000
3,800		55,000	22,000	7,500		74,000	34,000
3,900		55,000	22,000	7,540	19/64	79,000	37,000
4,000		55,000	22,000	7,600		79,000	37,000
4,090		55,000	22,000	7,700		79,000	37,000
4,100		55,000	22,000	7,900		79,000	37,000
4,200		55,000	22,000	7,940	5/16	79,000	37,000
4,370	11/64	58,000	24,000	8,000		79,000	37,000
4,400		58,000	24,000	8,100		79,000	37,000
4,500		58,000	24,000	8,200		79,000	37,000
4,650		58,000	24,000	8,300		79,000	37,000
4,700		58,000	24,000	8,500		79,000	37,000
4,760	3/16	62,000	26,000	8,600		84,000	40,000
4,800		62,000	26,000	8,700		84,000	40,000
4,980		62,000	26,000	8,730	11/32	84,000	40,000
5,000		62,000	26,000	8,800		84,000	40,000
5,100		62,000	26,000	9,100		84,000	40,000
5,160	13/64	62,000	26,000	9,130	23/64	84,000	40,000
5,300		62,000	26,000	9,200		84,000	40,000
5,400		66,000	28,000	9,300		84,000	40,000
5,410		66,000	28,000	9,350		84,000	40,000
5,500		66,000	28,000	9,500		84,000	40,000

Forets hélicoïdaux extra-courts

d1 mm	 inch	l1 mm	l2 mm
9,520	3/8	89,000	43,000
9,600		89,000	43,000
9,800		89,000	43,000
9,900		89,000	43,000
9,920	25/64	89,000	43,000
10,000		89,000	43,000
10,200		89,000	43,000
10,320	13/32	89,000	43,000
10,500		89,000	43,000
10,720	27/64	95,000	47,000
11,000		95,000	47,000
11,110	7/16	95,000	47,000

d1 mm	 inch	l1 mm	l2 mm
11,510	29/64	95,000	47,000
11,910	15/32	102,000	51,000
12,000		102,000	51,000
12,500		102,000	51,000
12,700	1/2	102,000	51,000
13,000		102,000	51,000
13,500		107,000	54,000

HARTNER

Forets hélicoïdaux extra-courts

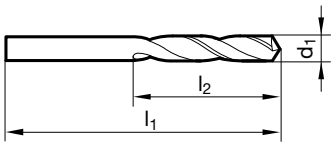
N° d'article 89235

P	M	K	N	S	H
○	○	○	●	○	

VHM | ◯ | N | ~3xD | DIN 6539 | 118° | h7 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • fontes grises • bronze, laiton • aluminium et alliages d'aluminium • magnésium, alliages de magnésium • matières synthét. et mat.synthét.renforcées de fibres



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

Forets hélicoïdaux extra-courts

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

HARTNER

Forets hélicoïdaux extra-courts

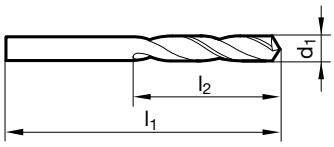
N° d'article 89253

P	M	K	N	S	H
○	○	○	●	○	

VHM | F | N | ~3xD | WN | 118° | h7 | R | Cyl

amin. de l'âme ≥ Ø 2,060 • affûtage en pente • arête de coupe principale rectiligne

alliages d'aluminium avec haut % de Si • aciers de décolletage, aciers d'amélioration • aciers de construction et de cémentation • fontes • matières synthét. et mat.synthét.renforcées de fibres • magnésium, alliages de magnésium • laitons



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		26,000	6,000	3,800		55,000	22,000
1,100		28,000	7,000	3,900		55,000	22,000
1,190	3/64	30,000	8,000	3,970	5/32	55,000	22,000
1,200		30,000	8,000	4,000		55,000	22,000
1,300		30,000	8,000	4,040		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
1,590	1/16	34,000	10,000	4,300		58,000	24,000
1,600		34,000	10,000	4,370	11/64	58,000	24,000
1,700		34,000	10,000	4,400		58,000	24,000
1,800		36,000	11,000	4,500		58,000	24,000
1,850		36,000	11,000	4,570		58,000	24,000
1,900		36,000	11,000	4,600		58,000	24,000
1,980	5/64	38,000	12,000	4,700		58,000	24,000
2,000		38,000	12,000	4,760	3/16	62,000	26,000
2,060		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	4,980		62,000	26,000
2,250		40,000	13,000	5,000		62,000	26,000
2,300		40,000	13,000	5,060		62,000	26,000
2,380	3/32	43,000	14,000	5,100		62,000	26,000
2,400		43,000	14,000	5,160	13/64	62,000	26,000
2,500		43,000	14,000	5,200		62,000	26,000
2,530		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
2,780	7/64	46,000	16,000	5,560	7/32	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	5,800		66,000	28,000
3,000		46,000	16,000	5,900		66,000	28,000
3,050		49,000	18,000	5,950	15/64	66,000	28,000
3,100		49,000	18,000	6,000		66,000	28,000
3,170	1/8	49,000	18,000	6,040		70,000	31,000
3,200		49,000	18,000	6,100		70,000	31,000
3,300		49,000	18,000	6,150		70,000	31,000
3,400		52,000	20,000	6,200		70,000	31,000
3,450		52,000	20,000	6,250		70,000	31,000
3,500		52,000	20,000	6,300		70,000	31,000
3,570	9/64	52,000	20,000	6,350	1/4	70,000	31,000
3,600		52,000	20,000	6,400		70,000	31,000
3,700		52,000	20,000	6,500		70,000	31,000

HARTNER

Forets hélicoïdaux extra-courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
6,600		70,000	31,000	9,000		84,000	40,000
6,700		70,000	31,000	9,130	23/64	84,000	40,000
6,800		74,000	34,000	9,300		84,000	40,000
6,900		74,000	34,000	9,500		84,000	40,000
7,000		74,000	34,000	9,520	3/8	89,000	43,000
7,030		74,000	34,000	9,600		89,000	43,000
7,100		74,000	34,000	9,700		89,000	43,000
7,140	9/32	74,000	34,000	9,800		89,000	43,000
7,200		74,000	34,000	9,920	25/64	89,000	43,000
7,300		74,000	34,000	10,000		89,000	43,000
7,400		74,000	34,000	10,080		89,000	43,000
7,500		74,000	34,000	10,200		89,000	43,000
7,540	19/64	79,000	37,000	10,320	13/32	89,000	43,000
7,600		79,000	37,000	10,500		89,000	43,000
7,800		79,000	37,000	10,720	27/64	95,000	47,000
7,900		79,000	37,000	11,000		95,000	47,000
7,940	5/16	79,000	37,000	11,110	7/16	95,000	47,000
8,000		79,000	37,000	11,500		95,000	47,000
8,030		79,000	37,000	11,510	29/64	95,000	47,000
8,100		79,000	37,000	11,910	15/32	102,000	51,000
8,200		79,000	37,000	12,000		102,000	51,000
8,300		79,000	37,000	12,300	31/64	102,000	51,000
8,330	21/64	79,000	37,000	12,700	1/2	102,000	51,000
8,400		79,000	37,000	13,000		102,000	51,000
8,500		79,000	37,000	13,500		107,000	54,000
8,600		84,000	40,000	14,000		107,000	54,000
8,700		84,000	40,000	14,290	9/16	111,000	56,000
8,730	11/32	84,000	40,000	14,500		111,000	56,000
8,800		84,000	40,000	15,000		111,000	56,000
8,900		84,000	40,000	16,000		115,000	58,000

HARTNER

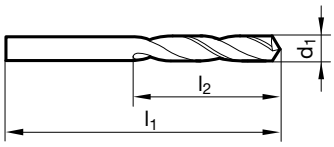
Forets hélicoïdaux extra-courts

N° d'article 89246

P	M	K	N	S	H
○	○	○	○	○	○

VHM | ◯ | N | ~3xD | WN | 130° | h7 | R | Cyl

affûtage en pente • arête de coupe principale rectiligne
matières synthétiques renforcées de fibres de verre • thermodurcissables abrasifs avec effet abrasif sur arêtes de coupe et listels



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

HARTNER

Forets hélicoïdaux courts

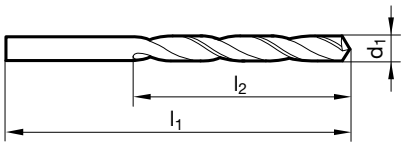
N° d'article 81010

P	M	K	N	S	H
●		●	○		

HSS | >Ø 2,36 | N | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,200		19,000	2,500	0,650		26,000	8,000
0,220		19,000	2,500	0,670		26,000	8,000
0,230		19,000	2,500	0,690		28,000	9,000
0,240		19,000	2,500	0,700		28,000	9,000
0,250		19,000	3,000	0,710		28,000	9,000
0,260		19,000	3,000	0,720		28,000	9,000
0,270		19,000	3,000	0,730		28,000	9,000
0,280		19,000	3,000	0,740		28,000	9,000
0,290		19,000	3,000	0,750		28,000	9,000
0,300		19,000	3,000	0,760		30,000	10,000
0,310		19,000	4,000	0,770		30,000	10,000
0,320		19,000	4,000	0,780		30,000	10,000
0,330		19,000	4,000	0,790	1/32	30,000	10,000
0,350		19,000	4,000	0,800		30,000	10,000
0,370		19,000	4,000	0,810		30,000	10,000
0,380		19,000	4,000	0,820		30,000	10,000
0,390		20,000	5,000	0,830		30,000	10,000
0,400		20,000	5,000	0,850		30,000	10,000
0,410		20,000	5,000	0,860		32,000	11,000
0,420		20,000	5,000	0,870		32,000	11,000
0,430		20,000	5,000	0,880		32,000	11,000
0,440		20,000	5,000	0,890		32,000	11,000
0,450		20,000	5,000	0,900		32,000	11,000
0,460		20,000	5,000	0,910		32,000	11,000
0,470		20,000	5,000	0,940		32,000	11,000
0,480		20,000	5,000	0,950		32,000	11,000
0,490		22,000	6,000	0,960		34,000	12,000
0,500		22,000	6,000	0,970		34,000	12,000
0,510		22,000	6,000	0,980		34,000	12,000
0,520		22,000	6,000	0,990		34,000	12,000
0,530		22,000	6,000	1,000		34,000	12,000
0,540		24,000	7,000	1,010		34,000	12,000
0,550		24,000	7,000	1,020		34,000	12,000
0,560		24,000	7,000	1,030		34,000	12,000
0,570		24,000	7,000	1,040		34,000	12,000
0,580		24,000	7,000	1,050		34,000	12,000
0,590		24,000	7,000	1,070		36,000	14,000
0,600		24,000	7,000	1,100		36,000	14,000
0,610		26,000	8,000	1,110		36,000	14,000
0,620		26,000	8,000	1,120		36,000	14,000
0,630		26,000	8,000	1,130		36,000	14,000
0,640		26,000	8,000	1,150		36,000	14,000

HARTNER

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,160		36,000	14,000	2,440		57,000	30,000
1,180		36,000	14,000	2,450		57,000	30,000
1,190	3/64	38,000	16,000	2,460		57,000	30,000
1,200		38,000	16,000	2,500		57,000	30,000
1,210		38,000	16,000	2,510		57,000	30,000
1,220		38,000	16,000	2,520		57,000	30,000
1,250		38,000	16,000	2,530		57,000	30,000
1,260		38,000	16,000	2,550		57,000	30,000
1,270		38,000	16,000	2,570		57,000	30,000
1,300		38,000	16,000	2,600		57,000	30,000
1,310		38,000	16,000	2,640		57,000	30,000
1,350		40,000	18,000	2,650		57,000	30,000
1,360		40,000	18,000	2,700		61,000	33,000
1,400		40,000	18,000	2,750		61,000	33,000
1,410		40,000	18,000	2,780	7/64	61,000	33,000
1,420		40,000	18,000	2,800		61,000	33,000
1,430		40,000	18,000	2,850		61,000	33,000
1,440		40,000	18,000	2,880		61,000	33,000
1,450		40,000	18,000	2,900		61,000	33,000
1,460		40,000	18,000	2,940		61,000	33,000
1,480		40,000	18,000	2,950		61,000	33,000
1,490		40,000	18,000	2,970		61,000	33,000
1,500		40,000	18,000	3,000		61,000	33,000
1,520		43,000	20,000	3,010		65,000	36,000
1,550		43,000	20,000	3,020		65,000	36,000
1,560		43,000	20,000	3,050		65,000	36,000
1,580		43,000	20,000	3,070		65,000	36,000
1,590	1/16	43,000	20,000	3,100		65,000	36,000
1,600		43,000	20,000	3,150		65,000	36,000
1,620		43,000	20,000	3,160		65,000	36,000
1,650		43,000	20,000	3,170	1/8	65,000	36,000
1,700		43,000	20,000	3,200		65,000	36,000
1,720		46,000	22,000	3,250		65,000	36,000
1,730		46,000	22,000	3,260		65,000	36,000
1,740		46,000	22,000	3,300		65,000	36,000
1,750		46,000	22,000	3,350		65,000	36,000
1,760		46,000	22,000	3,400		70,000	39,000
1,800		46,000	22,000	3,450		70,000	39,000
1,820		46,000	22,000	3,500		70,000	39,000
1,830		46,000	22,000	3,550		70,000	39,000
1,840		46,000	22,000	3,600		70,000	39,000
1,850		46,000	22,000	3,650		70,000	39,000
1,890		46,000	22,000	3,670		70,000	39,000
1,900		46,000	22,000	3,680		70,000	39,000
1,910		49,000	24,000	3,700		70,000	39,000
1,920		49,000	24,000	3,750		70,000	39,000
1,930		49,000	24,000	3,800		75,000	43,000
1,950		49,000	24,000	3,850		75,000	43,000
1,980	5/64	49,000	24,000	3,900		75,000	43,000
1,990		49,000	24,000	3,930		75,000	43,000
2,000		49,000	24,000	3,950		75,000	43,000
2,010		49,000	24,000	3,970	5/32	75,000	43,000
2,020		49,000	24,000	3,990		75,000	43,000
2,030		49,000	24,000	4,000		75,000	43,000
2,040		49,000	24,000	4,030		75,000	43,000
2,050		49,000	24,000	4,040		75,000	43,000
2,100		49,000	24,000	4,050		75,000	43,000
2,110		49,000	24,000	4,060		75,000	43,000
2,120		49,000	24,000	4,100		75,000	43,000
2,150		53,000	27,000	4,150		75,000	43,000
2,170		53,000	27,000	4,200		75,000	43,000
2,200		53,000	27,000	4,220		75,000	43,000
2,220		53,000	27,000	4,250		75,000	43,000
2,250		53,000	27,000	4,300		80,000	47,000
2,270		53,000	27,000	4,320		80,000	47,000
2,300		53,000	27,000	4,350		80,000	47,000
2,330		53,000	27,000	4,370	11/64	80,000	47,000
2,350		53,000	27,000	4,390		80,000	47,000
2,360		53,000	27,000	4,400		80,000	47,000
2,370		57,000	30,000	4,450		80,000	47,000
2,380	3/32	57,000	30,000	4,500		80,000	47,000
2,400		57,000	30,000	4,530		80,000	47,000

HARTNER

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,550		80,000	47,000	7,250		109,000	69,000
4,570		80,000	47,000	7,300		109,000	69,000
4,600		80,000	47,000	7,350		109,000	69,000
4,650		80,000	47,000	7,400		109,000	69,000
4,700		80,000	47,000	7,450		109,000	69,000
4,750		80,000	47,000	7,500		109,000	69,000
4,760	3/16	86,000	52,000	7,540	19/64	117,000	75,000
4,780		86,000	52,000	7,600		117,000	75,000
4,800		86,000	52,000	7,700		117,000	75,000
4,830		86,000	52,000	7,750		117,000	75,000
4,850		86,000	52,000	7,800		117,000	75,000
4,900		86,000	52,000	7,850		117,000	75,000
4,920		86,000	52,000	7,900		117,000	75,000
4,950		86,000	52,000	7,940	5/16	117,000	75,000
5,000		86,000	52,000	7,950		117,000	75,000
5,050		86,000	52,000	8,000		117,000	75,000
5,060		86,000	52,000	8,050		117,000	75,000
5,100		86,000	52,000	8,100		117,000	75,000
5,110		86,000	52,000	8,200		117,000	75,000
5,150		86,000	52,000	8,250		117,000	75,000
5,160	13/64	86,000	52,000	8,300		117,000	75,000
5,200		86,000	52,000	8,330	21/64	117,000	75,000
5,250		86,000	52,000	8,400		117,000	75,000
5,300		86,000	52,000	8,450		117,000	75,000
5,310		93,000	57,000	8,500		117,000	75,000
5,350		93,000	57,000	8,550		125,000	81,000
5,400		93,000	57,000	8,600		125,000	81,000
5,410		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	9,100		125,000	81,000
5,620		93,000	57,000	9,130	23/64	125,000	81,000
5,650		93,000	57,000	9,150		125,000	81,000
5,700		93,000	57,000	9,200		125,000	81,000
5,750		93,000	57,000	9,250		125,000	81,000
5,790		93,000	57,000	9,300		125,000	81,000
5,800		93,000	57,000	9,350		125,000	81,000
5,850		93,000	57,000	9,400		125,000	81,000
5,900		93,000	57,000	9,500		125,000	81,000
5,950	15/64	93,000	57,000	9,520	3/8	133,000	87,000
5,970		93,000	57,000	9,550		133,000	87,000
6,000		93,000	57,000	9,600		133,000	87,000
6,030		101,000	63,000	9,650		133,000	87,000
6,040		101,000	63,000	9,700		133,000	87,000
6,050		101,000	63,000	9,750		133,000	87,000
6,100		101,000	63,000	9,800		133,000	87,000
6,150		101,000	63,000	9,900		133,000	87,000
6,200		101,000	63,000	9,920	25/64	133,000	87,000
6,250		101,000	63,000	9,950		133,000	87,000
6,300		101,000	63,000	10,000		133,000	87,000
6,350	1/4	101,000	63,000	10,050		133,000	87,000
6,400		101,000	63,000	10,080		133,000	87,000
6,450		101,000	63,000	10,100		133,000	87,000
6,500		101,000	63,000	10,200		133,000	87,000
6,550		101,000	63,000	10,250		133,000	87,000
6,600		101,000	63,000	10,300		133,000	87,000
6,650		101,000	63,000	10,320	13/32	133,000	87,000
6,700		101,000	63,000	10,400		133,000	87,000
6,750	17/64	109,000	69,000	10,500		133,000	87,000
6,800		109,000	69,000	10,600		133,000	87,000
6,850		109,000	69,000	10,700		142,000	94,000
6,900		109,000	69,000	10,720	27/64	142,000	94,000
6,950		109,000	69,000	10,750		142,000	94,000
7,000		109,000	69,000	10,800		142,000	94,000
7,050		109,000	69,000	10,900		142,000	94,000
7,100		109,000	69,000	11,000		142,000	94,000
7,140	9/32	109,000	69,000	11,100		142,000	94,000
7,200		109,000	69,000	11,110	7/16	142,000	94,000

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
11,200		142,000	94,000	14,250		169,000	114,000
11,250		142,000	94,000	14,300		169,000	114,000
11,300		142,000	94,000	14,400		169,000	114,000
11,400		142,000	94,000	14,500		169,000	114,000
11,500		142,000	94,000	14,600		169,000	114,000
11,510	29/64	142,000	94,000	14,700		169,000	114,000
11,600		142,000	94,000	14,750		169,000	114,000
11,700		142,000	94,000	14,800		169,000	114,000
11,750		142,000	94,000	14,900		169,000	114,000
11,800		142,000	94,000	15,000		169,000	114,000
11,900		151,000	101,000	15,080	19/32	178,000	120,000
11,910	15/32	151,000	101,000	15,100		178,000	120,000
12,000		151,000	101,000	15,250		178,000	120,000
12,050		151,000	101,000	15,400		178,000	120,000
12,100		151,000	101,000	15,500		178,000	120,000
12,200		151,000	101,000	15,700		178,000	120,000
12,250		151,000	101,000	15,750		178,000	120,000
12,300	31/64	151,000	101,000	15,800		178,000	120,000
12,400		151,000	101,000	15,870	5/8	178,000	120,000
12,500		151,000	101,000	16,000		178,000	120,000
12,600		151,000	101,000	16,100		184,000	125,000
12,700	1/2	151,000	101,000	16,200		184,000	125,000
12,750		151,000	101,000	16,250		184,000	125,000
12,800		151,000	101,000	16,270	41/64	184,000	125,000
12,850		151,000	101,000	16,500		184,000	125,000
12,900		151,000	101,000	16,600		184,000	125,000
13,000		151,000	101,000	16,700		184,000	125,000
13,100	33/64	151,000	101,000	17,000		184,000	125,000
13,200		151,000	101,000	17,250		191,000	130,000
13,250		160,000	108,000	17,500		191,000	130,000
13,300		160,000	108,000	17,750		191,000	130,000
13,400		160,000	108,000	17,800		191,000	130,000
13,490	17/32	160,000	108,000	18,000		191,000	130,000
13,500		160,000	108,000	18,500		198,000	135,000
13,600		160,000	108,000	18,750		198,000	135,000
13,700		160,000	108,000	19,000		198,000	135,000
13,750		160,000	108,000	19,250		205,000	140,000
13,800		160,000	108,000	19,500		205,000	140,000
13,900		160,000	108,000	20,000		205,000	140,000
14,000		160,000	108,000				
14,100		169,000	114,000				
14,200		169,000	114,000				

HARTNER

Forets hélicoïdaux courts

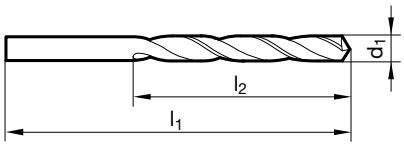
N° d'article 81015

P	M	K	N	S	H
●		●	○		

HSS | >Ø 6,00 | N | ~5xD | DIN 338 | 118° | h8 | L | Cyl

amin. de l'âme ≥ Ø 15,000 • affûtage à dépouille conique

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,250		19,000	3,000	3,150		65,000	36,000
0,300		19,000	3,000	3,200		65,000	36,000
0,370		19,000	4,000	3,250		65,000	36,000
0,400		20,000	5,000	3,300		65,000	36,000
0,500		22,000	6,000	3,350		65,000	36,000
0,650		26,000	8,000	3,400		70,000	39,000
0,700		28,000	9,000	3,450		70,000	39,000
0,800		30,000	10,000	3,500		70,000	39,000
0,900		32,000	11,000	3,550		70,000	39,000
0,950		32,000	11,000	3,600		70,000	39,000
1,000		34,000	12,000	3,650		70,000	39,000
1,050		34,000	12,000	3,700		70,000	39,000
1,100		36,000	14,000	3,750		70,000	39,000
1,150		36,000	14,000	3,800		75,000	43,000
1,170		36,000	14,000	3,850		75,000	43,000
1,200		38,000	16,000	3,900		75,000	43,000
1,250		38,000	16,000	3,950		75,000	43,000
1,300		38,000	16,000	4,000		75,000	43,000
1,350		40,000	18,000	4,100		75,000	43,000
1,400		40,000	18,000	4,150		75,000	43,000
1,450		40,000	18,000	4,200		75,000	43,000
1,500		40,000	18,000	4,250		75,000	43,000
1,550		43,000	20,000	4,350		80,000	47,000
1,560		43,000	20,000	4,400		80,000	47,000
1,600		43,000	20,000	4,450		80,000	47,000
1,700		43,000	20,000	4,500		80,000	47,000
1,800		46,000	22,000	4,550		80,000	47,000
2,000		49,000	24,000	4,600		80,000	47,000
2,050		49,000	24,000	4,650		80,000	47,000
2,100		49,000	24,000	4,700		80,000	47,000
2,200		53,000	27,000	4,750		80,000	47,000
2,250		53,000	27,000	4,850		86,000	52,000
2,400		57,000	30,000	4,900		86,000	52,000
2,500		57,000	30,000	5,000		86,000	52,000
2,550		57,000	30,000	5,200		86,000	52,000
2,600		57,000	30,000	5,300		86,000	52,000
2,700		61,000	33,000	5,400		93,000	57,000
2,750		61,000	33,000	5,500		93,000	57,000
2,800		61,000	33,000	5,600		93,000	57,000
3,000		61,000	33,000	5,700		93,000	57,000
3,050		65,000	36,000	5,750		93,000	57,000
3,100		65,000	36,000	5,800		93,000	57,000

Forets hélicoïdaux courts

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

HARTNER

Forets hélicoïdaux courts

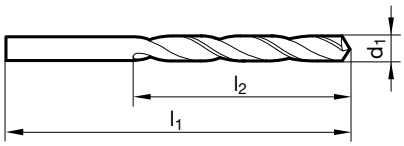
N° d'article 81017

P	M	K	N	S	H
●		●	○		

HSS | N | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • avec tenon suiv. DIN 1809

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
3,000		61,000	33,000	7,600		117,000	75,000
3,100		65,000	36,000	7,700		117,000	75,000
3,200		65,000	36,000	7,750		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	8,500		117,000	75,000
3,700		70,000	39,000	8,700		125,000	81,000
3,800		75,000	43,000	8,800		125,000	81,000
4,000		75,000	43,000	8,900		125,000	81,000
4,200		75,000	43,000	9,000		125,000	81,000
4,500		80,000	47,000	9,100		125,000	81,000
4,600		80,000	47,000	9,500		125,000	81,000
5,000		86,000	52,000	9,800		133,000	87,000
5,100		86,000	52,000	10,000		133,000	87,000
5,200		86,000	52,000	10,200		133,000	87,000
5,500		93,000	57,000	10,500		133,000	87,000
5,600		93,000	57,000	11,000		142,000	94,000
5,750		93,000	57,000	11,500		142,000	94,000
5,800		93,000	57,000	12,000		151,000	101,000
6,000		93,000	57,000	13,000		151,000	101,000
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				
6,800		109,000	69,000				
7,000		109,000	69,000				
7,200		109,000	69,000				
7,500		109,000	69,000				

HARTNER

Forets hélicoïdaux courts

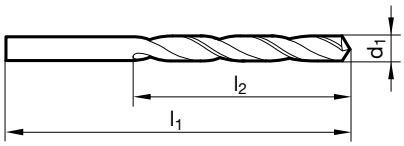
N° d'article 81020

P	M	K	N	S	H
			•		

HSS | ○ | H | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 14,500 • affûtage à dépouille conique

matières dures et friables • laitons, alliages de magnésium • bronze, bronze phosphoreux • ardoise, mica, pertinax



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,300		19,000	3,000	2,100		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
0,450		20,000	5,000	2,300		53,000	27,000
0,480		20,000	5,000	2,400		57,000	30,000
0,500		22,000	6,000	2,450		57,000	30,000
0,510		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	2,630		57,000	30,000
0,700		28,000	9,000	2,700		61,000	33,000
0,750		28,000	9,000	2,780	7/64	61,000	33,000
0,800		30,000	10,000	2,800		61,000	33,000
0,810		30,000	10,000	2,900		61,000	33,000
0,840		30,000	10,000	2,950		61,000	33,000
0,900		32,000	11,000	3,000		61,000	33,000
0,910		32,000	11,000	3,020		65,000	36,000
0,950		32,000	11,000	3,050		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	3,650		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
1,510		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	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

HARTNER

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,600		80,000	47,000	8,400		117,000	75,000
4,700		80,000	47,000	8,500		117,000	75,000
4,750		80,000	47,000	8,600		125,000	81,000
4,800		86,000	52,000	8,700		125,000	81,000
4,900		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
5,300		86,000	52,000	9,200		125,000	81,000
5,400		93,000	57,000	9,250		125,000	81,000
5,500		93,000	57,000	9,300		125,000	81,000
5,600		93,000	57,000	9,400		125,000	81,000
5,700		93,000	57,000	9,500		125,000	81,000
5,750		93,000	57,000	9,600		133,000	87,000
5,800		93,000	57,000	9,700		133,000	87,000
5,900		93,000	57,000	9,750		133,000	87,000
6,000		93,000	57,000	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
6,250		101,000	63,000	10,100		133,000	87,000
6,300		101,000	63,000	10,200		133,000	87,000
6,400		101,000	63,000	10,500		133,000	87,000
6,500		101,000	63,000	10,600		133,000	87,000
6,600		101,000	63,000	10,800		142,000	94,000
6,700		101,000	63,000	11,000		142,000	94,000
6,800		109,000	69,000	11,200		142,000	94,000
6,900		109,000	69,000	11,500		142,000	94,000
7,000		109,000	69,000	12,000		151,000	101,000
7,050		109,000	69,000	12,100		151,000	101,000
7,100		109,000	69,000	12,500		151,000	101,000
7,200		109,000	69,000	12,700	1/2	151,000	101,000
7,250		109,000	69,000	13,000		151,000	101,000
7,300		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	14,500		169,000	114,000
7,700		117,000	75,000	15,000		169,000	114,000
7,750		117,000	75,000	15,100		178,000	120,000
7,800		117,000	75,000	15,500		178,000	120,000
7,900		117,000	75,000	16,000		178,000	120,000
8,000		117,000	75,000	18,000		191,000	130,000
8,100		117,000	75,000	19,000		198,000	135,000
8,200		117,000	75,000	20,000		205,000	140,000

HARTNER

Forets hélicoïdaux courts

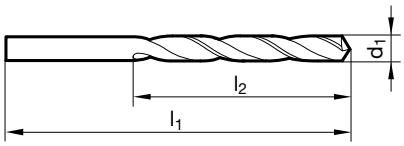
N° d'article 81025

P	M	K	N	S	H
			•		

HSS | ○ | H | ~5xD | DIN 338 | 118° | h8 | L | Cyl

amin. de l'âme ≥ Ø 14,500 • affûtage à dépouille conique

matières dures et friables • laitons, alliages de magnésium • bronze, bronze phosphoreux • ardoise, mica, pertinax



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,500		22,000	6,000	2,900		61,000	33,000
0,580		24,000	7,000	2,950		61,000	33,000
0,670		26,000	8,000	3,000		61,000	33,000
0,690		28,000	9,000	3,100		65,000	36,000
0,700		28,000	9,000	3,150		65,000	36,000
0,750		28,000	9,000	3,200		65,000	36,000
0,800		30,000	10,000	3,250		65,000	36,000
0,900		32,000	11,000	3,300		65,000	36,000
0,950		32,000	11,000	3,400		70,000	39,000
1,000		34,000	12,000	3,500		70,000	39,000
1,050		34,000	12,000	3,700		70,000	39,000
1,100		36,000	14,000	3,750		70,000	39,000
1,150		36,000	14,000	3,800		75,000	43,000
1,160		36,000	14,000	3,850		75,000	43,000
1,180		36,000	14,000	3,900		75,000	43,000
1,200		38,000	16,000	4,000		75,000	43,000
1,240		38,000	16,000	4,100		75,000	43,000
1,290		38,000	16,000	4,300		80,000	47,000
1,400		40,000	18,000	4,400		80,000	47,000
1,460		40,000	18,000	4,500		80,000	47,000
1,470		40,000	18,000	4,600		80,000	47,000
1,480		40,000	18,000	4,700		80,000	47,000
1,500		40,000	18,000	4,750		80,000	47,000
1,600		43,000	20,000	4,800		86,000	52,000
1,660		43,000	20,000	4,950		86,000	52,000
1,710		46,000	22,000	5,000		86,000	52,000
1,730		46,000	22,000	5,200		86,000	52,000
1,800		46,000	22,000	5,300		86,000	52,000
1,900		46,000	22,000	5,400		93,000	57,000
1,920		49,000	24,000	5,500		93,000	57,000
1,950		49,000	24,000	5,600		93,000	57,000
2,000		49,000	24,000	5,750		93,000	57,000
2,050		49,000	24,000	5,800		93,000	57,000
2,100		49,000	24,000	5,900		93,000	57,000
2,250		53,000	27,000	6,000		93,000	57,000
2,350		53,000	27,000	6,100		101,000	63,000
2,400		57,000	30,000	6,250		101,000	63,000
2,430		57,000	30,000	6,400		101,000	63,000
2,500		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	6,800		109,000	69,000
2,800		61,000	33,000	6,900		109,000	69,000

HARTNER

Forets hélicoïdaux courts

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

HARTNER

Forets hélicoïdaux courts

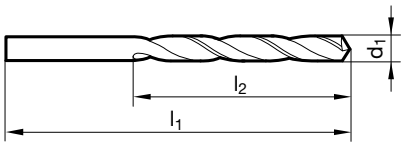
N° d'article 81030

P	M	K	N	S	H
			•		

HSS | ○ | W | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 14,500 • affûtage à dépouille conique

matières tendres et à copeaux longs • aluminium/alliages d'aluminium à copeaux longs • zinc, cuivre de 1ère fusion, Alpax, électrode • matières plastiques souples • bois



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,250		19,000	3,000	2,450		57,000	30,000
0,300		19,000	3,000	2,500		57,000	30,000
0,400		20,000	5,000	2,550		57,000	30,000
0,500		22,000	6,000	2,600		57,000	30,000
0,550		24,000	7,000	2,700		61,000	33,000
0,600		24,000	7,000	2,750		61,000	33,000
0,700		28,000	9,000	2,800		61,000	33,000
0,800		30,000	10,000	2,850		61,000	33,000
0,850		30,000	10,000	2,900		61,000	33,000
0,900		32,000	11,000	2,950		61,000	33,000
0,950		32,000	11,000	3,000		61,000	33,000
0,970		34,000	12,000	3,050		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
1,070		36,000	14,000	3,200		65,000	36,000
1,100		36,000	14,000	3,250		65,000	36,000
1,150		36,000	14,000	3,300		65,000	36,000
1,200		38,000	16,000	3,400		70,000	39,000
1,240		38,000	16,000	3,450		70,000	39,000
1,250		38,000	16,000	3,500		70,000	39,000
1,280		38,000	16,000	3,600		70,000	39,000
1,300		38,000	16,000	3,650		70,000	39,000
1,400		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
1,530		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	3,950		75,000	43,000
1,650		43,000	20,000	4,000		75,000	43,000
1,700		43,000	20,000	4,040		75,000	43,000
1,750		46,000	22,000	4,100		75,000	43,000
1,800		46,000	22,000	4,150		75,000	43,000
1,900		46,000	22,000	4,200		75,000	43,000
1,950		49,000	24,000	4,250		75,000	43,000
2,000		49,000	24,000	4,300		80,000	47,000
2,050		49,000	24,000	4,400		80,000	47,000
2,100		49,000	24,000	4,500		80,000	47,000
2,150		53,000	27,000	4,600		80,000	47,000
2,200		53,000	27,000	4,700		80,000	47,000
2,250		53,000	27,000	4,750		80,000	47,000
2,300		53,000	27,000	4,800		86,000	52,000
2,400		57,000	30,000	4,850		86,000	52,000

HARTNER

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm
4,900		86,000	52,000
4,950		86,000	52,000
5,000		86,000	52,000
5,050		86,000	52,000
5,100		86,000	52,000
5,200		86,000	52,000
5,250		86,000	52,000
5,300		86,000	52,000
5,400		93,000	57,000
5,500		93,000	57,000
5,550		93,000	57,000
5,600		93,000	57,000
5,700		93,000	57,000
5,750		93,000	57,000
5,800		93,000	57,000
5,900		93,000	57,000
5,950	15/64	93,000	57,000
6,000		93,000	57,000
6,100		101,000	63,000
6,150		101,000	63,000
6,200		101,000	63,000
6,250		101,000	63,000
6,300		101,000	63,000
6,350	1/4	101,000	63,000
6,400		101,000	63,000
6,500		101,000	63,000
6,600		101,000	63,000
6,700		101,000	63,000
6,750	17/64	109,000	69,000
6,800		109,000	69,000
6,900		109,000	69,000
7,000		109,000	69,000
7,100		109,000	69,000
7,200		109,000	69,000
7,250		109,000	69,000
7,300		109,000	69,000
7,400		109,000	69,000
7,500		109,000	69,000
7,600		117,000	75,000
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
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
8,750		125,000	81,000
8,800		125,000	81,000
8,900		125,000	81,000
9,000		125,000	81,000

d1 mm	inch	l1 mm	l2 mm
9,100		125,000	81,000
9,200		125,000	81,000
9,250		125,000	81,000
9,300		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
9,900		133,000	87,000
10,000		133,000	87,000
10,100		133,000	87,000
10,200		133,000	87,000
10,250		133,000	87,000
10,300		133,000	87,000
10,400		133,000	87,000
10,500		133,000	87,000
10,600		133,000	87,000
10,800		142,000	94,000
10,900		142,000	94,000
10,950		142,000	94,000
11,000		142,000	94,000
11,100		142,000	94,000
11,200		142,000	94,000
11,500		142,000	94,000
11,600		142,000	94,000
11,700		142,000	94,000
11,800		142,000	94,000
12,000		151,000	101,000
12,100		151,000	101,000
12,200		151,000	101,000
12,500		151,000	101,000
12,600		151,000	101,000
12,700	1/2	151,000	101,000
13,000		151,000	101,000
13,200		151,000	101,000
13,500		160,000	108,000
14,000		160,000	108,000
14,400		169,000	114,000
14,500		169,000	114,000
15,000		169,000	114,000
15,500		178,000	120,000
16,000		178,000	120,000
16,500		184,000	125,000

HARTNER

Forets hélicoïdaux courts

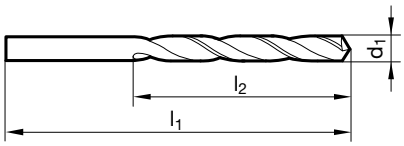
N° d'article 81035

P	M	K	N	S	H
			•		

HSS | W | ~5xD | DIN 338 | 130° | h8 | L | Cyl

amin. de l'âme ≥ Ø 15,000 • affûtage à dépouille conique

matières tendres et à copeaux longs • aluminium/alliages d'aluminium à copeaux longs • zinc, cuivre de 1ère fusion, Alpax, électrode • matières plastiques souples • bois



d1 mm	inch	l1 mm	l2 mm
0,500		22,000	6,000
0,600		24,000	7,000
0,750		28,000	9,000
1,000		34,000	12,000
1,050		34,000	12,000
1,100		36,000	14,000
1,200		38,000	16,000
1,550		43,000	20,000
1,750		46,000	22,000
1,800		46,000	22,000
1,850		46,000	22,000
1,900		46,000	22,000
2,000		49,000	24,000
2,250		53,000	27,000
2,300		53,000	27,000
2,350		53,000	27,000
2,400		57,000	30,000
2,500		57,000	30,000
2,600		57,000	30,000
2,650		57,000	30,000
2,700		61,000	33,000
2,900		61,000	33,000
3,000		61,000	33,000
3,100		65,000	36,000
3,200		65,000	36,000
3,500		70,000	39,000
3,700		70,000	39,000
3,800		75,000	43,000
3,850		75,000	43,000
3,900		75,000	43,000
3,950		75,000	43,000
4,100		75,000	43,000
4,200		75,000	43,000
4,500		80,000	47,000
4,600		80,000	47,000
4,700		80,000	47,000

d1 mm	inch	l1 mm	l2 mm
4,900		86,000	52,000
5,100		86,000	52,000
5,250		86,000	52,000
5,400		93,000	57,000
5,500		93,000	57,000
5,600		93,000	57,000
5,800		93,000	57,000
6,000		93,000	57,000
6,200		101,000	63,000
6,300		101,000	63,000
6,400		101,000	63,000
6,800		109,000	69,000
6,900		109,000	69,000
7,000		109,000	69,000
7,400		109,000	69,000
7,500		109,000	69,000
7,600		117,000	75,000
7,700		117,000	75,000
7,900		117,000	75,000
9,100		125,000	81,000
9,300		125,000	81,000
9,400		125,000	81,000
9,500		125,000	81,000
10,500		133,000	87,000
11,500		142,000	94,000
12,500		151,000	101,000
13,000		151,000	101,000
13,500		160,000	108,000
14,000		160,000	108,000
15,000		169,000	114,000

HARTNER

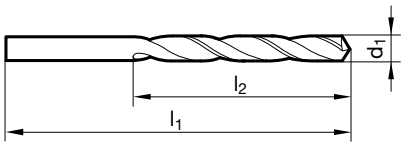
Forets hélicoïdaux courts

N° d'article 81040

P	M	K	N	S	H
•		•	•		

HSS | >Ø 2,36 | FN | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • goujures larges • parfait pour les profondeurs > 3xD
fontes grises • aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,800		30,000	10,000	3,550		70,000	39,000
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
1,350		40,000	18,000	3,950		75,000	43,000
1,400		40,000	18,000	4,000		75,000	43,000
1,450		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
1,570		43,000	20,000	4,250		75,000	43,000
1,600		43,000	20,000	4,400		80,000	47,000
1,650		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
1,850		46,000	22,000	4,800		86,000	52,000
1,900		46,000	22,000	4,900		86,000	52,000
1,950		49,000	24,000	4,950		86,000	52,000
2,000		49,000	24,000	5,000		86,000	52,000
2,050		49,000	24,000	5,030		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
2,300		53,000	27,000	5,400		93,000	57,000
2,350		53,000	27,000	5,500		93,000	57,000
2,500		57,000	30,000	5,600		93,000	57,000
2,550		57,000	30,000	5,700		93,000	57,000
2,600		57,000	30,000	5,800		93,000	57,000
2,700		61,000	33,000	5,900		93,000	57,000
2,800		61,000	33,000	5,950	15/64	93,000	57,000
2,850		61,000	33,000	6,000		93,000	57,000
2,900		61,000	33,000	6,100		101,000	63,000
3,000		61,000	33,000	6,300		101,000	63,000
3,050		65,000	36,000	6,400		101,000	63,000
3,100		65,000	36,000	6,450		101,000	63,000
3,150		65,000	36,000	6,500		101,000	63,000
3,200		65,000	36,000	6,600		101,000	63,000
3,250		65,000	36,000	6,800		109,000	69,000
3,300		65,000	36,000	6,900		109,000	69,000
3,350		65,000	36,000	7,000		109,000	69,000
3,400		70,000	39,000	7,100		109,000	69,000
3,500		70,000	39,000	7,300		109,000	69,000

Forets hélicoïdaux courts

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

HARTNER

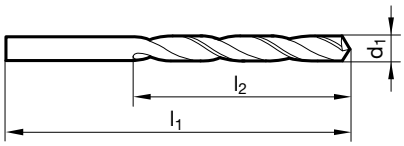
Forets hélicoïdaux courts

N° d'article 81045

P	M	K	N	S	H
•		•	•		

HSS | >Ø 2,36 | FN | ~5xD | DIN 338 | 130° | h8 | L | Cyl

amin. de l'âme ≥ Ø 1,400 • affûtage à dépouille conique • goujures larges • parfait pour les profondeurs > 3xD
fontes grises • aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



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

HARTNER

Forets hélicoïdaux courts

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

HARTNER

Forets hélicoïdaux courts

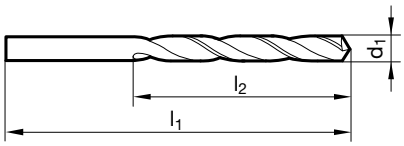
N° d'article 84405

P	M	K	N	S	H
•		•	•		

HSS | T | N | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



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

HARTNER

Forets hélicoïdaux courts

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

HARTNER

Forets hélicoïdaux courts

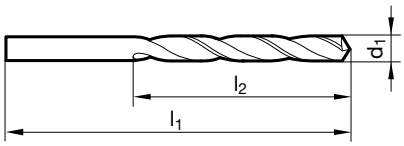
N° d'article 84406

P	M	K	N	S	H
●		●	○		

HSS | T | N | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • pointe revêtue

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



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

HARTNER

Forets hélicoïdaux courts

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

Forets hélicoïdaux courts

N° d'article 84415

P	M	K	N	S	H
•		•	•		

HSS | T | FN | ~5xD | DIN 338 | 130° | h8 | R | Cyl

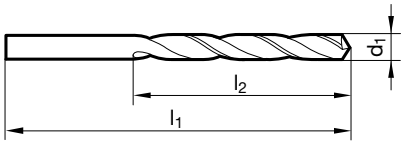
amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • goujures larges • parfait pour les profondeurs > 3xD
fontes grises • aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox

N° d'article 84502

P	M	K	N	S	H
•		•	•		

HSS | F | FN | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • goujures larges • parfait pour les profondeurs > 3xD
fontes grises • aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 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	6,200		101,000	63,000
3,200		65,000	36,000	6,300		101,000	63,000
3,300		65,000	36,000	6,400		101,000	63,000
3,400		70,000	39,000	6,500		101,000	63,000
3,500		70,000	39,000	6,600		101,000	63,000
3,600		70,000	39,000	6,700		101,000	63,000
3,700		70,000	39,000	6,800		109,000	69,000
3,800		75,000	43,000	6,900		109,000	69,000

Forets hélicoïdaux courts

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

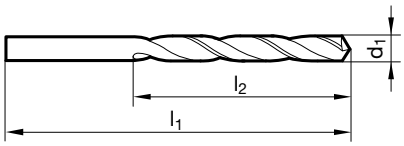
Forets hélicoïdaux courts

N° d'article 81012

P	M	K	N	S	H
●	○	○	●	●	○

M42 | N | ~5xD | DIN 338 | 135° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille tronconique avec amincissement de l'âme selon Norme NAS 907 • haut % de Co & Mo • résistance à l'usure particulièrement élevée



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

Forets hélicoïdaux courts

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			

HARTNER

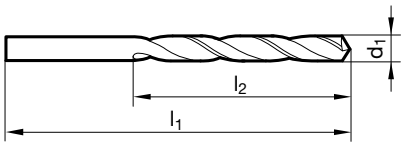
Forets hélicoïdaux courts

N° d'article 81018

P	M	K	N	S	H
●	●	●	●	●	○

M42 | N | ~5xD | DIN 338 | 135° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille tronconique avec amincissement de l'âme selon Norme NAS 907 • haut % de Co & Mo • résistance à l'usure particulièrement élevée • augmentation de l´épaisseur de l´âme fortement réduite



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		34,000	12,000	4,400		80,000	47,000
1,100		36,000	14,000	4,500		80,000	47,000
1,200		38,000	16,000	4,600		80,000	47,000
1,300		38,000	16,000	4,700		80,000	47,000
1,400		40,000	18,000	4,760	3/16	86,000	52,000
1,500		40,000	18,000	4,800		86,000	52,000
1,590	1/16	43,000	20,000	4,900		86,000	52,000
1,600		43,000	20,000	5,000		86,000	52,000
1,700		43,000	20,000	5,100		86,000	52,000
1,800		46,000	22,000	5,160	13/64	86,000	52,000
1,900		46,000	22,000	5,200		86,000	52,000
1,980	5/64	49,000	24,000	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
3,250		65,000	36,000	6,700		101,000	63,000
3,300		65,000	36,000	6,800		109,000	69,000
3,400		70,000	39,000	6,900		109,000	69,000
3,500		70,000	39,000	7,000		109,000	69,000
3,570	9/64	70,000	39,000	7,100		109,000	69,000
3,600		70,000	39,000	7,140	9/32	109,000	69,000
3,700		70,000	39,000	7,200		109,000	69,000
3,800		75,000	43,000	7,300		109,000	69,000
3,900		75,000	43,000	7,400		109,000	69,000
3,970	5/32	75,000	43,000	7,500		109,000	69,000
4,000		75,000	43,000	7,540	19/64	117,000	75,000
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

HARTNER

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
7,900		117,000	75,000	9,900		133,000	87,000
7,940	5/16	117,000	75,000	9,920	25/64	133,000	87,000
8,000		117,000	75,000	10,000		133,000	87,000
8,100		117,000	75,000	10,100		133,000	87,000
8,200		117,000	75,000	10,200		133,000	87,000
8,300		117,000	75,000	10,300		133,000	87,000
8,330	21/64	117,000	75,000	10,320	13/32	133,000	87,000
8,400		117,000	75,000	10,500		133,000	87,000
8,500		117,000	75,000	10,720	27/64	142,000	94,000
8,600		125,000	81,000	10,800		142,000	94,000
8,700		125,000	81,000	11,000		142,000	94,000
8,730	11/32	125,000	81,000	11,110	7/16	142,000	94,000
8,800		125,000	81,000	11,500		142,000	94,000
8,900		125,000	81,000	11,510	29/64	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
9,130	23/64	125,000	81,000	12,200		151,000	101,000
9,200		125,000	81,000	12,300	31/64	151,000	101,000
9,300		125,000	81,000	12,500		151,000	101,000
9,500		125,000	81,000	12,700	1/2	151,000	101,000
9,520	3/8	133,000	87,000	12,800		151,000	101,000
9,600		133,000	87,000	13,000		151,000	101,000
9,700		133,000	87,000				
9,800		133,000	87,000				

HARTNER

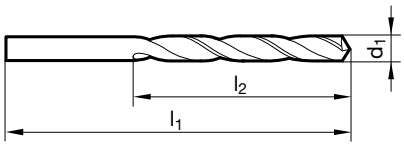
Forets hélicoïdaux courts

N° d'article 81019

P	M	K	N	S	H
●	●	●	○	●	○

M42 | F | N | ~5xD | DIN 338 | 135° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille tronconique avec amincissement de l'âme selon Norme NAS 907 • haut % de Co & Mo • résistance à l'usure particulièrement élevée



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

Forets hélicoïdaux courts

d1 mm	 inch	l1 mm	l2 mm
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
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
9,800		133,000	87,000
9,900		133,000	87,000
9,920	25/64	133,000	87,000
10,000		133,000	87,000

d1 mm	 inch	l1 mm	l2 mm
10,100		133,000	87,000
10,200		133,000	87,000
10,500		133,000	87,000
10,800		142,000	94,000
11,000		142,000	94,000
11,200		142,000	94,000
11,500		142,000	94,000
11,800		142,000	94,000
11,910	15/32	151,000	101,000
12,000		151,000	101,000
12,200		151,000	101,000
12,500		151,000	101,000
13,000		151,000	101,000
14,000		160,000	108,000
15,000		169,000	114,000
16,000		178,000	120,000

HARTNER

Forets hélicoïdaux courts

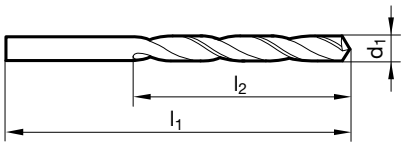
N° d'article 81011

P	M	K	N	S	H
●	○	●	○		

HSS-E | >Ø 2,36 | N | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure

acier, fonte aciérée (alliée / non alliée) • fontes supérieure à 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,200		19,000	2,500	1,900		46,000	22,000
0,250		19,000	3,000	1,950		49,000	24,000
0,300		19,000	3,000	2,000		49,000	24,000
0,350		19,000	4,000	2,030		49,000	24,000
0,400		20,000	5,000	2,050		49,000	24,000
0,430		20,000	5,000	2,100		49,000	24,000
0,450		20,000	5,000	2,150		53,000	27,000
0,500		22,000	6,000	2,200		53,000	27,000
0,550		24,000	7,000	2,250		53,000	27,000
0,600		24,000	7,000	2,300		53,000	27,000
0,650		26,000	8,000	2,400		57,000	30,000
0,680		28,000	9,000	2,450		57,000	30,000
0,700		28,000	9,000	2,500		57,000	30,000
0,750		28,000	9,000	2,550		57,000	30,000
0,800		30,000	10,000	2,600		57,000	30,000
0,860		32,000	11,000	2,650		57,000	30,000
0,870		32,000	11,000	2,700		61,000	33,000
0,900		32,000	11,000	2,750		61,000	33,000
0,950		32,000	11,000	2,800		61,000	33,000
0,980		34,000	12,000	2,850		61,000	33,000
1,000		34,000	12,000	2,900		61,000	33,000
1,050		34,000	12,000	2,950		61,000	33,000
1,100		36,000	14,000	3,000		61,000	33,000
1,150		36,000	14,000	3,050		65,000	36,000
1,170		36,000	14,000	3,100		65,000	36,000
1,200		38,000	16,000	3,150		65,000	36,000
1,230		38,000	16,000	3,200		65,000	36,000
1,250		38,000	16,000	3,250		65,000	36,000
1,300		38,000	16,000	3,300		65,000	36,000
1,350		40,000	18,000	3,400		70,000	39,000
1,370		40,000	18,000	3,500		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	3,750		70,000	39,000
1,550		43,000	20,000	3,800		75,000	43,000
1,600		43,000	20,000	3,900		75,000	43,000
1,650		43,000	20,000	4,000		75,000	43,000
1,700		43,000	20,000	4,100		75,000	43,000
1,750		46,000	22,000	4,200		75,000	43,000
1,800		46,000	22,000	4,250		75,000	43,000
1,820		46,000	22,000	4,300		80,000	47,000
1,860		46,000	22,000	4,400		80,000	47,000

HARTNER

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,500		80,000	47,000	9,400		125,000	81,000
4,550		80,000	47,000	9,500		125,000	81,000
4,600		80,000	47,000	9,520	3/8	133,000	87,000
4,650		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	9,800		133,000	87,000
4,900		86,000	52,000	9,900		133,000	87,000
5,000		86,000	52,000	10,000		133,000	87,000
5,020		86,000	52,000	10,050		133,000	87,000
5,050		86,000	52,000	10,200		133,000	87,000
5,100		86,000	52,000	10,250		133,000	87,000
5,150		86,000	52,000	10,300		133,000	87,000
5,200		86,000	52,000	10,400		133,000	87,000
5,250		86,000	52,000	10,500		133,000	87,000
5,300		86,000	52,000	10,600		133,000	87,000
5,400		93,000	57,000	10,720	27/64	142,000	94,000
5,500		93,000	57,000	10,800		142,000	94,000
5,600		93,000	57,000	10,900		142,000	94,000
5,700		93,000	57,000	11,000		142,000	94,000
5,750		93,000	57,000	11,100		142,000	94,000
5,800		93,000	57,000	11,200		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	12,250		151,000	101,000
6,400		101,000	63,000	12,400		151,000	101,000
6,500		101,000	63,000	12,500		151,000	101,000
6,600		101,000	63,000	12,600		151,000	101,000
6,750	17/64	109,000	69,000	12,700	1/2	151,000	101,000
6,800		109,000	69,000	12,800		151,000	101,000
7,000		109,000	69,000	12,900		151,000	101,000
7,100		109,000	69,000	13,000		151,000	101,000
7,140	9/32	109,000	69,000	13,200		151,000	101,000
7,200		109,000	69,000	13,300		160,000	108,000
7,300		109,000	69,000	13,400		160,000	108,000
7,400		109,000	69,000	13,500		160,000	108,000
7,500		109,000	69,000	13,600		160,000	108,000
7,600		117,000	75,000	13,700		160,000	108,000
7,700		117,000	75,000	13,800		160,000	108,000
7,900		117,000	75,000	14,000		160,000	108,000
8,000		117,000	75,000	14,200		169,000	114,000
8,100		117,000	75,000	14,400		169,000	114,000
8,200		117,000	75,000	14,500		169,000	114,000
8,300		117,000	75,000	15,000		169,000	114,000
8,500		117,000	75,000	15,250		178,000	120,000
8,600		125,000	81,000	15,500		178,000	120,000
8,700		125,000	81,000	15,870	5/8	178,000	120,000
8,730	11/32	125,000	81,000	16,000		178,000	120,000
8,750		125,000	81,000	16,500		184,000	125,000
8,800		125,000	81,000	17,000		184,000	125,000
8,900		125,000	81,000	17,500		191,000	130,000
9,000		125,000	81,000	19,000		198,000	135,000
9,100		125,000	81,000	20,000		205,000	140,000
9,200		125,000	81,000				
9,250		125,000	81,000				
9,300		125,000	81,000				

HARTNER

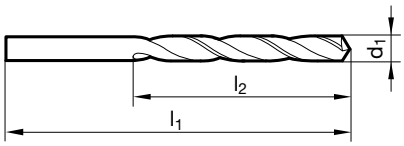
Forets hélicoïdaux courts

N° d'article 81013

P	M	K	N	S	H
○	●		○	○	

HSS-E | IS | ~5xD | DIN 338 | 130° | h8 | R | Cyl

forets INOX • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure
aciers austénit., inox., inaltérablesaux acides, réfractaires (V2A et 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

Forets hélicoïdaux courts

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

HARTNER

Forets hélicoïdaux courts

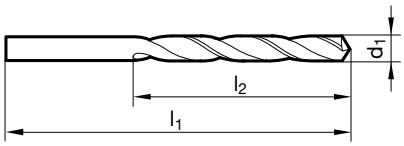
N° d'article 81041

P	M	K	N	S	H
●	○	●	●		

HSS-E | >Ø 2,36 | FN | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure • goujures larges • parfait pour les profondeurs > 3xD

fontes grises et aciers avec une résistance au - dessus de 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 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	4,050		75,000	43,000
1,250		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
1,550		43,000	20,000	4,500		80,000	47,000
1,600		43,000	20,000	4,600		80,000	47,000
1,650		43,000	20,000	4,700		80,000	47,000
1,700		43,000	20,000	4,900		86,000	52,000
1,800		46,000	22,000	5,000		86,000	52,000
1,850		46,000	22,000	5,100		86,000	52,000
1,900		46,000	22,000	5,200		86,000	52,000
2,000		49,000	24,000	5,300		86,000	52,000
2,050		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	5,600		93,000	57,000
2,300		53,000	27,000	5,700		93,000	57,000
2,350		53,000	27,000	5,800		93,000	57,000
2,400		57,000	30,000	5,900		93,000	57,000
2,450		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	6,300		101,000	63,000
2,650		57,000	30,000	6,400		101,000	63,000
2,700		61,000	33,000	6,500		101,000	63,000
2,750		61,000	33,000	6,600		101,000	63,000
2,780	7/64	61,000	33,000	6,700		101,000	63,000
2,800		61,000	33,000	6,750	17/64	109,000	69,000
2,900		61,000	33,000	6,800		109,000	69,000
3,000		61,000	33,000	6,900		109,000	69,000
3,050		65,000	36,000	7,000		109,000	69,000
3,100		65,000	36,000	7,100		109,000	69,000
3,200		65,000	36,000	7,200		109,000	69,000
3,250		65,000	36,000	7,300		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
3,450		70,000	39,000	7,700		117,000	75,000
3,500		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

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
8,100		117,000	75,000	10,200		133,000	87,000
8,200		117,000	75,000	10,300		133,000	87,000
8,300		117,000	75,000	10,500		133,000	87,000
8,400		117,000	75,000	10,700		142,000	94,000
8,500		117,000	75,000	10,800		142,000	94,000
8,600		125,000	81,000	11,000		142,000	94,000
8,700		125,000	81,000	11,100		142,000	94,000
8,800		125,000	81,000	11,200		142,000	94,000
8,900		125,000	81,000	11,600		142,000	94,000
9,000		125,000	81,000	11,700		142,000	94,000
9,100		125,000	81,000	11,800		142,000	94,000
9,200		125,000	81,000	12,000		151,000	101,000
9,300		125,000	81,000	12,500		151,000	101,000
9,500		125,000	81,000	12,700	1/2	151,000	101,000
9,700		133,000	87,000	13,000		151,000	101,000
9,800		133,000	87,000				
9,900		133,000	87,000				
10,000		133,000	87,000				

HARTNER

Forets hélicoïdaux courts

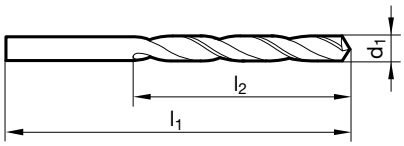
N° d'article 81061

P	M	K	N	S	H
○	●			●	

HSS-E | ◯ | S | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure

Titane et ses alliages • aciers austénit., inox., inaltérables aux acides, réfractaires • aciers > 900 N/mm², à copeaux courts • Hastelloy, Inconel, Nimonic



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,200		19,000	2,500	1,820		46,000	22,000
0,300		19,000	3,000	1,850		46,000	22,000
0,400		20,000	5,000	1,900		46,000	22,000
0,500		22,000	6,000	1,950		49,000	24,000
0,550		24,000	7,000	1,990		49,000	24,000
0,580		24,000	7,000	2,000		49,000	24,000
0,600		24,000	7,000	2,030		49,000	24,000
0,650		26,000	8,000	2,050		49,000	24,000
0,700		28,000	9,000	2,080		49,000	24,000
0,750		28,000	9,000	2,100		49,000	24,000
0,800		30,000	10,000	2,200		53,000	27,000
0,820		30,000	10,000	2,250		53,000	27,000
0,840		30,000	10,000	2,300		53,000	27,000
0,850		30,000	10,000	2,350		53,000	27,000
0,900		32,000	11,000	2,380	3/32	57,000	30,000
0,950		32,000	11,000	2,400		57,000	30,000
1,000		34,000	12,000	2,450		57,000	30,000
1,040		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	3,650		70,000	39,000
1,700		43,000	20,000	3,700		70,000	39,000
1,730		46,000	22,000	3,800		75,000	43,000
1,750		46,000	22,000	3,900		75,000	43,000
1,800		46,000	22,000	4,000		75,000	43,000

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
4,050		75,000	43,000	9,000		125,000	81,000
4,100		75,000	43,000	9,100		125,000	81,000
4,200		75,000	43,000	9,200		125,000	81,000
4,250		75,000	43,000	9,300		125,000	81,000
4,300		80,000	47,000	9,400		125,000	81,000
4,400		80,000	47,000	9,500		125,000	81,000
4,500		80,000	47,000	9,600		133,000	87,000
4,600		80,000	47,000	9,700		133,000	87,000
4,700		80,000	47,000	9,800		133,000	87,000
4,750		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	10,100		133,000	87,000
4,900		86,000	52,000	10,200		133,000	87,000
5,000		86,000	52,000	10,300		133,000	87,000
5,100		86,000	52,000	10,400		133,000	87,000
5,200		86,000	52,000	10,500		133,000	87,000
5,300		86,000	52,000	10,600		133,000	87,000
5,400		93,000	57,000	10,700		142,000	94,000
5,500		93,000	57,000	10,750		142,000	94,000
5,600		93,000	57,000	10,800		142,000	94,000
5,700		93,000	57,000	10,900		142,000	94,000
5,800		93,000	57,000	11,000		142,000	94,000
5,900		93,000	57,000	11,100		142,000	94,000
6,000		93,000	57,000	11,200		142,000	94,000
6,100		101,000	63,000	11,300		142,000	94,000
6,200		101,000	63,000	11,500		142,000	94,000
6,300		101,000	63,000	11,700		142,000	94,000
6,400		101,000	63,000	11,800		142,000	94,000
6,500		101,000	63,000	12,000		151,000	101,000
6,600		101,000	63,000	12,100		151,000	101,000
6,700		101,000	63,000	12,200		151,000	101,000
6,750	17/64	109,000	69,000	12,300	31/64	151,000	101,000
6,800		109,000	69,000	12,400		151,000	101,000
6,900		109,000	69,000	12,500		151,000	101,000
7,000		109,000	69,000	12,700	1/2	151,000	101,000
7,100		109,000	69,000	13,000		151,000	101,000
7,200		109,000	69,000	13,500		160,000	108,000
7,300		109,000	69,000	14,000		160,000	108,000
7,400		109,000	69,000	14,500		169,000	114,000
7,500		109,000	69,000	15,000		169,000	114,000
7,600		117,000	75,000	15,500		178,000	120,000
7,700		117,000	75,000	16,000		178,000	120,000
7,800		117,000	75,000	16,500		184,000	125,000
7,900		117,000	75,000	17,000		184,000	125,000
8,000		117,000	75,000	17,500		191,000	130,000
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				

Forets hélicoïdaux courts

N° d'article 84800

P	M	K	N	S	H
●	○	●	○		

HSS-E | T | FN | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure • goujures larges • parfait pour les profondeurs > 3xD

fontes grises et aciers avec une résistance au - dessus de 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration

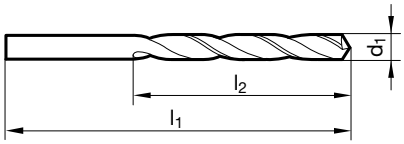
N° d'article 84504

P	M	K	N	S	H
●	○	●	●		○

HSS-E | F | FN | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • goujures larges • meilleure résistance à l´usure • parfait pour les profondeurs > 3xD

fontes grises et aciers avec une résistance au - dessus de 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		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
1,300		38,000	16,000	3,700		70,000	39,000
1,400		40,000	18,000	3,800		75,000	43,000
1,450		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
2,550		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	5,560	7/32	93,000	57,000
2,800		61,000	33,000	5,600		93,000	57,000
2,900		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	6,000		93,000	57,000
3,200		65,000	36,000	6,100		101,000	63,000
3,250		65,000	36,000	6,200		101,000	63,000
3,300		65,000	36,000	6,300		101,000	63,000

Forets hélicoïdaux courts

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

Forets hélicoïdaux courts

N° d'article 84804

P	M	K	N	S	H
•	•	•	•		

HSS-E | FU 500 DZ | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage en pente • acier rapide au Co • faible effort d'avance nécessaire • faible effort de couple nécessaire • pour applications universelles

aciers alliés ou non alliés < 800 N/mm² • aciers à outils, travail à froid ou à chaud • aciers à roulement • métaux non ferreux • fontes • aciers inoxydables • matériaux synthétiques

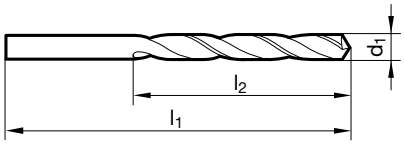
N° d'article 84802

P	M	K	N	S	H
•	•	•	•		

HSS-E | T | FU 500 DZ | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage en pente • acier rapide au Co • faible effort d'avance nécessaire • faible effort de couple nécessaire • meilleure résistance à l´usure • pour applications universelles

aciers alliés ou non alliés < 800 N/mm² • aciers à outils, travail à froid ou à chaud • aciers à roulement • métaux non ferreux • fontes • aciers inoxydables • matériaux synthétiques



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 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

Forets hélicoïdaux courts

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

Forets hélicoïdaux courts

N° d'article 84807

P	M	K	N	S	H
○	●			●	

HSS-E | T | S | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure

Titane et ses alliages • aciers austénit., inox., inaltérables aux acides, réfractaires • aciers > 900 N/mm², à copeaux courts • Hastelloy, Inconel, Nimonic

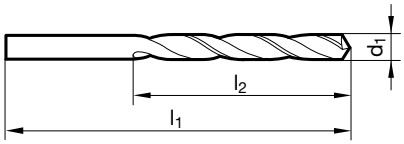
N° d'article 84505

P	M	K	N	S	H
○	●			●	

HSS-E | F | S | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure

Titane et ses alliages • aciers austénit., inox., inaltérables aux acides, réfractaires • aciers > 900 N/mm², à copeaux courts • Hastelloy, Inconel, Nimonic



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

HARTNER

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
5,200		86,000	52,000	8,800		125,000	81,000
5,300		86,000	52,000	8,900		125,000	81,000
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	10,500		133,000	87,000
6,900		109,000	69,000	10,800		142,000	94,000
7,000		109,000	69,000	11,000		142,000	94,000
7,100		109,000	69,000	11,500		142,000	94,000
7,200		109,000	69,000	12,000		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	13,000		151,000	101,000
7,700		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				
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				

HARTNER

Forets hélicoïdaux courts

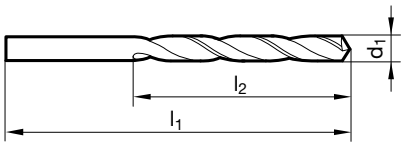
N° d'article 81078

P	M	K	N	S	H
○	●	○	○	○	

HSS-E | S | IS | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille tronconique avec amincissement de l´âme optimisé • acier rapide au Co • meilleure résistance à l´usure

aciers austénit., inox., inaltérablesaux acides, réfractaires (V2A et V4A) • alliages spéciaux



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	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

Forets hélicoïdaux courts

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

HARTNER

Forets hélicoïdaux courts

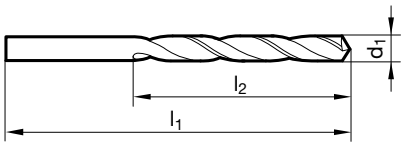
N° d'article 84811

P	M	K	N	S	H
●	○	●	○	○	○

HSS-E-PM | T | FN 500 DZ | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier PM HSS fritté et allié au Co • particulièrement rigide • résistance à l'usure particulièrement élevée

aciers hautement alliés • aciers de cémentation et d'amélioration • fontes, laitons, bronzes



d1 mm	inch	l1 mm	l2 mm
1,000		34,000	12,000
1,200		38,000	16,000
1,300		38,000	16,000
1,400		40,000	18,000
1,500		40,000	18,000
1,600		43,000	20,000
1,700		43,000	20,000
2,000		49,000	24,000
2,100		49,000	24,000
2,200		53,000	27,000
2,300		53,000	27,000
2,380	3/32	57,000	30,000
2,500		57,000	30,000
2,600		57,000	30,000
2,780	7/64	61,000	33,000
2,900		61,000	33,000
3,000		61,000	33,000
3,100		65,000	36,000
3,170	1/8	65,000	36,000
3,300		65,000	36,000
3,500		70,000	39,000
3,570	9/64	70,000	39,000
3,600		70,000	39,000
3,700		70,000	39,000
4,000		75,000	43,000
4,100		75,000	43,000
4,200		75,000	43,000
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
5,560	7/32	93,000	57,000
5,950	15/64	93,000	57,000
6,000		93,000	57,000

d1 mm	inch	l1 mm	l2 mm
6,300		101,000	63,000
6,350	1/4	101,000	63,000
6,700		101,000	63,000
6,800		109,000	69,000
7,000		109,000	69,000
7,140	9/32	109,000	69,000
7,400		109,000	69,000
7,900		117,000	75,000
7,940	5/16	117,000	75,000
8,000		117,000	75,000
8,500		117,000	75,000
8,730	11/32	125,000	81,000
9,000		125,000	81,000
9,300		125,000	81,000
9,500		125,000	81,000
9,800		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
11,110	7/16	142,000	94,000
11,500		142,000	94,000
12,000		151,000	101,000
12,500		151,000	101,000
13,000		151,000	101,000
13,500		160,000	108,000
14,000		160,000	108,000

Forets hélicoïdaux courts

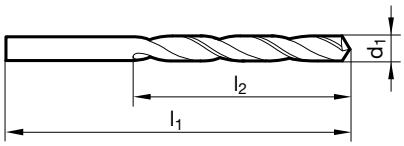
N° d'article 89244

P	M	K	N	S	H
○	○	○	●	○	

VHM | ○ | N | ~5xD | WN | 118° | h7 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • fontes grises • bronze, laiton • aluminium et alliages d'aluminium • magnésium, alliages de magnésium • matières synthét. et mat.synthét.renforcées de fibres



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 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

Forets hélicoïdaux courts

d1 mm	 inch	l1 mm	l2 mm
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
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
9,800		133,000	87,000

d1 mm	 inch	l1 mm	l2 mm
9,900		133,000	87,000
10,000		133,000	87,000
10,200		133,000	87,000
10,300		133,000	87,000
10,500		133,000	87,000
10,720	27/64	142,000	94,000
11,000		142,000	94,000
11,110	7/16	142,000	94,000
11,500		142,000	94,000
11,910	15/32	151,000	101,000
12,000		151,000	101,000

Forets hélicoïdaux courts

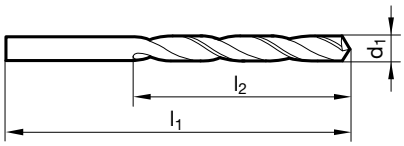
N° d'article 89261

P	M	K	N	S	H
○	○	○	●	○	

VHM | F | N | ~5xD | WN | 118° | h7 | R | Cyl

amin. de l'âme ≥ Ø 2,060 • affûtage en pente • arête de coupe principale rectiligne

alliages d'aluminium avec haut % de Si • aciers de décolletage, aciers d'amélioration • aciers de construction et de cémentation • fontes • matières synthét. et mat.synthét.renforcées de fibres • magnésium, alliages de magnésium • laitons



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		34,000	12,000	3,800		75,000	43,000
1,100		36,000	14,000	3,900		75,000	43,000
1,190	3/64	38,000	16,000	3,970	5/32	75,000	43,000
1,200		38,000	16,000	4,000		75,000	43,000
1,300		38,000	16,000	4,040		75,000	43,000
1,400		40,000	18,000	4,100		75,000	43,000
1,500		40,000	18,000	4,200		75,000	43,000
1,590	1/16	43,000	20,000	4,300		80,000	47,000
1,600		43,000	20,000	4,370	11/64	80,000	47,000
1,700		43,000	20,000	4,400		80,000	47,000
1,780		46,000	22,000	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	4,760	3/16	86,000	52,000
1,980	5/64	49,000	24,000	4,800		86,000	52,000
2,000		49,000	24,000	4,850		86,000	52,000
2,060		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	5,060		86,000	52,000
2,300		53,000	27,000	5,100		86,000	52,000
2,380	3/32	57,000	30,000	5,160	13/64	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
2,530		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	5,560	7/32	93,000	57,000
2,780	7/64	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
2,950		61,000	33,000	5,900		93,000	57,000
3,000		61,000	33,000	5,950	15/64	93,000	57,000
3,050		65,000	36,000	6,000		93,000	57,000
3,100		65,000	36,000	6,100		101,000	63,000
3,170	1/8	65,000	36,000	6,200		101,000	63,000
3,200		65,000	36,000	6,300		101,000	63,000
3,300		65,000	36,000	6,350	1/4	101,000	63,000
3,400		70,000	39,000	6,400		101,000	63,000
3,450		70,000	39,000	6,500		101,000	63,000
3,500		70,000	39,000	6,600		101,000	63,000
3,570	9/64	70,000	39,000	6,700		101,000	63,000
3,600		70,000	39,000	6,750	17/64	109,000	69,000
3,700		70,000	39,000	6,800		109,000	69,000

Forets hélicoïdaux courts

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
6,900		109,000	69,000	9,130	23/64	125,000	81,000
7,000		109,000	69,000	9,200		125,000	81,000
7,100		109,000	69,000	9,500		125,000	81,000
7,140	9/32	109,000	69,000	9,520	3/8	133,000	87,000
7,300		109,000	69,000	9,600		133,000	87,000
7,400		109,000	69,000	9,800		133,000	87,000
7,500		109,000	69,000	9,920	25/64	133,000	87,000
7,540	19/64	117,000	75,000	10,000		133,000	87,000
7,600		117,000	75,000	10,200		133,000	87,000
7,800		117,000	75,000	10,300		133,000	87,000
7,900		117,000	75,000	10,320	13/32	133,000	87,000
7,940	5/16	117,000	75,000	10,500		133,000	87,000
8,000		117,000	75,000	10,720	27/64	142,000	94,000
8,030		117,000	75,000	11,000		142,000	94,000
8,100		117,000	75,000	11,110	7/16	142,000	94,000
8,200		117,000	75,000	11,500		142,000	94,000
8,330	21/64	117,000	75,000	12,000		151,000	101,000
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				
9,000		125,000	81,000				
9,100		125,000	81,000				

HARTNER

Forets à goujures courtes

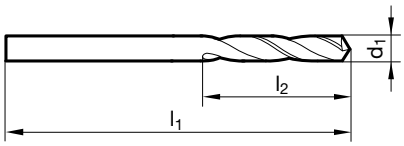
N° d'article 81000

P	M	K	N	S	H
●	○	●	○	●	○

M42 | Z | HX 500 | 3xD | WN | 135° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • résistance à l'usure particulièrement élevée • affûtage en croix, optimisé • acier rapide allié, HSCO, avec un taux de cobalt de 8%

pour l'usinage haute performance des aciers de construction et des aciers de cémentation • tôles résistantes à l´usure • Hardox



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
1,000	34,000	6,000	8,000	117,000	37,000
1,500	40,000	9,000	8,500	117,000	37,000
2,000	49,000	12,000	9,000	125,000	40,000
2,500	57,000	14,000	9,500	125,000	40,000
3,000	61,000	16,000	10,000	133,000	43,000
3,200	65,000	18,000	10,200	133,000	43,000
3,300	65,000	18,000	10,500	133,000	43,000
3,500	70,000	20,000	11,000	142,000	47,000
4,000	75,000	22,000	11,500	142,000	47,000
4,200	75,000	22,000	12,000	151,000	51,000
4,500	80,000	24,000	12,500	151,000	51,000
5,000	86,000	26,000	13,000	151,000	51,000
5,500	93,000	28,000			
6,000	93,000	28,000			
6,500	101,000	31,000			
6,800	109,000	34,000			
7,000	109,000	34,000			
7,500	109,000	34,000			

	Hardox HiTuf	Hardox 400	Hardox 450	Hardox 500
v_c (m/min)	~11	~8	~6	~4
vrc	~3	~2	~1	
Ø	f/rpm			
2.5	0.035/1400	0.025/1000	0.015/770	0.005/500
3	0.04/1200	0.03/850	0.02/640	0.01/430
4	0.05/900	0.04/650	0.03/480	0.02/320
5	0.06/700	0.05/510	0.04/400	0.03/255
6	0.07/590	0.06/430	0.05/320	0.04/220
7	0.08/500	0.07/370	0.06/280	0.05/190
8	0.09/440	0.08/320	0.07/240	0.06/160
10	0.11/350	0.10/260	0.09/200	0.08/130
13	0.14/270	0.13/200	0.12/150	0.1/100

HARTNER

Forets hélicoïd. à queue cylind. renforcée

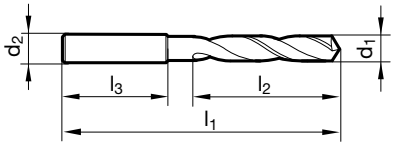
N° d'article 84805

P	M	K	N	S	H
•	•	•	•		

HSS-E-PM | F | FU 500 | ~3xD | WN | 118° | h8 | R | HA

amin. de l'âme ≥ Ø 2,000 • affûtage en pente • faible effort d'avance nécessaire • acier PM HSS fritté et allié au Co • faible effort de couple nécessaire • meilleure résistance à l´usure • pour applications universelles

aciers alliés ou non alliés < 800 N/mm² • aciers à outils, travail à froid ou à chaud • aciers inoxydables • métaux non ferreux • fontes • matériaux synthétiques • aciers à roulement



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
1,000		3,000	38,000	6,000	28,000	4,600		6,000	68,000	24,000	36,000
1,100		3,000	39,000	7,000	28,000	4,650		6,000	68,000	24,000	36,000
1,200		3,000	40,000	8,000	28,000	4,700		6,000	68,000	24,000	36,000
1,300		3,000	40,000	8,000	28,000	4,760	3/16	6,000	70,000	26,000	36,000
1,400		3,000	41,000	9,000	28,000	4,800		6,000	70,000	26,000	36,000
1,500		3,000	41,000	9,000	28,000	4,900		6,000	70,000	26,000	36,000
1,600		3,000	42,000	10,000	28,000	5,000		6,000	70,000	26,000	36,000
1,700		3,000	42,000	10,000	28,000	5,100		6,000	70,000	26,000	36,000
1,800		3,000	43,000	11,000	28,000	5,160	13/64	6,000	70,000	26,000	36,000
1,900		3,000	43,000	11,000	28,000	5,200		6,000	70,000	26,000	36,000
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

Forets hélicoïd. à queue cylind. renforcée

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,700		8,000	81,000	37,000	36,000
7,800		8,000	81,000	37,000	36,000
7,900		8,000	81,000	37,000	36,000
7,940	5/16	8,000	81,000	37,000	36,000
8,000		8,000	81,000	37,000	36,000
8,100		10,000	87,000	37,000	40,000
8,200		10,000	87,000	37,000	40,000
8,300		10,000	87,000	37,000	40,000
8,330	21/64	10,000	87,000	37,000	40,000
8,400		10,000	87,000	37,000	40,000
8,500		10,000	87,000	37,000	40,000
8,600		10,000	91,000	40,000	40,000
8,700		10,000	91,000	40,000	40,000
8,730	11/32	10,000	91,000	40,000	40,000
8,800		10,000	91,000	40,000	40,000
8,900		10,000	91,000	40,000	40,000
9,000		10,000	91,000	40,000	40,000
9,100		10,000	91,000	40,000	40,000
9,130	23/64	10,000	91,000	40,000	40,000
9,200		10,000	91,000	40,000	40,000
9,300		10,000	91,000	40,000	40,000
9,400		10,000	91,000	40,000	40,000
9,500		10,000	91,000	40,000	40,000
9,520	3/8	10,000	93,000	43,000	40,000
9,550		10,000	93,000	43,000	40,000
9,600		10,000	93,000	43,000	40,000
9,700		10,000	93,000	43,000	40,000
9,800		10,000	93,000	43,000	40,000
9,900		10,000	93,000	43,000	40,000
9,920	25/64	10,000	93,000	43,000	40,000
10,000		10,000	93,000	43,000	40,000
10,100		12,000	100,000	43,000	45,000
10,200		12,000	100,000	43,000	45,000
10,300		12,000	100,000	43,000	45,000
10,320	13/32	12,000	100,000	43,000	45,000
10,400		12,000	100,000	43,000	45,000
10,500		12,000	100,000	43,000	45,000
10,600		12,000	100,000	43,000	45,000
10,700		12,000	104,000	47,000	45,000
10,720	27/64	12,000	104,000	47,000	45,000
10,800		12,000	104,000	47,000	45,000
10,900		12,000	104,000	47,000	45,000
11,000		12,000	104,000	47,000	45,000
11,100		12,000	104,000	47,000	45,000
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
11,800		12,000	104,000	47,000	45,000
11,900		12,000	108,000	51,000	45,000
11,910	15/32	12,000	108,000	51,000	45,000
12,000		12,000	108,000	51,000	45,000
12,100		16,000	111,000	51,000	48,000
12,200		16,000	111,000	51,000	48,000
12,300	31/64	16,000	111,000	51,000	48,000
12,400		16,000	111,000	51,000	48,000
12,500		16,000	111,000	51,000	48,000
12,600		16,000	111,000	51,000	48,000
12,700	1/2	16,000	111,000	51,000	48,000
12,800		16,000	111,000	51,000	48,000
12,900		16,000	111,000	51,000	48,000
13,000		16,000	111,000	51,000	48,000
13,100	33/64	16,000	111,000	51,000	48,000
13,490	17/32	16,000	114,000	54,000	48,000
13,500		16,000	114,000	54,000	48,000
13,890	35/64	16,000	114,000	54,000	48,000
14,000		16,000	114,000	54,000	48,000
14,290	9/16	16,000	116,000	56,000	48,000
14,500		16,000	116,000	56,000	48,000
15,000		16,000	116,000	56,000	48,000
15,500		16,000	118,000	58,000	48,000
15,870	5/8	16,000	118,000	58,000	48,000
16,000		16,000	118,000	58,000	48,000
16,500		20,000	126,000	60,000	50,000
16,670	21/32	20,000	126,000	60,000	50,000
17,000		20,000	126,000	60,000	50,000
17,500		20,000	128,000	62,000	50,000
18,000		20,000	128,000	62,000	50,000
18,500		20,000	130,000	64,000	50,000
19,000		20,000	130,000	64,000	50,000
19,500		20,000	132,000	66,000	50,000
20,000		20,000	132,000	66,000	50,000

HARTNER

Forets hélicoïd. à queue cylind. renforcée

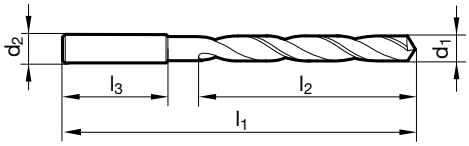
N° d'article 84801

P	M	K	N	S	H
•	•	•	•		

HSS-E-PM | F | FU 500 | ~5xD | WN | 118° | h8 | R | HA

amin. de l'âme ≥ Ø 2,000 • affûtage en pente • faible effort d'avance nécessaire • faible effort de couple nécessaire • acier PM HSS fritté et allié au Co • meilleure résistance à l´usure • pour applications universelles

aciers alliés ou non alliés < 800 N/mm² • aciers à outils, travail à froid ou à chaud • aciers inoxydables • métaux non ferreux • fontes • matériaux synthétiques



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
2,000		3,000	56,000	24,000	28,000
2,100		3,000	56,000	24,000	28,000
2,200		3,000	59,000	27,000	28,000
2,300		3,000	59,000	27,000	28,000
2,380	3/32	3,000	62,000	30,000	28,000
2,400		3,000	62,000	30,000	28,000
2,500		3,000	62,000	30,000	28,000
2,600		3,000	62,000	30,000	28,000
2,700		3,000	65,000	33,000	28,000
2,780	7/64	3,000	65,000	33,000	28,000
2,800		3,000	65,000	33,000	28,000
2,900		3,000	65,000	33,000	28,000
3,000		3,000	65,000	33,000	28,000
3,100		4,000	68,000	36,000	28,000
3,170	1/8	4,000	68,000	36,000	28,000
3,200		4,000	68,000	36,000	28,000
3,300		4,000	68,000	36,000	28,000
3,400		4,000	71,000	39,000	28,000
3,500		4,000	71,000	39,000	28,000
3,570	9/64	4,000	71,000	39,000	28,000
3,600		4,000	71,000	39,000	28,000
3,700		4,000	71,000	39,000	28,000
3,800		4,000	75,000	43,000	28,000
3,900		4,000	75,000	43,000	28,000
3,970	5/32	4,000	75,000	43,000	28,000
4,000		4,000	75,000	43,000	28,000
4,100		6,000	87,000	43,000	36,000
4,200		6,000	87,000	43,000	36,000
4,300		6,000	91,000	47,000	36,000
4,370	11/64	6,000	91,000	47,000	36,000
4,400		6,000	91,000	47,000	36,000
4,500		6,000	91,000	47,000	36,000
4,600		6,000	91,000	47,000	36,000
4,650		6,000	91,000	47,000	36,000
4,700		6,000	91,000	47,000	36,000
4,760	3/16	6,000	96,000	52,000	36,000
4,800		6,000	96,000	52,000	36,000
4,900		6,000	96,000	52,000	36,000
5,000		6,000	96,000	52,000	36,000
5,100		6,000	96,000	52,000	36,000
5,160	13/64	6,000	96,000	52,000	36,000
5,200		6,000	96,000	52,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
5,300		6,000	96,000	52,000	36,000
5,400		6,000	101,000	57,000	36,000
5,500		6,000	101,000	57,000	36,000
5,550		6,000	101,000	57,000	36,000
5,560	7/32	6,000	101,000	57,000	36,000
5,600		6,000	101,000	57,000	36,000
5,700		6,000	101,000	57,000	36,000
5,800		6,000	101,000	57,000	36,000
5,900		6,000	101,000	57,000	36,000
5,950	15/64	6,000	101,000	57,000	36,000
6,000		6,000	101,000	57,000	36,000
6,100		8,000	107,000	63,000	36,000
6,200		8,000	107,000	63,000	36,000
6,300		8,000	107,000	63,000	36,000
6,350	1/4	8,000	107,000	63,000	36,000
6,400		8,000	107,000	63,000	36,000
6,500		8,000	107,000	63,000	36,000
6,600		8,000	107,000	63,000	36,000
6,700		8,000	107,000	63,000	36,000
6,750	17/64	8,000	113,000	69,000	36,000
6,800		8,000	113,000	69,000	36,000
6,900		8,000	113,000	69,000	36,000
7,000		8,000	113,000	69,000	36,000
7,100		8,000	113,000	69,000	36,000
7,140	9/32	8,000	113,000	69,000	36,000
7,200		8,000	113,000	69,000	36,000
7,300		8,000	113,000	69,000	36,000
7,400		8,000	113,000	69,000	36,000
7,500		8,000	113,000	69,000	36,000
7,540	19/64	8,000	119,000	75,000	36,000
7,550		8,000	119,000	75,000	36,000
7,600		8,000	119,000	75,000	36,000
7,700		8,000	119,000	75,000	36,000
7,800		8,000	119,000	75,000	36,000
7,900		8,000	119,000	75,000	36,000
7,940	5/16	8,000	119,000	75,000	36,000
8,000		8,000	119,000	75,000	36,000
8,100		10,000	125,000	75,000	40,000
8,200		10,000	125,000	75,000	40,000
8,300		10,000	125,000	75,000	40,000
8,330	21/64	10,000	125,000	75,000	40,000
8,400		10,000	125,000	75,000	40,000

Forets hélicoïd. à queue cylind. renforcée

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

HARTNER

Forets hélicoïd. à queue cylind. renforcée

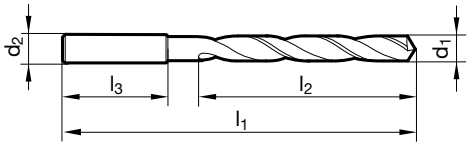
N° d'article 84507

P	M	K	N	S	H
●	○	●	○	○	○

HSS-E-PM | F | FN 500 | ~5xD | WN | 130° | h8 | R | HA

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • acier PM HSS fritté et allié au Co • résistance à l'usure particulièrement élevée • particulièrement rigide

mat. haute résistance, aciers hautement alliés • aciers de cémentation et d'amélioration • fontes, laitons, bronzes



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
2,000		3,000	56,000	24,000	28,000
2,100		3,000	56,000	24,000	28,000
2,200		3,000	59,000	27,000	28,000
2,300		3,000	59,000	27,000	28,000
2,380	3/32	3,000	62,000	30,000	28,000
2,400		3,000	62,000	30,000	28,000
2,500		3,000	62,000	30,000	28,000
2,600		3,000	62,000	30,000	28,000
2,700		3,000	65,000	33,000	28,000
2,800		3,000	65,000	33,000	28,000
2,900		3,000	65,000	33,000	28,000
3,000		3,000	65,000	33,000	28,000
3,100		4,000	68,000	36,000	28,000
3,170	1/8	4,000	68,000	36,000	28,000
3,200		4,000	68,000	36,000	28,000
3,300		4,000	68,000	36,000	28,000
3,400		4,000	71,000	39,000	28,000
3,500		4,000	71,000	39,000	28,000
3,600		4,000	71,000	39,000	28,000
3,700		4,000	71,000	39,000	28,000
3,800		4,000	75,000	43,000	28,000
3,900		4,000	75,000	43,000	28,000
4,000		4,000	75,000	43,000	28,000
4,100		6,000	87,000	43,000	36,000
4,200		6,000	87,000	43,000	36,000
4,300		6,000	91,000	47,000	36,000
4,400		6,000	91,000	47,000	36,000
4,500		6,000	91,000	47,000	36,000
4,600		6,000	91,000	47,000	36,000
4,650		6,000	91,000	47,000	36,000
4,700		6,000	91,000	47,000	36,000
4,800		6,000	96,000	52,000	36,000
4,900		6,000	96,000	52,000	36,000
5,000		6,000	96,000	52,000	36,000
5,100		6,000	96,000	52,000	36,000
5,160	13/64	6,000	96,000	52,000	36,000
5,300		6,000	96,000	52,000	36,000
5,400		6,000	101,000	57,000	36,000
5,500		6,000	101,000	57,000	36,000
5,550		6,000	101,000	57,000	36,000
5,600		6,000	101,000	57,000	36,000
5,950	15/64	6,000	101,000	57,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,000		6,000	101,000	57,000	36,000
6,100		8,000	107,000	63,000	36,000
6,200		8,000	107,000	63,000	36,000
6,300		8,000	107,000	63,000	36,000
6,400		8,000	107,000	63,000	36,000
6,500		8,000	107,000	63,000	36,000
6,600		8,000	107,000	63,000	36,000
6,700		8,000	107,000	63,000	36,000
6,750	17/64	8,000	113,000	69,000	36,000
6,800		8,000	113,000	69,000	36,000
6,900		8,000	113,000	69,000	36,000
7,000		8,000	113,000	69,000	36,000
7,100		8,000	113,000	69,000	36,000
7,200		8,000	113,000	69,000	36,000
7,300		8,000	113,000	69,000	36,000
7,400		8,000	113,000	69,000	36,000
7,500		8,000	113,000	69,000	36,000
7,700		8,000	119,000	75,000	36,000
7,800		8,000	119,000	75,000	36,000
8,000		8,000	119,000	75,000	36,000
8,100		10,000	125,000	75,000	40,000
8,200		10,000	125,000	75,000	40,000
8,300		10,000	125,000	75,000	40,000
8,400		10,000	125,000	75,000	40,000
8,500		10,000	125,000	75,000	40,000
8,600		10,000	131,000	81,000	40,000
8,700		10,000	131,000	81,000	40,000
8,730	11/32	10,000	131,000	81,000	40,000
8,800		10,000	131,000	81,000	40,000
9,000		10,000	131,000	81,000	40,000
9,300		10,000	131,000	81,000	40,000
9,500		10,000	131,000	81,000	40,000
9,700		10,000	137,000	87,000	40,000
9,800		10,000	137,000	87,000	40,000
9,900		10,000	137,000	87,000	40,000
10,000		10,000	137,000	87,000	40,000
10,200		12,000	144,000	87,000	45,000
10,300		12,000	144,000	87,000	45,000
10,400		12,000	144,000	87,000	45,000
10,500		12,000	144,000	87,000	45,000
10,600		12,000	144,000	87,000	45,000
11,000		12,000	151,000	94,000	45,000

Forets hélicoïd. à queue cylind. renforcée

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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
11,700		12,000	151,000	94,000	45,000
11,800		12,000	151,000	94,000	45,000
12,000		12,000	158,000	101,000	45,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
12,100		14,000	161,000	101,000	45,000
12,400		14,000	161,000	101,000	45,000
12,500		14,000	161,000	101,000	45,000
12,800		14,000	161,000	101,000	45,000
13,000		14,000	161,000	101,000	45,000

HARTNER

Coffrets de forets hélicoïdaux

N° d'article 88303

WN

Coffret vide

d1 mm	ascendant par mm	Pièces/coffret	N° de code
1,0-5,0	0,1	41	0,111
5,1-10,0	0,1	50	0,112
1,0-10,0	0,5	19	0,113
1,0-13,0	0,5	25	0,114
1,0-5,9	0,1	50	0,115
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
1,0-10,5	0,5	32	0,219

HARTNER

Coffrets de forets hélicoïdaux

N° d'article 88015

P	M	K	N	S	H
●	○	○	○		

HSS-E | M | P2000 | ~3xD | DIN 1897 | 118° | R | Cyl

amin. de l'âme ≥ Ø 1,000 • Jeu en coffret métallique • affûtage à dépouille conique

d1 mm	ascendant par mm	Pièces/coffret	N° de code
1,0-5,0	0,1	41	0,011
5,1-10,0	0,1	50	0,012
1,0-13,0	0,5	25	0,014
1,0-10,5	0,5	24	0,018

N° d'article 88013

P	M	K	N	S	H
●		●	○		

HSS | N | ~5xD | DIN 338 | 118° | R | Cyl

amin. de l'âme ≥ Ø 1,000 • Jeu en coffret plastique • affûtage à dépouille conique
acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite

d1 mm	ascendant par mm	Pièces/coffret	N° de code
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
1,0-5,0	0,1	41	0,311
1,0-13,0	0,5	25	0,314
1,0-5,9	0,1	50	0,315

Coffrets de forets hélicoïdaux

N° d'article 88016

P	M	K	N	S	H
●		●	○		

HSS | T | N | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • Jeu en coffret plastique • affûtage à dépouille conique • pointe revêtue
acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite

d1 mm	ascendant par mm	Pièces/coffret	N° de code
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

N° d'article 88014

P	M	K	N	S	H
○	●			●	

HSS-E | ◯ | S | ~5xD | DIN 338 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 0,970 • Jeu en coffret plastique • affûtage à dépouille conique
Titane et ses alliages • aciers austénit., inox., inaltérables aux acides, réfractaires • aciers > 900 N/mm², à copeaux courts • Hastelloy, Inconel, Nimonic

d1 mm	ascendant par mm	Pièces/coffret	N° de code
1,0-5,0	0,1	41	8,011
5,1-10,0	0,1	50	8,012
1,0-10,0	0,5	19	8,013
1,0-13,0	0,5	25	8,014
1,0-10,5	0,5	24	8,018

Coffrets de forets hélicoïdaux

N° d'article 88026

P	M	K	N	S	H
●		●	○		

HSS-E | N | ~5xD | DIN 338 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • Jeu en coffret plastique • affûtage à dépouille conique

acier, fonte aciérée (alliée / non alliée) • fontes supérieure à 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration

d1 mm	ascendant par mm	Pièces/coffret	N° de code
1,0-10,0	0,5	19	3,013
1,0-13,0	0,5	25	3,014

N° d'article 88018

P	M	K	N	S	H
●	●	●	●	●	○

M42 | N | ~5xD | DIN 338 | 135° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • composé de forets hélicoïdaux en M 42, n° d´article 81018

d1 mm	ascendant par mm	Pièces/coffret	N° de code
1,0-10,0	0,5	19	0,013
1,0-13,0	0,5	25	0,014

Forets NC

N° d'article 81191

P	M	K	N	S	H
●	○	●	●	○	

HSS | ◯ | N | WN | 120° | h6 | R | Cyl | ⊘

affûtage à dépouille conique • seulement prévu pour amorcer un perçage

pour applications universelles

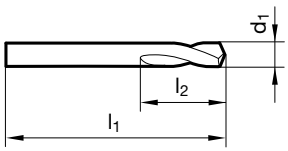
N° d'article 84434

P	M	K	N	S	H
●	○	●	●	○	

HSS | T | N | WN | 120° | h6 | R | Cyl | ⊘

affûtage à dépouille conique • seulement prévu pour amorcer un perçage

pour applications universelles



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

Forets NC

N° d'article 81192

P	M	K	N	S	H
●	○	●	●	●	

HSS | ◯ | N | WN | 90° | h6 | R | Cyl

affûtage à dépouille conique • seulement prévu pour amorcer un perçage

pour applications universelles

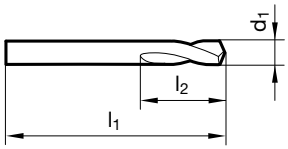
N° d'article 84435

P	M	K	N	S	H
●	○	●	●	○	

HSS | T | N | WN | 90° | h6 | R | Cyl

affûtage à dépouille conique • seulement prévu pour amorcer un perçage

pour applications universelles



d1 mm	inch	l1 mm	l2 mm
3,000		46,000	12,000
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

d1 mm	inch	l1 mm	l2 mm
12,000		102,000	30,000
14,000		107,000	33,500
16,000		115,000	37,500
20,000		131,000	45,000
25,000	63/64	151,000	53,000

Forets NC

N° d'article 89242

P	M	K	N	S	H
○	○	○	○	○	○

VHM | ◯ | N | WN | 120° | h6 | R | Cyl | ⊘

affûtage en pente • seulement prévu pour amorcer un perçage

pour applications universelles

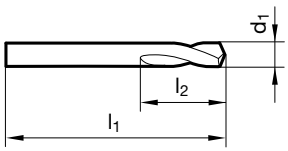
N° d'article 89249

P	M	K	N	S	H
○	○	○	○	○	○

VHM | ◯ | N | WN | 142° | h6 | R | HB | ⊘

affûtage en pente • seulement prévu pour amorcer un perçage

pour applications universelles



d1 mm	inch	l1 mm	l2 mm
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

d1 mm	inch	l1 mm	l2 mm
12,700	1/2	102,000	30,000
16,000		115,000	37,500
20,000		131,000	45,000

Forets NC

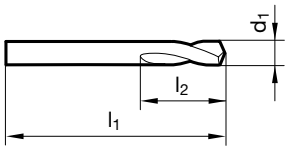
N° d'article 89243

P	M	K	N	S	H
○	○	○	○	○	○

VHM | ◯ | N | WN | 90° | h6 | R | HA | ⊘

affûtage en pente • seulement prévu pour amorcer un perçage

pour applications universelles



d1 mm	l1 mm	l2 mm
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

d1 mm	l1 mm	l2 mm
16,000	115,000	37,500
20,000	131,000	45,000

Forets carrosseries

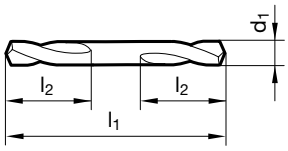
N° d'article 81190

P	M	K	N	S	H
●	○	●	●	●	

HSS | >Ø 2,36 | N | WN | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • pour utilisation des deux côtés • p. perçage à main levée dans ateliers de carross.

matériaux minces



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

Forets avec canaux de refroidissment

N° d'article 82761

P	M	K	N	S	H
●	●	●	●	●	

HSS-E | ○ | FN | ~5xD | WN | 130° | h8 | R | HE

amin. de l'âme ≥ Ø 5,000 • affûtage à dépouille conique • acier rapide au Co

matières à copeaux longs < 1000 N/mm² • aciers inoxydables • fontes • métaux non ferreux

N° d'article 84461

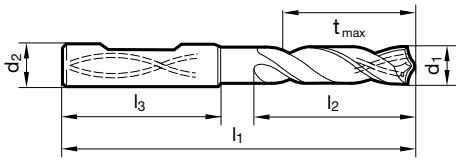
P	M	K	N	S	H
●	●	●	●	●	○

HSS-E | T | FN | ~5xD | WN | 130° | h8 | R | HE

amin. de l'âme ≥ Ø 5,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure

matières à copeaux longs < 1000 N/mm² • aciers inoxydables • fontes • métaux non ferreux

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



d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
5,000	6,000	82,000	44,000	36,000
5,500	6,000	82,000	44,000	36,000
6,000	6,000	82,000	44,000	36,000
6,500	8,000	91,000	53,000	36,000
7,000	8,000	91,000	53,000	36,000
7,500	8,000	91,000	53,000	36,000
7,800	8,000	91,000	53,000	36,000
8,000	8,000	91,000	53,000	36,000
8,500	10,000	103,000	61,000	40,000
9,000	10,000	103,000	61,000	40,000
9,500	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
10,500	12,000	118,000	71,000	45,000
11,000	12,000	118,000	71,000	45,000
11,500	12,000	118,000	71,000	45,000
12,000	12,000	118,000	71,000	45,000
12,500	14,000	124,000	77,000	45,000

d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
13,000	14,000	124,000	77,000	45,000
13,500	14,000	124,000	77,000	45,000
14,000	14,000	124,000	77,000	45,000
14,500	16,000	133,000	83,000	48,000
15,000	16,000	133,000	83,000	48,000
15,500	16,000	133,000	83,000	48,000
16,000	16,000	133,000	83,000	48,000
16,500	18,000	143,000	93,000	48,000
17,000	18,000	143,000	93,000	48,000
17,500	18,000	143,000	93,000	48,000
18,000	18,000	143,000	93,000	48,000
18,500	20,000	153,000	101,000	50,000
19,000	20,000	153,000	101,000	50,000
19,500	20,000	153,000	101,000	50,000
20,000	20,000	153,000	101,000	50,000

HARTNER

Forets avec canaux de refroidissment

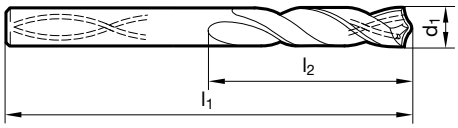
N° d'article 82710

P	M	K	N	S	H
●	○	●	●	○	

HSS | FN | ~10xD | WN | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • aussi pour le perçage avec canons de perçage • parfait pour les profondeurs > 5xD

tôles superposées • acier et fonte aciérée, fonte grise • aciers austénitiques jusqu'à 800 N/mm²



d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000	3,000	100,000	66,000	34,000
3,300	3,300	106,000	69,000	37,000
4,000	4,000	119,000	78,000	41,000
5,000	5,000	132,000	87,000	45,000
5,500	5,500	139,000	91,000	48,000
6,000	6,000	139,000	91,000	48,000
6,500	6,500	148,000	97,000	51,000
6,800	6,800	156,000	102,000	54,000
7,000	7,000	156,000	102,000	54,000
7,500	7,500	156,000	102,000	54,000
8,000	8,000	165,000	109,000	56,000
8,500	8,500	165,000	109,000	56,000

d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,000	9,000	175,000	115,000	60,000
9,500	9,500	175,000	115,000	60,000
10,000	10,000	184,000	121,000	63,000
10,200	10,200	184,000	121,000	63,000
10,500	10,500	184,000	121,000	63,000
11,000	11,000	195,000	128,000	67,000
11,500	11,500	195,000	128,000	67,000
12,000	12,000	205,000	134,000	71,000
13,000	13,000	205,000	134,000	71,000

HARTNER

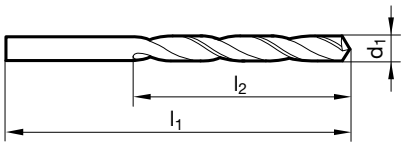
Forets pour perçage par canon

N° d'article 81210

P	M	K	N	S	H
●		●	○		

HSS | >Ø 2,36 | N | ~10xD | DIN 339 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • pour le perçage avec canons de perçage • avec tenon suiv. DIN 1809
acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,800		42,000	22,000	4,900		108,000	74,000
0,950		45,000	24,000	5,000		108,000	74,000
1,000		48,000	26,000	5,100		108,000	74,000
1,200		52,000	30,000	5,200		108,000	74,000
1,250		52,000	30,000	5,300		108,000	74,000
1,350		55,000	33,000	5,350		116,000	80,000
1,400		55,000	33,000	5,400		116,000	80,000
1,450		55,000	33,000	5,500		116,000	80,000
1,500		55,000	33,000	5,550		116,000	80,000
1,700		58,000	35,000	5,600		116,000	80,000
1,800		62,000	38,000	5,700		116,000	80,000
1,900		62,000	38,000	5,750		116,000	80,000
2,000		66,000	41,000	5,800		116,000	80,000
2,300		70,000	44,000	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	6,200		124,000	86,000
2,500		74,000	47,000	6,400		124,000	86,000
2,600		74,000	47,000	6,500		124,000	86,000
2,900		79,000	51,000	6,600		124,000	86,000
3,000		79,000	51,000	6,700		124,000	86,000
3,050		84,000	55,000	6,750	17/64	133,000	93,000
3,100		84,000	55,000	6,900		133,000	93,000
3,200		84,000	55,000	7,000		133,000	93,000
3,250		84,000	55,000	7,100		133,000	93,000
3,300		84,000	55,000	7,200		133,000	93,000
3,400		91,000	60,000	7,400		133,000	93,000
3,500		91,000	60,000	7,500		133,000	93,000
3,600		91,000	60,000	7,600		142,000	100,000
3,700		91,000	60,000	7,700		142,000	100,000
3,750		91,000	60,000	7,800		142,000	100,000
3,800		96,000	64,000	8,000		142,000	100,000
3,900		96,000	64,000	8,200		142,000	100,000
4,000		96,000	64,000	8,250		142,000	100,000
4,050		96,000	64,000	8,500		142,000	100,000
4,200		96,000	64,000	8,600		151,000	107,000
4,300		102,000	69,000	8,700		151,000	107,000
4,400		102,000	69,000	8,800		151,000	107,000
4,500		102,000	69,000	9,000		151,000	107,000
4,600		102,000	69,000	9,100		151,000	107,000
4,700		102,000	69,000	9,400		151,000	107,000
4,800		108,000	74,000	9,500		151,000	107,000

Forets pour perçage par canon

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

HARTNER

Forets hélicoïdaux longs

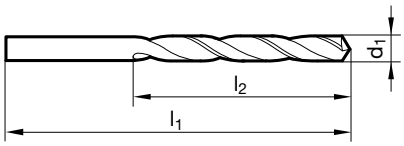
N° d'article 81310

P	M	K	N	S	H
●		●	○		

HSS | >Ø 2,36 | N | ~10xD | DIN 340 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • pour les perçages profonds

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



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

HARTNER

Forets hélicoïdaux longs

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

HARTNER

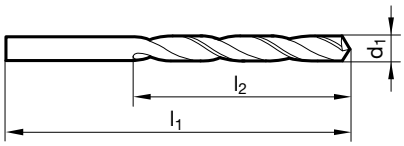
Forets hélicoïdaux longs

N° d'article 81315

P	M	K	N	S	H
●		●	○		

HSS | >Ø 6,00 | N | ~10xD | DIN 340 | 118° | h8 | L | Cyl

amin. de l'âme ≥ Ø 15,000 • affûtage à dépouille conique • pour les perçages profonds • pour le perçage avec canons de perçage
acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



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

HARTNER

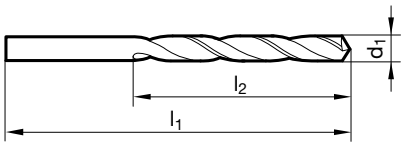
Forets hélicoïdaux longs

N° d'article 81317

P	M	K	N	S	H
●		●	○		

HSS | N | ~10xD | DIN 340 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,100 • affûtage à dépouille conique • avec tenon d´entraînement
acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
3,100	106,000	69,000	6,600	148,000	97,000
3,400	112,000	73,000	7,000	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
4,000	119,000	78,000	7,500	156,000	102,000
4,300	126,000	82,000	7,900	165,000	109,000
4,500	126,000	82,000	8,000	165,000	109,000
4,900	132,000	87,000	8,250	165,000	109,000
5,000	132,000	87,000	8,400	165,000	109,000
5,500	139,000	91,000	8,700	175,000	115,000
5,700	139,000	91,000	10,000	184,000	121,000
6,100	148,000	97,000	12,200	205,000	134,000

HARTNER

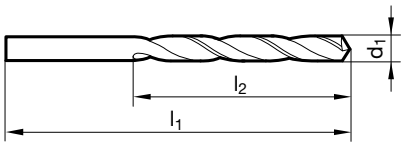
Forets hélicoïdaux longs

N° d'article 81320

P	M	K	N	S	H
			•		

HSS | ○ | H | ~10xD | DIN 340 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 14,500 • affûtage à dépouille conique • pour les perçages profonds
matières dures et friables • laitons, alliages de magnésium • bronze, bronze phosphoreux • ardoise, mica, pertinax



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
0,500	32,000	12,000	4,000	119,000	78,000
0,600	35,000	15,000	4,100	119,000	78,000
0,700	42,000	21,000	4,200	119,000	78,000
0,750	42,000	21,000	4,400	126,000	82,000
0,800	46,000	25,000	4,500	126,000	82,000
0,900	51,000	29,000	4,700	126,000	82,000
1,000	56,000	33,000	4,900	132,000	87,000
1,050	56,000	33,000	5,000	132,000	87,000
1,100	60,000	37,000	5,200	132,000	87,000
1,150	60,000	37,000	5,300	132,000	87,000
1,200	65,000	41,000	5,400	139,000	91,000
1,300	65,000	41,000	5,500	139,000	91,000
1,400	70,000	45,000	5,700	139,000	91,000
1,450	70,000	45,000	5,800	139,000	91,000
1,500	70,000	45,000	5,900	139,000	91,000
1,600	76,000	50,000	6,000	139,000	91,000
1,700	76,000	50,000	6,300	148,000	97,000
1,800	80,000	53,000	6,500	148,000	97,000
1,850	80,000	53,000	6,600	148,000	97,000
1,900	80,000	53,000	6,700	148,000	97,000
2,000	85,000	56,000	6,800	156,000	102,000
2,200	90,000	59,000	7,000	156,000	102,000
2,300	90,000	59,000	7,500	156,000	102,000
2,500	95,000	62,000	8,000	165,000	109,000
2,600	95,000	62,000	8,250	165,000	109,000
2,700	100,000	66,000	9,000	175,000	115,000
2,900	100,000	66,000	9,250	175,000	115,000
3,000	100,000	66,000	10,000	184,000	121,000
3,100	106,000	69,000	14,000	214,000	140,000
3,200	106,000	69,000	14,500	220,000	144,000
3,250	106,000	69,000			
3,300	106,000	69,000			
3,400	112,000	73,000			
3,500	112,000	73,000			
3,600	112,000	73,000			
3,900	119,000	78,000			

HARTNER

Forets hélicoïdaux longs

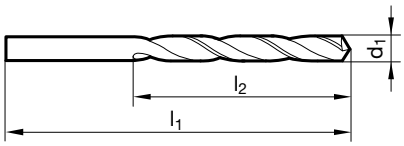
N° d'article 81330

P	M	K	N	S	H
			•		

HSS | ○ | W | ~10xD | DIN 340 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 14,250 • affûtage à dépouille conique • pour les perçages profonds

matières tendres et à copeaux longs • aluminium/alliages d'aluminium à copeaux longs • zinc, cuivre de 1ère fusion, Alpax, électrode • thermoplastiques, bois



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,500		32,000	12,000	3,750		112,000	73,000
0,600		35,000	15,000	3,800		119,000	78,000
0,700		42,000	21,000	3,900		119,000	78,000
0,800		46,000	25,000	4,000		119,000	78,000
0,850		46,000	25,000	4,100		119,000	78,000
0,900		51,000	29,000	4,200		119,000	78,000
0,950		51,000	29,000	4,250		119,000	78,000
1,000		56,000	33,000	4,300		126,000	82,000
1,050		56,000	33,000	4,500		126,000	82,000
1,200		65,000	41,000	4,600		126,000	82,000
1,250		65,000	41,000	4,700		126,000	82,000
1,300		65,000	41,000	4,900		132,000	87,000
1,350		70,000	45,000	5,000		132,000	87,000
1,400		70,000	45,000	5,100		132,000	87,000
1,500		70,000	45,000	5,250		132,000	87,000
1,600		76,000	50,000	5,300		132,000	87,000
1,780		80,000	53,000	5,400		139,000	91,000
1,800		80,000	53,000	5,500		139,000	91,000
1,850		80,000	53,000	5,700		139,000	91,000
1,900		80,000	53,000	5,800		139,000	91,000
2,000		85,000	56,000	6,000		139,000	91,000
2,100		85,000	56,000	6,100		148,000	97,000
2,150		90,000	59,000	6,200		148,000	97,000
2,200		90,000	59,000	6,300		148,000	97,000
2,250		90,000	59,000	6,400		148,000	97,000
2,500		95,000	62,000	6,500		148,000	97,000
2,550		95,000	62,000	6,600		148,000	97,000
2,700		100,000	66,000	6,700		148,000	97,000
2,850		100,000	66,000	6,750	17/64	156,000	102,000
2,900		100,000	66,000	6,800		156,000	102,000
3,000		100,000	66,000	6,900		156,000	102,000
3,050		106,000	69,000	7,000		156,000	102,000
3,200		106,000	69,000	7,100		156,000	102,000
3,250		106,000	69,000	7,200		156,000	102,000
3,300		106,000	69,000	7,300		156,000	102,000
3,350		106,000	69,000	7,400		156,000	102,000
3,400		112,000	73,000	7,500		156,000	102,000
3,450		112,000	73,000	7,600		165,000	109,000
3,500		112,000	73,000	7,700		165,000	109,000
3,600		112,000	73,000	7,750		165,000	109,000
3,650		112,000	73,000	7,800		165,000	109,000
3,700		112,000	73,000	7,900		165,000	109,000

Forets hélicoïdaux longs

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
8,000		165,000	109,000	9,750		184,000	121,000
8,100		165,000	109,000	10,200		184,000	121,000
8,200		165,000	109,000	10,500		184,000	121,000
8,300		165,000	109,000	11,000		195,000	128,000
8,400		165,000	109,000	11,300		195,000	128,000
8,500		165,000	109,000	11,500		195,000	128,000
8,600		175,000	115,000	12,000		205,000	134,000
8,800		175,000	115,000	13,000		205,000	134,000
9,000		175,000	115,000	13,500		214,000	140,000
9,100		175,000	115,000	14,500		220,000	144,000
9,200		175,000	115,000	17,000		235,000	154,000
9,300		175,000	115,000				

HARTNER

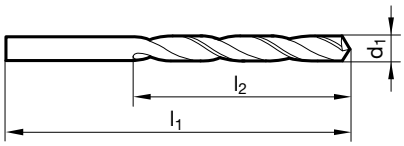
Forets hélicoïdaux longs

N° d'article 81340

P	M	K	N	S	H
•		•	•		

HSS | >Ø 2,36 | FN | ~10xD | DIN 340 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • goujures larges • en cas de mauvaise évacuation des copeaux
fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
0,900		51,000	29,000	4,750		126,000	82,000
1,000		56,000	33,000	4,800		132,000	87,000
1,100		60,000	37,000	5,000		132,000	87,000
1,200		65,000	41,000	5,100		132,000	87,000
1,300		65,000	41,000	5,200		132,000	87,000
1,400		70,000	45,000	5,400		139,000	91,000
1,500		70,000	45,000	5,500		139,000	91,000
1,600		76,000	50,000	5,900		139,000	91,000
1,700		76,000	50,000	6,000		139,000	91,000
1,800		80,000	53,000	6,100		148,000	97,000
1,900		80,000	53,000	6,200		148,000	97,000
2,000		85,000	56,000	6,300		148,000	97,000
2,100		85,000	56,000	6,500		148,000	97,000
2,200		90,000	59,000	6,600		148,000	97,000
2,300		90,000	59,000	6,800		156,000	102,000
2,400		95,000	62,000	6,900		156,000	102,000
2,500		95,000	62,000	7,000		156,000	102,000
2,600		95,000	62,000	7,100		156,000	102,000
2,700		100,000	66,000	7,300		156,000	102,000
2,800		100,000	66,000	7,500		156,000	102,000
2,900		100,000	66,000	7,600		165,000	109,000
3,000		100,000	66,000	7,800		165,000	109,000
3,100		106,000	69,000	8,000		165,000	109,000
3,170	1/8	106,000	69,000	8,400		165,000	109,000
3,200		106,000	69,000	8,500		165,000	109,000
3,250		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	9,000		175,000	115,000
3,600		112,000	73,000	9,100		175,000	115,000
3,700		112,000	73,000	9,200		175,000	115,000
3,750		112,000	73,000	9,400		175,000	115,000
3,800		119,000	78,000	9,500		175,000	115,000
3,900		119,000	78,000	9,800		184,000	121,000
4,000		119,000	78,000	9,900		184,000	121,000
4,100		119,000	78,000	10,000		184,000	121,000
4,200		119,000	78,000	10,300		184,000	121,000
4,250		119,000	78,000	10,500		184,000	121,000
4,300		126,000	82,000	10,800		195,000	128,000
4,400		126,000	82,000	11,000		195,000	128,000
4,500		126,000	82,000	11,200		195,000	128,000
4,700		126,000	82,000	11,250		195,000	128,000

Forets hélicoïdaux longs

d1 mm	inch	l1 mm	l2 mm
11,500		195,000	128,000
11,800		195,000	128,000
12,000		205,000	134,000
12,500		205,000	134,000
12,800		205,000	134,000
13,000		205,000	134,000

d1 mm	inch	l1 mm	l2 mm
14,000		214,000	140,000

Forets hélicoïdaux longs

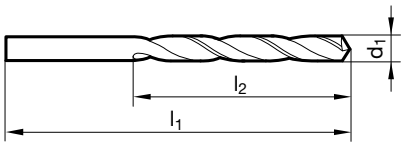
N° d'article 81350

P	M	K	N	S	H
○			●		

HSS | ◯ | FW | ~10xD | DIN 340 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,400 • affûtage à dépouille conique • goujures particulièrement volumineuses

matières tendres et à copeaux longs • jusqu'à 500 N/mm² • aciers de décolletage, doux • aluminium/alliages d'aluminium à copeaux longs • zinc, cuivre de 1ère fusion, Alpax, électrode • zamak, thermoplastiques, bois



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		56,000	33,000	6,600		148,000	97,000
1,100		60,000	37,000	6,700		148,000	97,000
1,500		70,000	45,000	6,900		156,000	102,000
2,000		85,000	56,000	7,000		156,000	102,000
2,100		85,000	56,000	7,100		156,000	102,000
2,200		90,000	59,000	7,200		156,000	102,000
2,400		95,000	62,000	7,500		156,000	102,000
2,500		95,000	62,000	7,600		165,000	109,000
2,700		100,000	66,000	7,700		165,000	109,000
2,800		100,000	66,000	7,800		165,000	109,000
2,900		100,000	66,000	7,900		165,000	109,000
3,000		100,000	66,000	8,000		165,000	109,000
3,100		106,000	69,000	8,100		165,000	109,000
3,200		106,000	69,000	8,300		165,000	109,000
3,250		106,000	69,000	8,400		165,000	109,000
3,300		106,000	69,000	8,500		165,000	109,000
3,400		112,000	73,000	8,600		175,000	115,000
3,500		112,000	73,000	8,800		175,000	115,000
3,600		112,000	73,000	8,900		175,000	115,000
3,700		112,000	73,000	9,000		175,000	115,000
3,800		119,000	78,000	9,100		175,000	115,000
3,900		119,000	78,000	9,200		175,000	115,000
4,000		119,000	78,000	9,300		175,000	115,000
4,100		119,000	78,000	9,400		175,000	115,000
4,200		119,000	78,000	9,600		184,000	121,000
4,400		126,000	82,000	9,700		184,000	121,000
4,500		126,000	82,000	9,800		184,000	121,000
4,700		126,000	82,000	10,000		184,000	121,000
4,800		132,000	87,000	10,100		184,000	121,000
4,900		132,000	87,000	10,500		184,000	121,000
5,000		132,000	87,000	10,700		195,000	128,000
5,400		139,000	91,000	10,800		195,000	128,000
5,500		139,000	91,000	11,200		195,000	128,000
5,600		139,000	91,000	11,500		195,000	128,000
5,700		139,000	91,000	11,600		195,000	128,000
5,800		139,000	91,000	11,800		195,000	128,000
5,900		139,000	91,000	12,000		205,000	134,000
6,000		139,000	91,000	12,200		205,000	134,000
6,100		148,000	97,000	12,300	31/64	205,000	134,000
6,200		148,000	97,000	12,400		205,000	134,000
6,300		148,000	97,000	12,500		205,000	134,000
6,500		148,000	97,000	12,800		205,000	134,000

Forets hélicoïdaux longs

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
13,000		205,000	134,000				
13,500		214,000	140,000				
14,000		214,000	140,000				

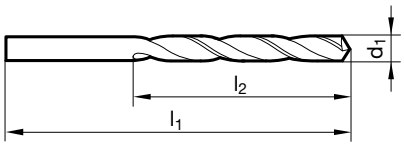
Forets hélicoïdaux longs

N° d'article 84418

P	M	K	N	S	H
●		●	○		

HSS | T | N | ~10xD | DIN 340 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • pour les perçages profonds • pour le perçage avec canons de perçage
acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



d1 mm	inch	l1 mm	l2 mm
0,500		32,000	12,000
0,700		42,000	21,000
1,000		56,000	33,000
1,200		65,000	41,000
1,500		70,000	45,000
1,600		76,000	50,000
1,700		76,000	50,000
1,900		80,000	53,000
2,000		85,000	56,000
2,200		90,000	59,000
2,400		95,000	62,000
2,500		95,000	62,000
2,700		100,000	66,000
2,800		100,000	66,000
2,900		100,000	66,000
3,000		100,000	66,000
3,100		106,000	69,000
3,300		106,000	69,000
3,400		112,000	73,000
3,500		112,000	73,000
3,800		119,000	78,000
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
4,500		126,000	82,000
4,600		126,000	82,000
4,800		132,000	87,000
4,900		132,000	87,000
5,000		132,000	87,000
5,300		132,000	87,000
5,500		139,000	91,000
5,700		139,000	91,000
5,800		139,000	91,000
5,900		139,000	91,000
6,000		139,000	91,000
6,100		148,000	97,000
6,200		148,000	97,000
6,400		148,000	97,000
6,500		148,000	97,000
6,600		148,000	97,000

d1 mm	inch	l1 mm	l2 mm
6,800		156,000	102,000
6,900		156,000	102,000
7,000		156,000	102,000
7,200		156,000	102,000
7,300		156,000	102,000
7,500		156,000	102,000
7,600		165,000	109,000
7,700		165,000	109,000
7,800		165,000	109,000
7,900		165,000	109,000
8,000		165,000	109,000
8,100		165,000	109,000
8,200		165,000	109,000
8,500		165,000	109,000
8,700		175,000	115,000
8,800		175,000	115,000
8,900		175,000	115,000
9,000		175,000	115,000
9,400		175,000	115,000
9,800		184,000	121,000
9,900		184,000	121,000
10,000		184,000	121,000
10,200		184,000	121,000
10,800		195,000	128,000
11,000		195,000	128,000
11,500		195,000	128,000
12,000		205,000	134,000
12,500		205,000	134,000
12,700	1/2	205,000	134,000
13,000		205,000	134,000
14,000		214,000	140,000
14,500		220,000	144,000
14,800		220,000	144,000
15,000		220,000	144,000
16,000		227,000	149,000

Forets hélicoïdaux longs

N° d'article 84423

P	M	K	N	S	H
•		•	•		

HSS | T | FN | ~10xD | DIN 340 | 130° | h8 | R | Cyl

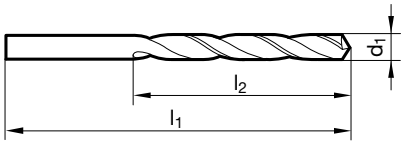
amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • goujures larges • en cas de mauvaise évacuation des copeaux
fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox

N° d'article 84506

P	M	K	N	S	H
•		•	•		

HSS | F | FN | ~10xD | DIN 340 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • goujures larges • en cas de mauvaise évacuation des copeaux
fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



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

HARTNER

Forets hélicoïdaux longs

d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
14,000	214,000	140,000			

HARTNER

Forets hélicoïdaux longs

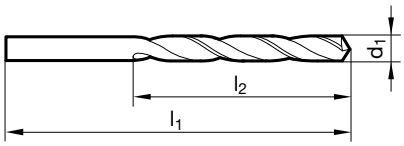
N° d'article 81311

P	M	K	N	S	H
●	○	●	●	○	

HSS-E | >Ø 2,36 | N | ~10xD | DIN 340 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure

aciers, alliés ou non alliés, et fontes > 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	l1 mm	l2 mm
0,500	32,000	12,000
0,600	35,000	15,000
0,700	42,000	21,000
0,800	46,000	25,000
0,900	51,000	29,000
1,000	56,000	33,000
1,100	60,000	37,000
1,200	65,000	41,000
1,400	70,000	45,000
1,500	70,000	45,000
1,900	80,000	53,000
2,000	85,000	56,000
2,200	90,000	59,000
3,000	100,000	66,000
3,100	106,000	69,000
3,200	106,000	69,000
3,300	106,000	69,000
3,400	112,000	73,000
3,500	112,000	73,000
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
4,700	126,000	82,000
4,800	132,000	87,000
4,900	132,000	87,000
5,000	132,000	87,000
5,300	132,000	87,000
5,500	139,000	91,000
5,600	139,000	91,000
5,700	139,000	91,000
5,900	139,000	91,000

d1 mm	l1 mm	l2 mm
6,000	139,000	91,000
6,300	148,000	97,000
6,400	148,000	97,000
6,500	148,000	97,000
6,600	148,000	97,000
6,900	156,000	102,000
7,200	156,000	102,000
7,300	156,000	102,000
7,600	165,000	109,000
7,800	165,000	109,000
7,900	165,000	109,000
8,000	165,000	109,000
8,400	165,000	109,000
8,700	175,000	115,000
8,800	175,000	115,000
8,900	175,000	115,000
9,000	175,000	115,000
9,100	175,000	115,000
9,300	175,000	115,000
9,400	175,000	115,000
9,500	175,000	115,000
9,600	184,000	121,000
9,800	184,000	121,000
9,900	184,000	121,000
10,000	184,000	121,000
10,500	184,000	121,000
10,800	195,000	128,000
11,000	195,000	128,000
11,200	195,000	128,000
12,000	205,000	134,000
12,500	205,000	134,000

HARTNER

Forets hélicoïdaux longs

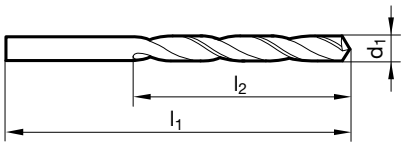
N° d'article 81341

P	M	K	N	S	H
●	●	●	●		○

HSS-E | >Ø 2,36 | FN | ~10xD | DIN 340 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,100 • affûtage à dépouille conique • acier rapide au Co • goujures larges • meilleure résistance à l´usure • en cas de mauvaise évacuation des copeaux

aciers, alliés ou non alliés, et fontes > 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
1,000		56,000	33,000	5,200		132,000	87,000
1,200		65,000	41,000	5,300		132,000	87,000
1,250		65,000	41,000	5,400		139,000	91,000
1,300		65,000	41,000	5,500		139,000	91,000
1,400		70,000	45,000	5,600		139,000	91,000
1,500		70,000	45,000	5,700		139,000	91,000
1,600		76,000	50,000	5,800		139,000	91,000
1,700		76,000	50,000	5,900		139,000	91,000
1,800		80,000	53,000	6,000		139,000	91,000
1,900		80,000	53,000	6,100		148,000	97,000
2,000		85,000	56,000	6,150		148,000	97,000
2,100		85,000	56,000	6,200		148,000	97,000
2,200		90,000	59,000	6,250		148,000	97,000
2,400		95,000	62,000	6,300		148,000	97,000
2,440		95,000	62,000	6,350	1/4	148,000	97,000
2,500		95,000	62,000	6,400		148,000	97,000
2,600		95,000	62,000	6,500		148,000	97,000
2,700		100,000	66,000	6,600		148,000	97,000
2,800		100,000	66,000	6,700		148,000	97,000
2,900		100,000	66,000	6,800		156,000	102,000
3,000		100,000	66,000	6,900		156,000	102,000
3,050		106,000	69,000	7,000		156,000	102,000
3,100		106,000	69,000	7,200		156,000	102,000
3,200		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
3,700		112,000	73,000	7,700		165,000	109,000
3,800		119,000	78,000	7,800		165,000	109,000
3,900		119,000	78,000	7,900		165,000	109,000
4,000		119,000	78,000	8,000		165,000	109,000
4,050		119,000	78,000	8,100		165,000	109,000
4,100		119,000	78,000	8,200		165,000	109,000
4,200		119,000	78,000	8,300		165,000	109,000
4,300		126,000	82,000	8,400		165,000	109,000
4,400		126,000	82,000	8,500		165,000	109,000
4,500		126,000	82,000	8,600		175,000	115,000
4,700		126,000	82,000	8,700		175,000	115,000
4,800		132,000	87,000	8,800		175,000	115,000
4,900		132,000	87,000	8,900		175,000	115,000
5,000		132,000	87,000	9,000		175,000	115,000
5,100		132,000	87,000	9,100		175,000	115,000

Forets hélicoïdaux longs

d1 mm	inch	l1 mm	l2 mm
9,200		175,000	115,000
9,300		175,000	115,000
9,500		175,000	115,000
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
10,800		195,000	128,000
10,900		195,000	128,000
11,000		195,000	128,000
11,500		195,000	128,000
11,800		195,000	128,000
11,910	15/32	205,000	134,000
12,000		205,000	134,000
12,500		205,000	134,000
12,700	1/2	205,000	134,000
13,000		205,000	134,000
16,000		227,000	149,000

Forets hélicoïdaux longs

N° d'article 81361

P	M	K	N	S	H
○	●			●	

HSS-E | ◯ | S | ~10xD | DIN 340 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,400 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure

Titane et ses alliages • aciers austénit., inox., inaltérables aux acides, réfractaires • aciers > 900 N/mm², à copeaux courts • aciers à roulement • Hastelloy, Inconel, Nimonic

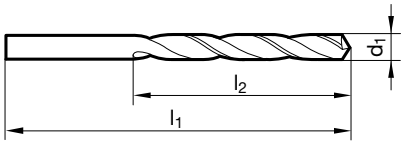
N° d'article 81362

P	M	K	N	S	H
○	●			●	

HSS-E | T | S | ~10xD | DIN 340 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure

Titane et ses alliages • aciers austénit., inox., inaltérables aux acides, réfractaires • aciers > 900 N/mm², à copeaux courts • aciers à roulement • 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

Forets hélicoïdaux longs

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

HARTNER

Forets hélicoïdaux longs

N° d'article 84814

P	M	K	N	S	H
•	•	•	•		

HSS-E | FU 500 DZ | ~10xD | DIN 340 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage en pente • acier rapide au Co • faible effort d'avance nécessaire • faible effort de couple nécessaire • meilleure résistance à l´usure • pour applications universelles

aciers alliés ou non alliés < 800 N/mm² • aciers à outils, travail à froid ou à chaud • aciers à roulement • métaux non ferreux • fontes • aciers inoxydables • matériaux synthétiques

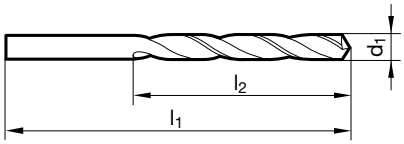
N° d'article 84812

P	M	K	N	S	H
•	•	•	•		

HSS-E | T | FU 500 DZ | ~10xD | DIN 340 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage en pente • acier rapide au Co • faible effort de couple nécessaire • faible effort d'avance nécessaire • meilleure résistance à l´usure • pour applications universelles

aciers alliés ou non alliés < 800 N/mm² • aciers à outils, travail à froid ou à chaud • aciers à roulement • métaux non ferreux • fontes • matériaux synthétiques • aciers inoxydables



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

Forets hélicoïdaux longs

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			

HARTNER

Forets hélicoïdaux longs

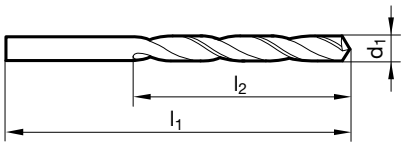
N° d'article 84508

P	M	K	N	S	H
●	●	●	●		○

HSS-E | F | FN | ~10xD | DIN 340 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 1,000 • affûtage à dépouille conique • acier rapide au Co • goujures larges • résistance à l'usure particulièrement élevée • en cas de mauvaise évacuation des copeaux

aciers, alliés ou non alliés, et fontes > 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



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

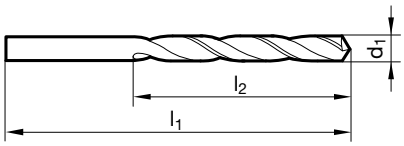
Forets hélicoïdaux longs

N° d'article 89286

P	M	K	N	S	H
○		○			○

VHM | N | ~10xD | WN | 130° | h7 | R | Cyl

affûtage en pente • arête de coupe principale rectiligne
matières synthétiques renforcées de fibres de verre • thermodurcissables abrasifs avec effet abrasif sur arêtes de coupe et listels



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			

HARTNER

Forets hélicoïdaux extra-longs, série 1

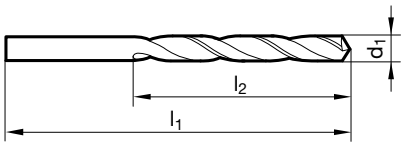
N° d'article 81410

P	M	K	N	S	H
●		●	○		

HSS | >Ø 2,36 | N | ~15xD | DIN 1869 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,400 • affûtage à dépouille conique • pour les perçages très profonds

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



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

HARTNER

Forets hélicoïdaux extra-longs, série 1

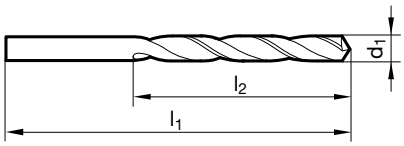
N° d'article 81440

P	M	K	N	S	H
•		•	•		

HSS | >Ø 2,36 | FN | ~15xD | DIN 1869 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	inch	l1 mm	l2 mm
2,000		125,000	85,000
2,200		135,000	90,000
2,300		135,000	90,000
2,400		140,000	95,000
2,500		140,000	95,000
2,600		140,000	95,000
2,700		150,000	100,000
2,850		150,000	100,000
2,900		150,000	100,000
2,950		150,000	100,000
3,000		150,000	100,000
3,100		155,000	105,000
3,170	1/8	155,000	105,000
3,200		155,000	105,000
3,300		155,000	105,000
3,400		165,000	115,000
3,500		165,000	115,000
3,600		165,000	115,000
3,700		165,000	115,000
3,750		165,000	115,000
3,800		175,000	120,000
3,900		175,000	120,000
4,000		175,000	120,000
4,100		175,000	120,000
4,200		175,000	120,000
4,500		185,000	125,000
4,700		185,000	125,000
4,800		195,000	135,000
5,000		195,000	135,000
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
5,600		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
6,400		215,000	150,000

d1 mm	inch	l1 mm	l2 mm
6,500		215,000	150,000
6,600		215,000	150,000
6,700		215,000	150,000
6,800		225,000	155,000
7,000		225,000	155,000
7,100		225,000	155,000
7,400		225,000	155,000
7,500		225,000	155,000
7,600		240,000	165,000
7,800		240,000	165,000
8,000		240,000	165,000
8,100		240,000	165,000
8,200		240,000	165,000
8,300		240,000	165,000
8,400		240,000	165,000
8,500		240,000	165,000
8,600		250,000	175,000
8,800		250,000	175,000
9,000		250,000	175,000
9,200		250,000	175,000
9,300		250,000	175,000
9,400		250,000	175,000
9,500		250,000	175,000
9,600		265,000	185,000
9,700		265,000	185,000
9,800		265,000	185,000
9,900		265,000	185,000
10,000		265,000	185,000
10,200		265,000	185,000
10,500		265,000	185,000
11,000		280,000	195,000
11,500		280,000	195,000
11,750		280,000	195,000
11,800		280,000	195,000
12,000		295,000	205,000
12,500		295,000	205,000
12,700	1/2	295,000	205,000
13,000		295,000	205,000

HARTNER

Forets hélicoïdaux extra-longs, série 1

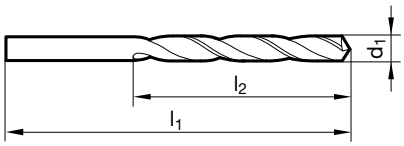
N° d'article 81450

P	M	K	N	S	H
○			●		

HSS | ◯ | FW | ~15xD | DIN 1869 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,500 • affûtage à dépouille conique • pour les perçages très profonds

matières tendres et à copeaux longs < 500 N/mm² • aciers de décolletage, doux • aluminium/alliages d'aluminium à copeaux longs • zinc, cuivre de 1ère fusion, Alpax, électrode • zamak, thermoplastiques, bois



d1 mm	l1 mm	l2 mm
2,000	125,000	85,000
2,500	140,000	95,000
2,600	140,000	95,000
3,000	150,000	100,000
3,200	155,000	105,000
4,000	175,000	120,000
5,000	195,000	135,000
6,000	205,000	140,000
6,500	215,000	150,000
7,000	225,000	155,000
8,000	240,000	165,000
9,000	250,000	175,000

d1 mm	l1 mm	l2 mm
9,500	250,000	175,000

Forets hélicoïdaux extra-longs, série 1

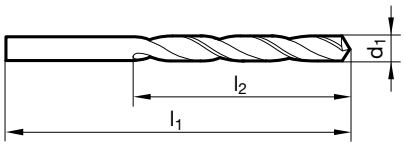
N° d'article 84425

P	M	K	N	S	H
•		•	•		

HSS | T | FN | ~15xD | DIN 1869 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



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

HARTNER

Forets hélicoïdaux extra-longs, série 1

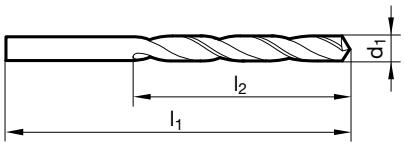
N° d'article 81441

P	M	K	N	S	H
●	●	●	●	●	○

HSS-E | FN | ~15xD | DIN 1869 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • acier rapide au Co • goujures larges • meilleure résistance à l´usure • pour les perçages très profonds
• en cas de mauvaise évacuation des copeaux

aciers, alliés ou non alliés, et fontes > 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
3,000		150,000	100,000	7,000		225,000	155,000
3,500		165,000	115,000	8,000		240,000	165,000
4,000		175,000	120,000	8,200		240,000	165,000
4,300		185,000	125,000	8,500		240,000	165,000
4,500		185,000	125,000	9,000		250,000	175,000
4,760	3/16	195,000	135,000	9,500		250,000	175,000
4,800		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				

HARTNER

Forets hélicoïdaux extra-longs, série 2

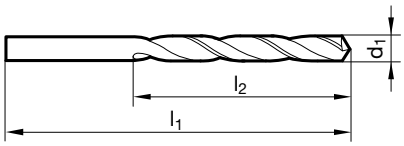
N° d'article 81510

P	M	K	N	S	H
●		●	○		

HSS | N | ~20xD | DIN 1869 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • pour les perçages très profonds

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



d1 mm	inch	l1 mm	l2 mm
3,000		190,000	130,000
3,170	1/8	200,000	135,000
3,300		200,000	135,000
3,500		210,000	145,000
4,000		220,000	150,000
4,200		220,000	150,000
4,500		235,000	160,000
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
7,500		290,000	200,000
8,000		305,000	210,000

d1 mm	inch	l1 mm	l2 mm
8,500		305,000	210,000
9,000		320,000	220,000
9,500		320,000	220,000
10,000		340,000	235,000
10,500		340,000	235,000
11,000		365,000	250,000
11,500		365,000	250,000
12,000		375,000	260,000

HARTNER

Forets hélicoïdaux extra-longs, série 2

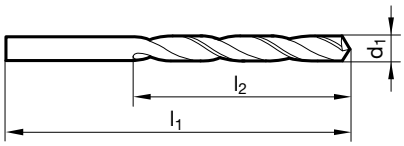
N° d'article 81540

P	M	K	N	S	H
•		•	•		

HSS | >Ø 2,36 | FN | ~20xD | DIN 1869 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	inch	l1 mm	l2 mm
2,000		160,000	110,000
2,500		180,000	120,000
2,800		190,000	130,000
3,000		190,000	130,000
3,200		200,000	135,000
3,300		200,000	135,000
3,500		210,000	145,000
4,000		220,000	150,000
4,100		220,000	150,000
4,200		220,000	150,000
4,500		235,000	160,000
5,000		245,000	170,000
5,500		260,000	180,000
6,000		260,000	180,000
6,500		275,000	190,000
7,000		290,000	200,000
7,500		290,000	200,000
8,000		305,000	210,000

d1 mm	inch	l1 mm	l2 mm
8,200		305,000	210,000
8,500		305,000	210,000
9,000		320,000	220,000
9,500		320,000	220,000
9,800		340,000	235,000
10,000		340,000	235,000
10,200		340,000	235,000
10,500		340,000	235,000
10,720	27/64	365,000	250,000
11,000		365,000	250,000
11,500		365,000	250,000
12,000		375,000	260,000
12,500		375,000	260,000
12,700	1/2	375,000	260,000
13,000		375,000	260,000

HARTNER

Forets hélicoïdaux extra-longs, série 2

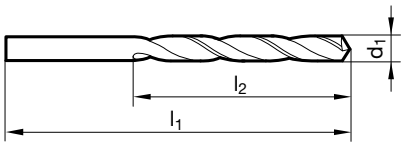
N° d'article 84426

P	M	K	N	S	H
●		●	●	○	

HSS | T | FN | ~20xD | DIN 1869 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



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

HARTNER

Forets hélicoïdaux extra-longs, série 2

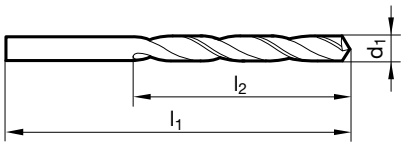
N° d'article 81541

P	M	K	N	S	H
●	●	●	●		○

HSS-E | FN | ~20xD | DIN 1869 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure • goujures larges • pour les perçages très profonds
• en cas de mauvaise évacuation des copeaux

aciers, alliés ou non alliés, et fontes > 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	inch	l1 mm	l2 mm
3,000		190,000	130,000
3,170	1/8	200,000	135,000
3,200		200,000	135,000
3,500		210,000	145,000
4,000		220,000	150,000
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

d1 mm	inch	l1 mm	l2 mm
7,500		290,000	200,000
8,000		305,000	210,000
8,500		305,000	210,000
9,000		320,000	220,000
10,000		340,000	235,000

HARTNER

Forets hélicoïdaux extra-longs, série 3

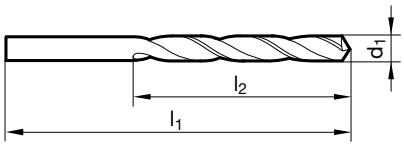
N° d'article 81610

P	M	K	N	S	H
●		●	○		

HSS | N | ~25xD | DIN 1869 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 4,000 • affûtage à dépouille conique • pour les perçages très profonds

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
3,500	265,000	180,000	10,000	430,000	295,000
4,000	280,000	190,000	11,000	455,000	310,000
5,000	315,000	210,000	12,000	480,000	330,000
5,500	330,000	225,000			
5,800	330,000	225,000			
5,900	330,000	225,000			
6,000	330,000	225,000			
7,000	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			

HARTNER

Forets hélicoïdaux extra-longs, série 3

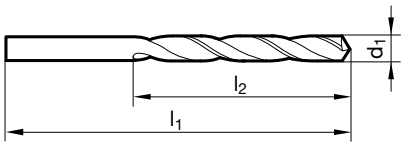
N° d'article 81640

P	M	K	N	S	H
•		•	•		

HSS | FN | ~25xD | DIN 1869 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	inch	l1 mm	l2 mm
2,500		225,000	150,000
3,000		240,000	160,000
3,170	1/8	250,000	170,000
3,500		265,000	180,000
3,700		265,000	180,000
4,000		280,000	190,000
4,200		280,000	190,000
4,500		295,000	200,000
5,000		315,000	210,000
5,100		315,000	210,000
5,500		330,000	225,000
6,000		330,000	225,000
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

d1 mm	inch	l1 mm	l2 mm
8,200		390,000	265,000
8,500		390,000	265,000
9,000		410,000	280,000
9,500		410,000	280,000
9,520	3/8	430,000	295,000
10,000		430,000	295,000
10,500		430,000	295,000
11,000		455,000	310,000
11,500		455,000	310,000
12,000		480,000	330,000
12,500		480,000	330,000
13,000		480,000	330,000

HARTNER

Forets hélicoïdaux extra-longs, série 3

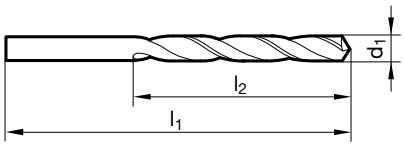
N° d'article 81641

P	M	K	N	S	H
•	•		•	•	

HSS-E | FN | ~25xD | DIN 1869 | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,500 • affûtage à dépouille conique • acier rapide au Co • goujures larges • résistance à l´usure, améliorée • pour les perçages très profonds
• en cas de mauvaise évacuation des copeaux

aciers et fontes aciérées à haute résistance • fontes grises, fontes malléables, fontes à graphite sphéroïdal



d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
2,500		225,000	150,000	6,300		350,000	235,000
3,000		240,000	160,000	6,350	1/4	350,000	235,000
3,100		250,000	170,000	6,400		350,000	235,000
3,170	1/8	250,000	170,000	6,500		350,000	235,000
3,200		250,000	170,000	6,700		350,000	235,000
3,300		250,000	170,000	6,800		370,000	250,000
3,400		265,000	180,000	7,000		370,000	250,000
3,500		265,000	180,000	7,200		370,000	250,000
3,700		265,000	180,000	7,500		370,000	250,000
3,800		280,000	190,000	7,800		390,000	265,000
3,900		280,000	190,000	7,940	5/16	390,000	265,000
3,970	5/32	280,000	190,000	8,000		390,000	265,000
4,000		280,000	190,000	8,200		390,000	265,000
4,200		280,000	190,000	8,500		390,000	265,000
4,300		295,000	200,000	8,600		410,000	280,000
4,500		295,000	200,000	8,730	11/32	410,000	280,000
4,600		295,000	200,000	8,800		410,000	280,000
4,760	3/16	315,000	210,000	9,000		410,000	280,000
4,800		315,000	210,000	9,500		410,000	280,000
4,900		315,000	210,000	9,520	3/8	430,000	295,000
5,000		315,000	210,000	10,000		430,000	295,000
5,100		315,000	210,000	10,320	13/32	430,000	295,000
5,200		315,000	210,000	10,500		430,000	295,000
5,500		330,000	225,000	11,000		455,000	310,000
5,560	7/32	330,000	225,000	11,110	7/16	455,000	310,000
5,800		330,000	225,000	11,500		455,000	310,000
5,950	15/64	330,000	225,000	12,000		480,000	330,000
6,000		330,000	225,000	12,200		480,000	330,000
6,100		350,000	235,000	12,500		480,000	330,000
6,200		350,000	235,000	13,000		480,000	330,000

HARTNER

Forets hélicoïdaux extra-longs

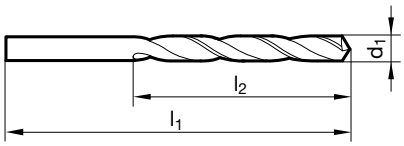
N° d'article 81740

P	M	K	N	S	H
•		•	•		

HSS | FN | >25xD | WN | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 6,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



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			

HARTNER

Forets hélicoïdaux extra-longs

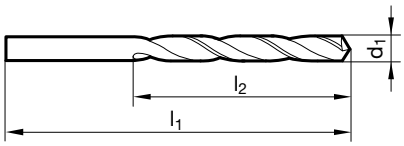
N° d'article 81750

P	M	K	N	S	H
•		•	•		

HSS | FN | >25xD | WN | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 8,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



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

d1 mm	l1 mm	l2 mm

HARTNER

Forets hélicoïdaux extra-longs

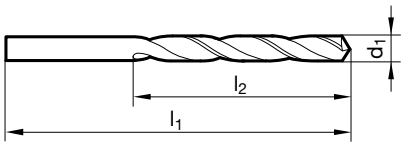
N° d'article 81760

P	M	K	N	S	H
•		•	•		

HSS | FN | >25xD | WN | 130° | h8 | R | Cyl

amin. de l'âme ≥ Ø 10,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



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

d1 mm	l1 mm	l2 mm

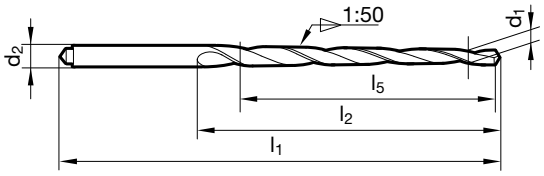
Forets de chaudronnerie

N° d'article 81810

P	M	K	N	S	H
●	○	●	○		

HSS | >Ø 2,36 | N | DIN 1898 | 118° | R | Cyl

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • pour trous coniques • avec tenon suiv. DIN 1809



d1 mm	d2 mm	l1 mm	l2 mm	l5 mm
2,000	3,150	86,000	52,000	48,000
3,000	4,000	100,000	63,000	58,000
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
8,000	10,000	207,000	157,000	145,000

d1 mm	d2 mm	l1 mm	l2 mm	l5 mm
10,000	12,500	245,000	190,000	175,000
12,000	16,000	290,000	228,000	228,500

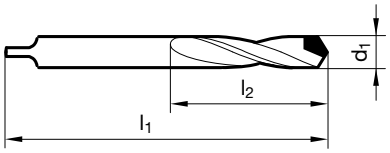
Forets spéciaux avec arêtes de coupe CW

N° d'article 89301

P	M	K	N	S	H
○		○			○

HM | ◯ | N | DIN 8037 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 2,600 • affûtage en pente • à plaquette(s) cw rapportée(s) • avec tenon suiv. DIN 1809
bande d´acier à ressorts • fontes dures > 300 HB • molybdène pur • bronzes tenaces et durs



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

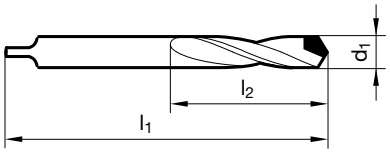
Forets spéciaux avec arêtes de coupe CW

N° d'article 89303

P	M	K	N	S	H
○		○			○

HM | ◯ | N | DIN 8038 | 85° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,100 • affûtage en pente • à plaquette(s) cw rapportée(s) • avec tenon suiv. DIN 1809
matières synthétiques renforcées de fibres de verre • thermodurcissables abrasifs avec effet abrasif sur arêtes de coupe et listels



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
3,100	56,000	25,000	6,900	80,000	40,000
3,200	56,000	25,000	7,000	80,000	40,000
4,100	63,000	28,000	7,500	80,000	40,000
4,200	63,000	28,000	8,000	80,000	40,000
4,600	63,000	28,000	8,300	90,000	50,000
5,000	63,000	28,000	8,500	90,000	50,000
5,100	71,000	32,000	9,000	90,000	50,000
5,200	71,000	32,000	10,000	100,000	56,000
5,300	71,000	32,000	10,500	100,000	56,000
5,800	71,000	32,000	11,500	112,000	63,000
6,100	71,000	32,000	13,000	112,000	63,000
6,400	71,000	32,000	19,000	160,000	90,000

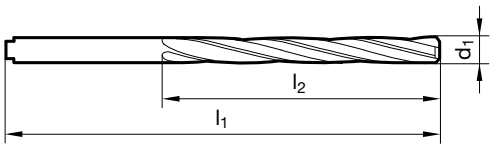
Forets aléseurs, queue cylindrique

N° d'article 86010

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 344 | 120° | h8 | R | Cyl

affûtage à dépouille conique • particulièrement rigide • avec tenon suiv. DIN 1809 • pour les perçages préalablement coulés, percés ou estampés • précision d´alignement corrigée • erreur de circularité corrigée • état de surface du perçage amélioré • Ø d´entrée < que le Ø du perçage à aléser • respecter le Ø minimum de l´avant-perçage «d0»



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	12,750		9,1	184,000	134,000
6,200		4,2	124,000	86,000	13,000		9,1	184,000	134,000
6,400		4,2	124,000	86,000	13,750		9,8	194,000	142,000
6,800		4,9	133,000	93,000	14,000		9,8	194,000	142,000
7,500		4,9	133,000	93,000	14,750		10,5	202,000	147,000
7,700		5,6	142,000	100,000	15,000		10,5	202,000	147,000
7,800		5,6	142,000	100,000					
8,000		5,6	142,000	100,000					
8,200		5,6	142,000	100,000					
9,800		7,0	162,000	116,000					
10,000		7,0	162,000	116,000					

GRANDES VARIABILITÉ ET FLEXIBILITÉ

Propriétés du système

- Tambour de distribution rotatif avec volet roulant automatique
- Contrôle à 100 % des articles distribués
- Configuration individuelle rapide des casiers
- Compartiments disponibles en différentes dimensions
- De la simple plaquette au foret hélicoïdal Ø 6 mm, en passant par des gants et même des forets pour trous profonds, tout peut être stocké, géré et distribué dans l'automate grâce au logiciel Hartner TM
- Procédure de commande automatique du logiciel Hartner TM programmé en interne
- Hauteurs de compartiments variables de 25 mm à 1525 mm, possibles par cloisonnement de 25 mm
- Maximum de 987 casiers (dans la plus petite configuration)
- Durée de prélèvement inférieur à 10 s
- Disponibilité 24h/24, 7j/7
- Charge maximale possible de 544 kg
- Conception à maintenance réduite

HARTNER

Precision Cutting Tools

TOOL MANAGEMENT

TM 826

HARTNER

Precision Cutting Tools

FORETS À QUEUE CÔNE MORSE

HSS, HSS-E, CW
polis et revêtus

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
Forets hélicoïdaux															
															
●		●	○			DIN 345	N	**HSS**	⬤	à droite	CM	~5xD	3,000 - 75,000	**82010**	173
															
			●			DIN 345	W	**HSS**	◯	à droite	CM	~5xD	6,800 - 30,500	**82030**	175
															
●		●	○			DIN 345	N	**HSS**	Ⓣ	à droite	CM	~5xD	8,000 - 30,000	**84460**	176
															
●	○	●	○			DIN 345	N	**HSS-E**	⬤	à droite	CM	~5xD	5,000 - 50,000	**82011**	177
															
○	●		○	●		DIN 345	IS	**HSS-E**	◯	à droite	CM	~5xD	11,500 - 32,000	**82012**	178
															
○		●	○			DIN 345	FN	**HSS-E**	Ⓐ	à droite	CM	~5xD	19,000 - 19,500	**84660**	179
															
●	○	●	○			DIN 345	N	**HSS-E**	Ⓣ	à droite	CM	~5xD	8,000 - 23,000	**84859**	180
Forets hélicoïdaux courts															
															
●	●	●	○	●	○	Norme usine	V	**HSS-E**	⬤	à droite	CM	~3xD	10,000 - 28,000	**82971**	181
															
○	●		○	○		Norme usine	IS	**HSS-E**	◯	à droite	CM	~3xD	10,000 - 31,000	**82972**	182
Forets NC															
															
●	○	●	●	○		Norme usine	N	**HSS**	⬤	à droite	CM		12,000 - 25,000	**82191**	183
															
●	○	●	●	○		Norme usine	N	**HSS**	⬤	à droite	CM		12,000 - 25,000	**82192**	183

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
Forets hélicoïdaux longs															
															
•		•	○			DIN 341	N	**HSS**	●	à droite	CM	~10xD	4,000 - 50,000	**82210**	184
															
•	○	•	•	○		DIN 341	N	**HSS-E**	●	à droite	CM	~10xD	5,000 - 30,000	**82211**	185
Forets hélicoïdaux extra-longs, série 1															
															
•		•	○			DIN 1870	N	**HSS**	●	à droite	CM	~15xD	8,500 - 38,000	**82310**	186
															
•		•	•			DIN 1870	FN	**HSS**	≥Ø 16,0	à droite	CM	~15xD	8,000 - 30,000	**82340**	187
															
•	•	•	•	•	○	DIN 1870	FN	**HSS-E**	≥Ø 16,0	à droite	CM	~15xD	10,000 - 20,000	**82341**	188
Forets hélicoïdaux extra-longs, série 2															
															
•		•	○			DIN 1870	N	**HSS**	●	à droite	CM	~20xD	8,500 - 30,000	**82410**	189
															
•		•	•			DIN 1870	FN	**HSS**	≥Ø 16,0	à droite	CM	~20xD	8,000 - 30,000	**82440**	190
Forets hélicoïdaux extra-longs															
															
•		•	•			Norme usine	FN	**HSS**	≥Ø 16,0	à droite	CM	>20xD	8,000 - 20,000	**82466**	191
															
•		•	•			Norme usine	FN	**HSS**	≥Ø 16,0	à droite	CM	20xD	14,000 - 38,000	**82467**	192
															
•		•	•			Norme usine	FN	**HSS**	○	à droite	CM	>20xD	14,000 - 18,000	**82468**	193
															
•		•	•			Norme usine	FN	**HSS**	○	à droite	CM	>20xD	15,000 - 18,000	**82469**	194

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
Forets avec canaux de refroidissment, longs															
															
●	○	●	●	○		Norme usine	N	**HSS**	◯	à droite	CM	~10xD	10,000 - 40,000	**82521**	195
															
●	○	●	●			Norme usine	FN	**HSS**	◯	à droite	CM	~10xD	10,000 - 20,000	**82535**	196
															
●	●	●	●	●	○	Norme usine	FN	**HSS-E**	◯	à droite	CM	~10xD	15,000 - 32,500	**82525**	197
Forets avec canaux de refroidissment, extra longs															
															
●	●	●	●	●	○	Norme usine	FN	**HSS-E**	◯	à droite	CM	~15xD	14,000 - 20,000	**82515**	198
Forets spéciaux avec arêtes de coupe CW															
															
○		○			○	DIN 8041	N	**CW rapportée**	○	à droite	CM		8,500 - 40,000	**89302**	199
Forets aléseurs, queue CM															
															
●	○	●	○			DIN 343	N	**HSS**	◯	à droite	CM		8,000 - 40,000	**86110**	200
															
●	○	●	●	○		DIN 343	N	**HSS-E**	◯	à droite	CM		12,000 - 22,000	**86111**	201
Forets de chaudronnerie															
															
●	○	●	○			DIN 1898	N	**HSS**	◯	à droite	CM		5,000 - 20,000	**82810**	202

Forets hélicoïdaux

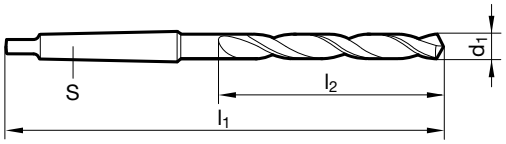
N° d'article 82010

P	M	K	N	S	H
●		●	○		

HSS | N | ~5xD | DIN 345 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 14,100 • affûtage à dépouille conique

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



d1 mm	inch	S	l1 mm	l2 mm	d1 mm	inch	S	l1 mm	l2 mm
3,000		MK-1	114,000	33,000	10,250		MK-1	168,000	87,000
3,300		MK-1	117,000	36,000	10,300		MK-1	168,000	87,000
3,600		MK-1	120,000	39,000	10,500		MK-1	168,000	87,000
3,750		MK-1	120,000	39,000	10,600		MK-1	168,000	87,000
4,000		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
6,700		MK-1	144,000	63,000	12,200		MK-1	182,000	101,000
6,750	17/64	MK-1	150,000	69,000	12,250		MK-1	182,000	101,000
6,800		MK-1	150,000	69,000	12,300	31/64	MK-1	182,000	101,000
7,000		MK-1	150,000	69,000	12,500		MK-1	182,000	101,000
7,250		MK-1	150,000	69,000	12,750		MK-1	182,000	101,000
7,500		MK-1	150,000	69,000	12,800		MK-1	182,000	101,000
7,900		MK-1	156,000	75,000	13,000		MK-1	182,000	101,000
8,000		MK-1	156,000	75,000	13,200		MK-1	182,000	101,000
8,100		MK-1	156,000	75,000	13,250		MK-1	189,000	108,000
8,200		MK-1	156,000	75,000	13,490	17/32	MK-1	189,000	108,000
8,250		MK-1	156,000	75,000	13,500		MK-1	189,000	108,000
8,400		MK-1	156,000	75,000	13,750		MK-1	189,000	108,000
8,500		MK-1	156,000	75,000	13,800		MK-1	189,000	108,000
8,700		MK-1	162,000	81,000	14,000		MK-1	189,000	108,000
8,750		MK-1	162,000	81,000	14,100		MK-2	212,000	114,000
8,800		MK-1	162,000	81,000	14,200		MK-2	212,000	114,000
9,000		MK-1	162,000	81,000	14,250		MK-2	212,000	114,000
9,200		MK-1	162,000	81,000	14,300		MK-2	212,000	114,000
9,250		MK-1	162,000	81,000	14,500		MK-2	212,000	114,000
9,500		MK-1	162,000	81,000	14,600		MK-2	212,000	114,000
9,700		MK-1	168,000	87,000	14,750		MK-2	212,000	114,000
9,750		MK-1	168,000	87,000	15,000		MK-2	212,000	114,000
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
10,200		MK-1	168,000	87,000	15,800		MK-2	218,000	120,000

Forets hélicoïdaux

d1 mm	inch	S	l1 mm	l2 mm
16,000		MK-2	218,000	120,000
16,100		MK-2	223,000	125,000
16,200		MK-2	223,000	125,000
16,250		MK-2	223,000	125,000
16,500		MK-2	223,000	125,000
16,750		MK-2	223,000	125,000
17,000		MK-2	223,000	125,000
17,250		MK-2	228,000	130,000
17,500		MK-2	228,000	130,000
17,750		MK-2	228,000	130,000
18,000		MK-2	228,000	130,000
18,200		MK-2	233,000	135,000
18,250		MK-2	233,000	135,000
18,500		MK-2	233,000	135,000
18,750		MK-2	233,000	135,000
19,000		MK-2	233,000	135,000
19,250		MK-2	238,000	140,000
19,500		MK-2	238,000	140,000
19,700		MK-2	238,000	140,000
19,750		MK-2	238,000	140,000
20,000		MK-2	238,000	140,000
20,100		MK-2	243,000	145,000
20,200		MK-2	243,000	145,000
20,250		MK-2	243,000	145,000
20,400		MK-2	243,000	145,000
20,500		MK-2	243,000	145,000
20,750		MK-2	243,000	145,000
21,000		MK-2	243,000	145,000
21,250		MK-2	248,000	150,000
21,500		MK-2	248,000	150,000
21,750		MK-2	248,000	150,000
22,000		MK-2	248,000	150,000
22,100		MK-2	248,000	150,000
22,200		MK-2	248,000	150,000
22,250		MK-2	248,000	150,000
22,500		MK-2	253,000	155,000
22,750		MK-2	253,000	155,000
23,000		MK-2	253,000	155,000
23,250		MK-3	276,000	155,000
23,500		MK-3	276,000	155,000
23,750		MK-3	281,000	160,000
24,000		MK-3	281,000	160,000
24,250		MK-3	281,000	160,000
24,500		MK-3	281,000	160,000
24,750		MK-3	281,000	160,000
25,000	63/64	MK-3	281,000	160,000
25,200		MK-3	286,000	165,000
25,250		MK-3	286,000	165,000
25,400	1	MK-3	286,000	165,000
25,500		MK-3	286,000	165,000
25,750		MK-3	286,000	165,000
25,800	1 1/64	MK-3	286,000	165,000
26,000		MK-3	286,000	165,000
26,250		MK-3	286,000	165,000
26,500		MK-3	286,000	165,000
27,000		MK-3	291,000	170,000
27,250		MK-3	291,000	170,000
27,500		MK-3	291,000	170,000
27,750		MK-3	291,000	170,000
28,000		MK-3	291,000	170,000
28,250		MK-3	296,000	175,000
28,500		MK-3	296,000	175,000
28,750		MK-3	296,000	175,000
29,000		MK-3	296,000	175,000
29,250		MK-3	296,000	175,000
29,500		MK-3	296,000	175,000
29,750		MK-3	296,000	175,000
30,000		MK-3	296,000	175,000
30,250		MK-3	301,000	180,000
30,500		MK-3	301,000	180,000
30,600		MK-3	301,000	180,000
30,750		MK-3	301,000	180,000
31,000		MK-3	301,000	180,000
31,250		MK-3	301,000	180,000
31,500		MK-3	301,000	180,000
31,750	1 1/4	MK-3	306,000	185,000
32,000		MK-4	334,000	185,000
32,500		MK-4	334,000	185,000
33,000		MK-4	334,000	185,000
33,500		MK-4	334,000	185,000
34,000		MK-4	339,000	190,000
34,500		MK-4	339,000	190,000
35,000		MK-4	339,000	190,000
35,500		MK-4	339,000	190,000
36,000		MK-4	344,000	195,000
36,500		MK-4	344,000	195,000
37,000		MK-4	344,000	195,000
37,500		MK-4	344,000	195,000
38,000		MK-4	349,000	200,000
38,500	1 33/64	MK-4	349,000	200,000
39,000		MK-4	349,000	200,000
39,500		MK-4	349,000	200,000
40,000		MK-4	349,000	200,000
40,500		MK-4	354,000	205,000
41,000		MK-4	354,000	205,000
41,500		MK-4	354,000	205,000
42,000		MK-4	354,000	205,000
42,500		MK-4	354,000	205,000
43,000		MK-4	359,000	210,000
43,500		MK-4	359,000	210,000
44,000		MK-4	359,000	210,000
44,500		MK-4	359,000	210,000
45,000		MK-4	359,000	210,000
45,500		MK-4	364,000	215,000
46,000		MK-4	364,000	215,000
46,500		MK-4	364,000	215,000
47,000		MK-4	364,000	215,000
47,500		MK-4	364,000	215,000
48,000		MK-4	369,000	220,000
48,500		MK-4	369,000	220,000
49,000		MK-4	369,000	220,000
49,500		MK-4	369,000	220,000
50,000		MK-4	369,000	220,000
50,500		MK-4	374,000	225,000
51,000		MK-5	412,000	225,000
52,000		MK-5	412,000	225,000
53,000		MK-5	412,000	225,000
54,000		MK-5	417,000	230,000
55,000		MK-5	417,000	230,000
56,000		MK-5	417,000	230,000
56,500		MK-5	422,000	235,000
57,000		MK-5	422,000	235,000
58,000		MK-5	422,000	235,000
59,000		MK-5	422,000	235,000
60,000		MK-5	422,000	235,000
62,000		MK-5	427,000	240,000
63,000		MK-5	427,000	240,000
65,000		MK-5	432,000	245,000
70,000		MK-5	437,000	250,000
75,000		MK-5	442,000	255,000

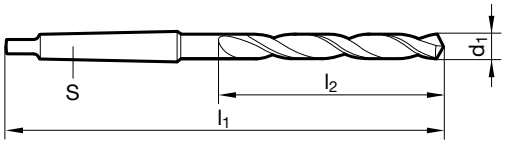
Forets hélicoïdaux

N° d'article 82030

P	M	K	N	S	H
			•		

HSS | ○ | W | ~5xD | DIN 345 | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 15,000 • affûtage à dépouille conique
matières tendres et à copeaux longs • aluminium/alliages d'aluminium à copeaux longs • zinc, cuivre de 1ère fusion, Alpax, électrode



d1 mm	S	l1 mm	l2 mm
6,800	MK-1	150,000	69,000
8,500	MK-1	156,000	75,000
9,000	MK-1	162,000	81,000
9,500	MK-1	162,000	81,000
10,000	MK-1	168,000	87,000
12,000	MK-1	182,000	101,000

d1 mm	S	l1 mm	l2 mm
15,000	MK-2	212,000	114,000
24,300	MK-3	281,000	160,000
30,500	MK-3	301,000	180,000

Forets hélicoïdaux

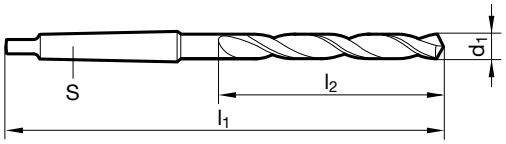
N° d'article 84460

P	M	K	N	S	H
●		●	○		

HSS | T | N | ~5xD | DIN 345 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 5,500 • affûtage à dépouille conique

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



d1 mm	inch	S	l1 mm	l2 mm
8,000		MK-1	156,000	75,000
8,500		MK-1	156,000	75,000
9,000		MK-1	162,000	81,000
9,500		MK-1	162,000	81,000
10,000		MK-1	168,000	87,000
10,200		MK-1	168,000	87,000
10,250		MK-1	168,000	87,000
10,500		MK-1	168,000	87,000
10,750		MK-1	175,000	94,000
11,000		MK-1	175,000	94,000
11,250		MK-1	175,000	94,000
11,500		MK-1	175,000	94,000
12,000		MK-1	182,000	101,000
12,500		MK-1	182,000	101,000
12,750		MK-1	182,000	101,000
13,000		MK-1	182,000	101,000
13,250		MK-1	189,000	108,000
13,500		MK-1	189,000	108,000
13,750		MK-1	189,000	108,000
14,000		MK-1	189,000	108,000
14,250		MK-2	212,000	114,000
14,500		MK-2	212,000	114,000
14,750		MK-2	212,000	114,000
15,000		MK-2	212,000	114,000
15,500		MK-2	218,000	120,000
16,000		MK-2	218,000	120,000
16,250		MK-2	223,000	125,000
16,500		MK-2	223,000	125,000
17,000		MK-2	223,000	125,000
17,500		MK-2	228,000	130,000

d1 mm	inch	S	l1 mm	l2 mm
18,000		MK-2	228,000	130,000
18,500		MK-2	233,000	135,000
19,000		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
23,000		MK-2	253,000	155,000
24,000		MK-3	281,000	160,000
24,500		MK-3	281,000	160,000
25,000	63/64	MK-3	281,000	160,000
25,500		MK-3	286,000	165,000
26,000		MK-3	286,000	165,000
26,500		MK-3	286,000	165,000
27,000		MK-3	291,000	170,000
28,000		MK-3	291,000	170,000
28,500		MK-3	296,000	175,000
29,000		MK-3	296,000	175,000
29,500		MK-3	296,000	175,000
30,000		MK-3	296,000	175,000

Forets hélicoïdaux

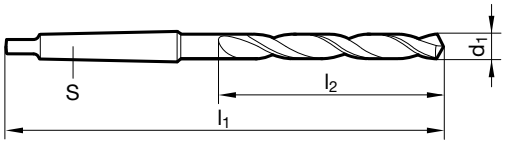
N° d'article 82011

P	M	K	N	S	H
●	○	●	○		

HSS-E | N | ~5xD | DIN 345 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 5,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure

aciers, alliés ou non alliés, et fontes > 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	inch	S	l1 mm	l2 mm
5,000		MK-1	133,000	52,000
6,000		MK-1	138,000	57,000
7,000		MK-1	150,000	69,000
7,500		MK-1	150,000	69,000
8,000		MK-1	156,000	75,000
8,500		MK-1	156,000	75,000
9,000		MK-1	162,000	81,000
9,500		MK-1	162,000	81,000
10,000		MK-1	168,000	87,000
10,250		MK-1	168,000	87,000
10,500		MK-1	168,000	87,000
11,000		MK-1	175,000	94,000
11,500		MK-1	175,000	94,000
12,000		MK-1	182,000	101,000
12,200		MK-1	182,000	101,000
12,250		MK-1	182,000	101,000
12,500		MK-1	182,000	101,000
12,750		MK-1	182,000	101,000
13,000		MK-1	182,000	101,000
13,200		MK-1	182,000	101,000
13,500		MK-1	189,000	108,000
13,800		MK-1	189,000	108,000
14,000		MK-1	189,000	108,000
14,200		MK-2	212,000	114,000
14,290	9/16	MK-2	212,000	114,000
14,500		MK-2	212,000	114,000
14,750		MK-2	212,000	114,000
15,000		MK-2	212,000	114,000
15,250		MK-2	218,000	120,000
15,500		MK-2	218,000	120,000
15,750		MK-2	218,000	120,000
16,000		MK-2	218,000	120,000
16,250		MK-2	223,000	125,000
16,500		MK-2	223,000	125,000
16,750		MK-2	223,000	125,000
17,000		MK-2	223,000	125,000
17,250		MK-2	228,000	130,000
17,460	11/16	MK-2	228,000	130,000
17,500		MK-2	228,000	130,000
17,750		MK-2	228,000	130,000
18,000		MK-2	228,000	130,000
18,200		MK-2	233,000	135,000

d1 mm	inch	S	l1 mm	l2 mm
18,500		MK-2	233,000	135,000
19,000		MK-2	233,000	135,000
19,050	3/4	MK-2	238,000	140,000
19,500		MK-2	238,000	140,000
20,000		MK-2	238,000	140,000
20,500		MK-2	243,000	145,000
20,750		MK-2	243,000	145,000
21,000		MK-2	243,000	145,000
21,500		MK-2	248,000	150,000
22,000		MK-2	248,000	150,000
22,500		MK-2	253,000	155,000
23,000		MK-2	253,000	155,000
23,500		MK-3	276,000	155,000
24,000		MK-3	281,000	160,000
24,500		MK-3	281,000	160,000
25,000	63/64	MK-3	281,000	160,000
25,250		MK-3	286,000	165,000
25,500		MK-3	286,000	165,000
26,000		MK-3	286,000	165,000
26,500		MK-3	286,000	165,000
27,000		MK-3	291,000	170,000
27,500		MK-3	291,000	170,000
28,000		MK-3	291,000	170,000
28,500		MK-3	296,000	175,000
28,570	1 1/8	MK-3	296,000	175,000
29,000		MK-3	296,000	175,000
29,500		MK-3	296,000	175,000
30,000		MK-3	296,000	175,000
31,000		MK-3	301,000	180,000
31,500		MK-3	301,000	180,000
32,000		MK-4	334,000	185,000
33,000		MK-4	334,000	185,000
34,000		MK-4	339,000	190,000
35,000		MK-4	339,000	190,000
36,000		MK-4	344,000	195,000
38,000		MK-4	349,000	200,000
40,000		MK-4	349,000	200,000
50,000		MK-4	369,000	220,000

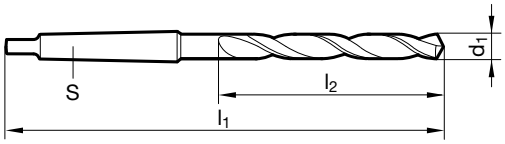
Forets hélicoïdaux

N° d'article 82012

P	M	K	N	S	H
○	●		○	●	

HSS-E | ◯ | IS | ~5xD | DIN 345 | 130° | h8 | R | MK

forets INOX • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure
aciers austénit., inox., inaltérablesaux acides, réfractaires (V2A et V4A)



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

Forets hélicoïdaux

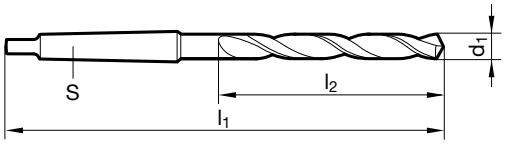
N° d'article 84660

P	M	K	N	S	H
○		●	○		

HSS-E | A | FN | ~5xD | DIN 345 | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 14,200 • affûtage à dépouille conique • goujures larges • acier rapide au Co • résistance à l´usure, améliorée • parfait pour les profondeurs > 3xD

aciers, alliés ou non alliés, et fontes > 1000 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	S	l1 mm	l2 mm
19,000	MK-2	233,000	135,000
19,500	MK-2	238,000	140,000

d1 mm	S	l1 mm	l2 mm

Forets hélicoïdaux

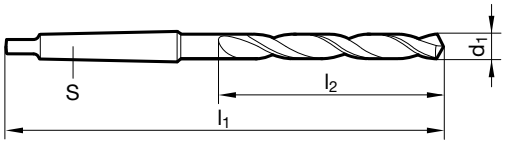
N° d'article 84859

P	M	K	N	S	H
●	○	●	○		

HSS-E | T | N | ~5xD | DIN 345 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 8,000 • affûtage à dépouille conique • acier rapide au Co • résistance à l´usure, améliorée

aciers, alliés ou non alliés, et fontes > 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	S	l1 mm	l2 mm
8,000	MK-1	156,000	75,000
10,000	MK-1	168,000	87,000
11,000	MK-1	175,000	94,000
12,000	MK-1	182,000	101,000
13,000	MK-1	182,000	101,000
14,000	MK-1	189,000	108,000

d1 mm	S	l1 mm	l2 mm
15,000	MK-2	212,000	114,000
23,000	MK-2	253,000	155,000

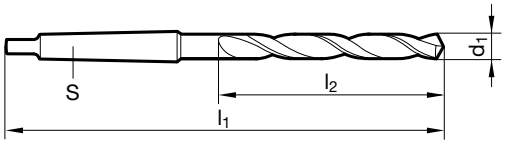
Forets hélicoïdaux courts

N° d'article 82971

P	M	K	N	S	H
●	●	●	○	●	○

HSS-E | V | ~3xD | WN | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 10,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure
mat. difficiles à usiner • aciers inoxydables, inaltérables aux acides • aciers à ressorts, aciers austénitiques



d1 mm	S	l1 mm	l2 mm
10,000	MK-1	138,000	57,000
10,200	MK-1	138,000	57,000
10,500	MK-1	138,000	57,000
11,500	MK-1	142,000	61,000
12,000	MK-1	147,000	66,000
12,500	MK-1	147,000	66,000
13,000	MK-1	147,000	66,000
13,500	MK-2	168,000	70,000
14,000	MK-2	168,000	70,000
14,500	MK-2	172,000	74,000
15,000	MK-2	172,000	74,000
15,500	MK-2	176,000	78,000
16,000	MK-2	176,000	78,000
17,000	MK-2	179,000	81,000
17,500	MK-2	183,000	85,000
18,000	MK-2	183,000	85,000
18,500	MK-2	186,000	88,000
19,000	MK-2	186,000	88,000

d1 mm	S	l1 mm	l2 mm
20,000	MK-3	212,000	91,000
21,000	MK-3	216,000	95,000
21,500	MK-3	219,000	98,000
22,000	MK-3	219,000	98,000
23,000	MK-3	222,000	101,000
24,000	MK-3	225,000	104,000
25,000	MK-3	225,000	104,000
26,000	MK-4	256,000	107,000
27,000	MK-4	259,000	110,000
28,000	MK-4	259,000	110,000

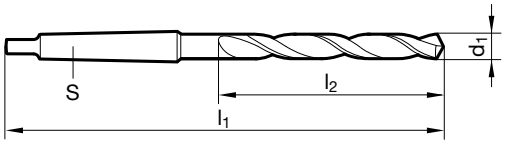
Forets hélicoïdaux courts

N° d'article 82972

P	M	K	N	S	H
○	●		○	○	

HSS-E | IS | ~3xD | WN | 130° | h8 | R | MK

forets INOX • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure
aciers austénit., inox., inaltérablesaux acides, réfractaires (V2A et V4A)



d1 mm	S	l1 mm	l2 mm
10,000	MK-1	138,000	57,000
10,500	MK-1	138,000	57,000
10,800	MK-1	142,000	61,000
11,500	MK-1	142,000	61,000
11,800	MK-1	142,000	61,000
12,000	MK-1	147,000	66,000
15,000	MK-2	172,000	74,000
19,750	MK-3	212,000	91,000
21,750	MK-3	219,000	98,000
22,750	MK-3	222,000	101,000
26,000	MK-4	256,000	107,000
27,000	MK-4	259,000	110,000

d1 mm	S	l1 mm	l2 mm
27,500	MK-4	259,000	110,000
28,500	MK-4	263,000	114,000
29,000	MK-4	263,000	114,000
29,500	MK-4	263,000	114,000
30,500	MK-4	266,000	117,000
31,000	MK-4	266,000	117,000

N° d'article 82191

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 120° | h6 | R | MK

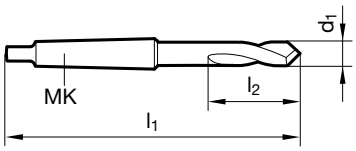
affûtage à dépouille conique • seulement prévu pour amorcer un perçage
• particulièrement rigide

N° d'article 82192

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 90° | h6 | R | MK

affûtage à dépouille conique • seulement prévu pour amorcer un perçage
• particulièrement rigide



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

HARTNER

Forets hélicoïdaux longs

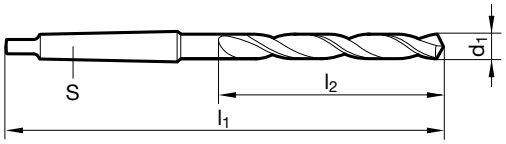
N° d'article 82210

P	M	K	N	S	H
●		●	○		

HSS | N | ~10xD | DIN 341 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 14,500 • affûtage à dépouille conique • pour le perçage avec canons de perçage

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté, maillechort, graphite



d1 mm	inch	S	l1 mm	l2 mm
4,000		MK-1	145,000	64,000
4,200		MK-1	145,000	64,000
5,000		MK-1	155,000	74,000
5,200		MK-1	155,000	74,000
5,500		MK-1	161,000	80,000
6,000		MK-1	161,000	80,000
6,500		MK-1	167,000	86,000
6,800		MK-1	174,000	93,000
7,800		MK-1	181,000	100,000
8,000		MK-1	181,000	100,000
8,200		MK-1	181,000	100,000
8,500		MK-1	181,000	100,000
9,000		MK-1	188,000	107,000
9,900		MK-1	197,000	116,000
10,000		MK-1	197,000	116,000
10,200		MK-1	197,000	116,000
10,500		MK-1	197,000	116,000
11,000		MK-1	206,000	125,000
11,500		MK-1	206,000	125,000
11,800		MK-1	206,000	125,000
12,000		MK-1	215,000	134,000
12,500		MK-1	215,000	134,000
13,000		MK-1	215,000	134,000
13,500		MK-1	223,000	142,000
13,750		MK-1	223,000	142,000
14,000		MK-1	223,000	142,000
14,500		MK-2	245,000	147,000
14,750		MK-2	245,000	147,000
15,000		MK-2	245,000	147,000
15,500		MK-2	251,000	153,000
15,750		MK-2	251,000	153,000
16,000		MK-2	251,000	153,000
16,500		MK-2	257,000	159,000
17,000		MK-2	257,000	159,000
17,250		MK-2	263,000	165,000
17,500		MK-2	263,000	165,000
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

d1 mm	inch	S	l1 mm	l2 mm
21,000		MK-2	282,000	184,000
21,400		MK-2	289,000	191,000
21,500		MK-2	289,000	191,000
22,000		MK-2	289,000	191,000
22,500		MK-2	296,000	198,000
23,000		MK-2	296,000	198,000
23,250		MK-3	319,000	198,000
24,000		MK-3	327,000	206,000
24,500		MK-3	327,000	206,000
25,000	63/64	MK-3	327,000	206,000
25,500		MK-3	335,000	214,000
26,000		MK-3	335,000	214,000
26,500		MK-3	335,000	214,000
27,000		MK-3	343,000	222,000
27,500		MK-3	343,000	222,000
28,000		MK-3	343,000	222,000
29,000		MK-3	351,000	230,000
29,500		MK-3	351,000	230,000
30,000		MK-3	351,000	230,000
31,000		MK-3	360,000	239,000
32,000		MK-4	397,000	248,000
33,000		MK-4	397,000	248,000
34,000		MK-4	406,000	257,000
35,000		MK-4	406,000	257,000
36,000		MK-4	416,000	267,000
37,000		MK-4	416,000	267,000
38,000		MK-4	426,000	277,000
39,000		MK-4	426,000	277,000
39,500		MK-4	426,000	277,000
40,000		MK-4	426,000	277,000
41,000		MK-4	436,000	287,000
42,000		MK-4	436,000	287,000
44,000		MK-4	447,000	298,000
45,000		MK-4	447,000	298,000
48,000		MK-4	470,000	321,000
49,000		MK-4	470,000	321,000
50,000		MK-4	470,000	321,000

Forets hélicoïdaux longs

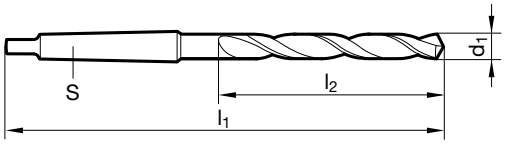
N° d'article 82211

P	M	K	N	S	H
●	○	●	●	○	

HSS-E | N | ~10xD | DIN 341 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 5,000 • affûtage à dépouille conique • acier rapide au Co • meilleure résistance à l´usure • pour le perçage avec canons de perçage

aciers, alliés ou non alliés, et fontes > 800 N/mm² • aciers à outils, travail à froid et à chaud • aciers à roulement • aciers hautement alliés • aciers de cémentation et d'amélioration



d1 mm	inch	S	l1 mm	l2 mm
5,000		MK-1	155,000	74,000
6,800		MK-1	174,000	93,000
8,500		MK-1	181,000	100,000
10,000		MK-1	197,000	116,000
10,200		MK-1	197,000	116,000
11,500		MK-1	206,000	125,000
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
18,000		MK-2	263,000	165,000

d1 mm	inch	S	l1 mm	l2 mm
20,000		MK-2	275,000	177,000
25,000	63/64	MK-3	327,000	206,000
30,000		MK-3	351,000	230,000

HARTNER

Forets hélicoïdaux extra-longs, série 1

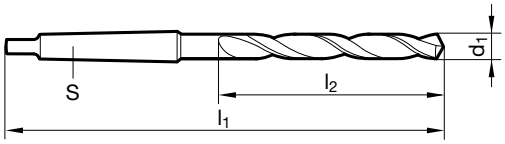
N° d'article 82310

P	M	K	N	S	H
●		●	○		

HSS | N | ~15xD | DIN 1870 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 8,500 • affûtage à dépouille conique • pour les perçages très profonds

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



d1 mm	S	l1 mm	l2 mm
8,500	MK-1	265,000	165,000
9,000	MK-1	275,000	175,000
9,500	MK-1	275,000	175,000
10,000	MK-1	285,000	185,000
10,200	MK-1	285,000	185,000
11,000	MK-1	300,000	195,000
11,800	MK-1	300,000	195,000
12,500	MK-1	310,000	205,000
13,000	MK-1	310,000	205,000
14,000	MK-1	325,000	220,000
14,500	MK-2	340,000	220,000
15,000	MK-2	340,000	220,000
15,750	MK-2	355,000	230,000
15,800	MK-2	355,000	230,000
16,000	MK-2	355,000	230,000
16,250	MK-2	355,000	230,000
17,000	MK-2	355,000	230,000
17,500	MK-2	370,000	245,000
17,750	MK-2	370,000	245,000
18,000	MK-2	370,000	245,000
18,500	MK-2	370,000	245,000
19,000	MK-2	370,000	245,000
20,000	MK-2	385,000	260,000
21,000	MK-2	385,000	260,000

d1 mm	S	l1 mm	l2 mm
22,000	MK-2	405,000	270,000
22,500	MK-2	405,000	270,000
23,000	MK-2	405,000	270,000
23,500	MK-3	425,000	270,000
24,000	MK-3	440,000	290,000
24,500	MK-3	440,000	290,000
25,000	MK-3	440,000	290,000
26,000	MK-3	440,000	290,000
26,500	MK-3	440,000	290,000
30,000	MK-3	460,000	305,000
30,500	MK-3	480,000	320,000
33,000	MK-4	505,000	320,000
38,000	MK-4	555,000	360,000

Forets hélicoïdaux extra-longs, série 1

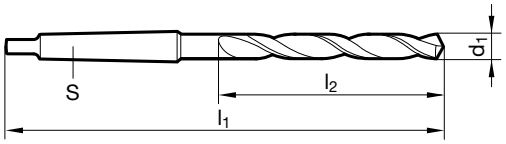
N° d'article 82340

P	M	K	N	S	H
•		•	•		

HSS | >Ø 16,0 | FN | ~15xD | DIN 1870 | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 8,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	inch	S	l1 mm	l2 mm
8,000		MK-1	265,000	165,000
8,500		MK-1	265,000	165,000
9,000		MK-1	275,000	175,000
10,000		MK-1	285,000	185,000
10,500		MK-1	285,000	185,000
11,000		MK-1	300,000	195,000
11,500		MK-1	300,000	195,000
12,000		MK-1	310,000	205,000
12,500		MK-1	310,000	205,000
13,000		MK-1	310,000	205,000
13,500		MK-1	325,000	220,000
14,000		MK-1	325,000	220,000
14,500		MK-2	340,000	220,000
15,000		MK-2	340,000	220,000
15,500		MK-2	355,000	230,000
16,000		MK-2	355,000	230,000
16,500		MK-2	355,000	230,000
17,000		MK-2	355,000	230,000

d1 mm	inch	S	l1 mm	l2 mm
17,500		MK-2	370,000	245,000
18,000		MK-2	370,000	245,000
19,000		MK-2	370,000	245,000
19,500		MK-2	385,000	260,000
20,000		MK-2	385,000	260,000
20,500		MK-2	385,000	260,000
21,000		MK-2	385,000	260,000
22,000		MK-2	405,000	270,000
23,000		MK-2	405,000	270,000
24,000		MK-3	440,000	290,000
25,000	63/64	MK-3	440,000	290,000
26,000		MK-3	440,000	290,000
28,000		MK-3	460,000	305,000
29,000		MK-3	460,000	305,000
30,000		MK-3	460,000	305,000

Forets hélicoïdaux extra-longs, série 1

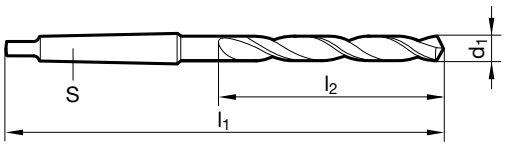
N° d'article 82341

P	M	K	N	S	H
●	●	●	●	●	○

HSS-E | >Ø 16,0 | FN | ~15xD | DIN 1870 | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 10,000 • affûtage à dépouille conique • goujures larges • meilleure résistance à l´usure • acier rapide au Co • pour les perçages très profonds
• en cas de mauvaise évacuation des copeaux

aciers et fontes aciérées à haute résistance • fontes grises, fontes malléables, fontes à graphite sphéroïdal



d1 mm	S	l1 mm	l2 mm
10,000	MK-1	285,000	185,000
12,000	MK-1	310,000	205,000
12,500	MK-1	310,000	205,000
13,000	MK-1	310,000	205,000
14,000	MK-1	325,000	220,000
15,000	MK-2	340,000	220,000

d1 mm	S	l1 mm	l2 mm
16,000	MK-2	355,000	230,000
16,500	MK-2	355,000	230,000
17,000	MK-2	355,000	230,000
18,000	MK-2	370,000	245,000
19,000	MK-2	370,000	245,000
20,000	MK-2	385,000	260,000

HARTNER

Forets hélicoïdaux extra-longs, série 2

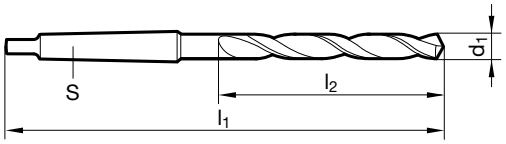
N° d'article 82410

P	M	K	N	S	H
●		●	○		

HSS | N | ~20xD | DIN 1870 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 8,500 • affûtage à dépouille conique • pour les perçages très profonds

acier, fonte aciérée (alliée / non alliée) • fontes grises, fontes malléables, fontes à graphite sphéroïdal • fer fritté et graphite



d1 mm	inch	S	l1 mm	l2 mm
8,500		MK-1	330,000	210,000
9,000		MK-1	345,000	220,000
9,500		MK-1	345,000	220,000
10,000		MK-1	360,000	235,000
10,500		MK-1	360,000	235,000
11,000		MK-1	375,000	250,000
11,750		MK-1	375,000	250,000
11,800		MK-1	375,000	250,000
13,000		MK-1	395,000	260,000
13,500		MK-1	410,000	275,000
14,000		MK-1	410,000	275,000
14,500		MK-2	425,000	275,000
15,000		MK-2	425,000	275,000
15,500		MK-2	445,000	295,000
15,750		MK-2	445,000	295,000
16,000		MK-2	445,000	295,000
16,250		MK-2	445,000	295,000
18,000		MK-2	465,000	310,000

d1 mm	inch	S	l1 mm	l2 mm
19,000		MK-2	465,000	310,000
20,000		MK-2	490,000	325,000
21,000		MK-2	490,000	325,000
22,000		MK-2	515,000	345,000
23,000		MK-2	515,000	345,000
25,000	63/64	MK-3	555,000	365,000
28,000		MK-3	580,000	385,000
30,000		MK-3	580,000	385,000

HARTNER

Forets hélicoïdaux extra-longs, série 2

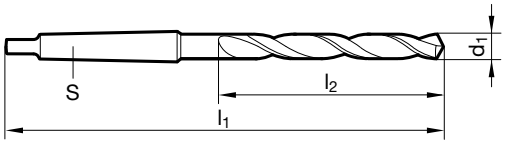
N° d'article 82440

P	M	K	N	S	H
•		•	•		

HSS | >Ø 16,0 | FN | ~20xD | DIN 1870 | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 8,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	inch	S	l1 mm	l2 mm
8,000		MK-1	330,000	210,000
8,500		MK-1	330,000	210,000
9,500		MK-1	345,000	220,000
10,000		MK-1	360,000	235,000
10,500		MK-1	360,000	235,000
11,000		MK-1	375,000	250,000
12,000		MK-1	395,000	260,000
12,500		MK-1	395,000	260,000
13,000		MK-1	395,000	260,000
13,500		MK-1	410,000	275,000
14,000		MK-1	410,000	275,000
14,500		MK-2	425,000	275,000
15,000		MK-2	425,000	275,000
15,500		MK-2	445,000	295,000
16,000		MK-2	445,000	295,000
16,500		MK-2	445,000	295,000
17,000		MK-2	445,000	295,000
17,500		MK-2	465,000	310,000

d1 mm	inch	S	l1 mm	l2 mm
18,000		MK-2	465,000	310,000
18,500		MK-2	465,000	310,000
19,000		MK-2	465,000	310,000
19,500		MK-2	490,000	325,000
20,000		MK-2	490,000	325,000
20,500		MK-2	490,000	325,000
21,000		MK-2	490,000	325,000
21,500		MK-2	515,000	345,000
22,000		MK-2	515,000	345,000
23,000		MK-2	515,000	345,000
24,000		MK-3	555,000	365,000
25,000	63/64	MK-3	555,000	365,000
26,000		MK-3	555,000	365,000
28,000		MK-3	580,000	385,000
29,000		MK-3	580,000	385,000
30,000		MK-3	580,000	385,000

HARTNER

Forets hélicoïdaux extra-longs

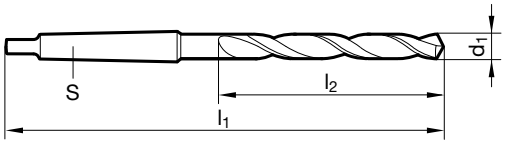
N° d'article 82466

P	M	K	N	S	H
•		•	•		

HSS | >Ø 16,0 | FN | >20xD | WN | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 8,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	S	l1 mm	l2 mm
8,000	MK-1	500,000	420,000
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

d1 mm	S	l1 mm	l2 mm
20,000	MK-2	500,000	400,000

HARTNER

Forets hélicoïdaux extra-longs

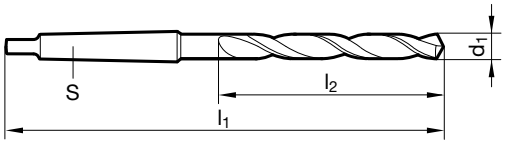
N° d'article 82467

P	M	K	N	S	H
•		•	•		

HSS | >Ø 16,0 | FN | 20xD | WN | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 14,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



d1 mm	S	l1 mm	l2 mm
14,000	MK-1	600,000	500,000
15,000	MK-2	600,000	500,000
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

d1 mm	S	l1 mm	l2 mm
32,000	MK-4	600,000	450,000
35,000	MK-4	600,000	450,000
38,000	MK-4	600,000	450,000

HARTNER

Forets hélicoïdaux extra-longs

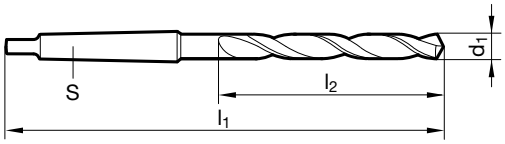
N° d'article 82468

P	M	K	N	S	H
•		•	•		

HSS | ○ | FN | >20xD | WN | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 14,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



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

d1 mm	S	l1 mm	l2 mm

HARTNER

Forets hélicoïdaux extra-longs

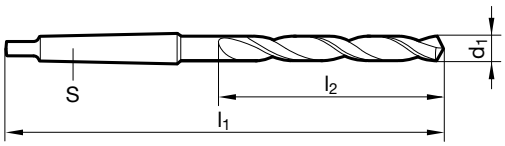
N° d'article 82469

P	M	K	N	S	H
•		•	•		

HSS | ◯ | FN | >20xD | WN | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 15,000 • affûtage à dépouille conique • goujures larges • pour les perçages très profonds • en cas de mauvaise évacuation des copeaux

fontes grises et aciers jusqu'à 1000 N/mm² • Ne pas utiliser pour les aciers CrNi et les aciers inox



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

d1 mm	S	l1 mm	l2 mm

HARTNER

Forets avec canaux de refroidissment, longs

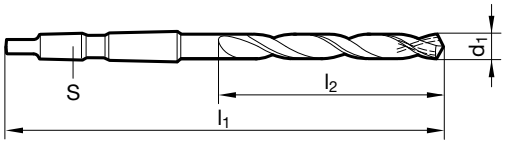
N° d'article 82521

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | ~10xD | WN | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 10,000 • affûtage à dépouille conique • adduction axiale du liquide de refroid. p. le CM • pour le perçage avec canons de perçage

tôles superposées • acier et fonte aciérée, fonte grise • aciers austénitiques jusqu'à 800 N/mm²



d1 mm	S	l1 mm	l2 mm
10,000	MK-2	233,000	116,000
11,000	MK-2	242,000	125,000
12,000	MK-2	251,000	134,000
13,000	MK-2	251,000	134,000
13,200	MK-2	251,000	134,000
13,500	MK-2	259,000	142,000
13,800	MK-2	259,000	142,000
14,000	MK-2	259,000	142,000
15,000	MK-2	264,000	147,000
16,000	MK-2	270,000	153,000
17,000	MK-2	276,000	159,000
18,000	MK-2	282,000	165,000
18,500	MK-3	307,000	171,000
18,750	MK-3	307,000	171,000
19,000	MK-3	307,000	171,000
19,500	MK-3	313,000	177,000
20,000	MK-3	313,000	177,000
21,000	MK-3	320,000	184,000

d1 mm	S	l1 mm	l2 mm
22,000	MK-3	327,000	191,000
23,000	MK-3	334,000	198,000
24,000	MK-3	342,000	206,000
25,000	MK-3	342,000	206,000
26,000	MK-3	350,000	214,000
26,500	MK-3	350,000	214,000
27,000	MK-4	385,000	222,000
28,000	MK-4	385,000	222,000
29,000	MK-4	393,000	230,000
30,000	MK-4	393,000	230,000
32,000	MK-4	421,000	248,000
34,000	MK-4	430,000	257,000
35,000	MK-4	430,000	257,000
40,000	MK-4	450,000	277,000

Forets avec canaux de refroidissment, longs

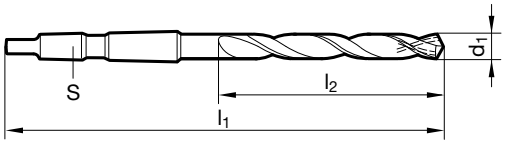
N° d'article 82535

P	M	K	N	S	H
●	○	●	●		

HSS | FN | ~10xD | WN | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 10,000 • affûtage à dépouille conique • adduction axiale du liquide de refroid. p. le CM • pour le perçage avec canons de perçage

tôles superposées • acier et fonte aciérée, fonte grise • aciers austénitiques jusqu'à 800 N/mm²



d1 mm	S	l1 mm	l2 mm
10,000	MK-2	224,000	116,000
10,500	MK-2	224,000	116,000
11,000	MK-2	233,000	125,000
11,500	MK-2	233,000	125,000
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

d1 mm	S	l1 mm	l2 mm
18,500	MK-3	303,000	171,000
19,000	MK-3	303,000	171,000
19,500	MK-3	309,000	177,000
20,000	MK-3	309,000	177,000

Forets avec canaux de refroidissment, longs

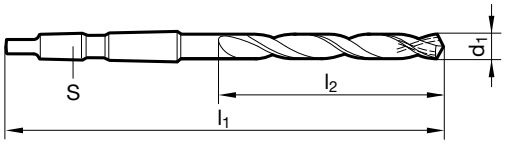
N° d'article 82525

P	M	K	N	S	H
●	●	●	●	●	○

HSS-E | FN | ~10xD | WN | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 15,000 • affûtage à dépouille conique • adduction axiale du liquide de refroid. p. le CM • acier rapide au Co • meilleure résistance à l´usure • pour le perçage avec canons de perçage

aciers tenaces et aciers à haute résistance • fontes aciérées, fontes grises • aciers inox., inaltérables aux acides et réfractaires • résistance jusqu'à 1300 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				

Forets avec canaux de refroidissment, extra longs

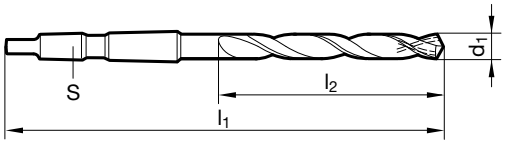
N° d'article 82515

P	M	K	N	S	H
●	●	●	●	●	○

HSS-E | FN | ~15xD | WN | 130° | h8 | R | MK

amin. de l'âme ≥ Ø 14,000 • affûtage à dépouille conique • adduction axiale du liquide de refroid. p. le CM • acier rapide au Co • meilleure résistance à l´usure • pour le perçage avec canons de perçage

aciers tenaces et aciers à haute résistance • fontes aciérées, fontes grises • aciers inox., inaltérables aux acides et réfractaires • résistance jusqu'à 1300 N/mm²



d1 mm	S	l1 mm	l2 mm
14,000	MK-2	337,000	220,000
16,000	MK-2	347,000	230,000
18,000	MK-2	362,000	245,000
20,000	MK-3	396,000	260,000

d1 mm	S	l1 mm	l2 mm

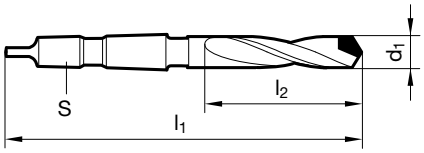
Forets spéciaux avec arêtes de coupe CW

N° d'article 89302

P	M	K	N	S	H
○		○			○

HM | ◯ | N | DIN 8041 | 118° | h8 | R | MK | | |

amin. de l'âme ≥ Ø 8,500 • affûtage en pente • à plaquette(s) cw rapportée(s)
bande d´acier à ressorts • fontes dures > 300 HB • molybdène pur • bronzes tenaces et durs



d1 mm	S	l1 mm	l2 mm
8,500	MK-1	135,000	45,000
10,000	MK-1	140,000	50,000
10,200	MK-1	140,000	50,000
10,500	MK-1	140,000	50,000
11,000	MK-1	140,000	50,000
11,500	MK-1	146,000	56,000
12,000	MK-1	146,000	56,000
12,500	MK-1	146,000	56,000
13,000	MK-1	146,000	56,000
13,500	MK-2	168,000	63,000
14,000	MK-2	168,000	63,000
14,500	MK-2	168,000	63,000
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

d1 mm	S	l1 mm	l2 mm
18,000	MK-2	185,000	80,000
19,000	MK-2	185,000	80,000
20,000	MK-3	215,000	90,000
21,500	MK-3	215,000	90,000
22,000	MK-3	215,000	90,000
25,000	MK-3	225,000	100,000
26,500	MK-4	260,000	110,000
27,000	MK-4	260,000	110,000
29,000	MK-4	275,000	125,000
30,000	MK-4	275,000	125,000
32,000	MK-4	275,000	125,000
33,000	MK-4	290,000	140,000
40,000	MK-4	310,000	160,000

HARTNER

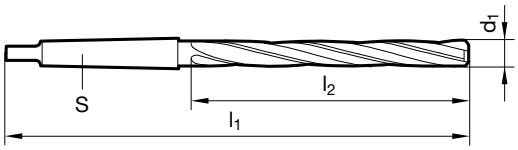
Forets aléseurs, queue CM

N° d'article 86110

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 343 | 120° | R | MK

affûtage à dépouille conique • 3 dents • particulièrement rigide • pour les perçages préalablement coulés, percés ou estampés • précision d´alignement corrigée • erreur de circularité corrigée • état de surface du perçage amélioré • Ø d´entrée < que le Ø du perçage à aléser • respecter le Ø minimum de l´avant-perçage «d0» • après le foret aléseur, alésage final optimisé



d1 mm	d0 mm	S	l1 mm	l2 mm
8,000	5,6	MK-1	156,000	75,000
9,000	6,3	MK-1	162,000	81,000
9,800	7,0	MK-1	168,000	87,000
10,000	7,0	MK-1	168,000	87,000
10,100	7,0	MK-1	168,000	87,000
11,000	7,7	MK-1	175,000	94,000
11,500	7,7	MK-1	175,000	94,000
11,750	8,4	MK-1	182,000	101,000
13,000	9,1	MK-1	182,000	101,000
13,750	9,8	MK-1	189,000	108,000
14,000	9,8	MK-1	189,000	108,000
14,100	10,5	MK-2	212,000	114,000
14,750	10,5	MK-2	212,000	114,000
15,000	10,5	MK-2	212,000	114,000
15,750	11,2	MK-2	218,000	120,000
16,000	11,2	MK-2	218,000	120,000
16,250	11,9	MK-2	223,000	125,000
16,750	11,9	MK-2	223,000	125,000
17,000	11,9	MK-2	223,000	125,000
17,750	12,6	MK-2	228,000	130,000
18,000	12,6	MK-2	228,000	130,000
18,700	13,3	MK-2	233,000	135,000
19,000	13,3	MK-2	233,000	135,000
19,700	14,0	MK-2	238,000	140,000
19,750	14,0	MK-2	238,000	140,000
20,000	14,0	MK-2	238,000	140,000
20,700	14,6	MK-2	243,000	145,000
21,000	14,6	MK-2	243,000	145,000
21,700	15,3	MK-2	248,000	150,000
22,000	15,3	MK-2	248,000	150,000

d1 mm	d0 mm	S	l1 mm	l2 mm
22,700	16,0	MK-2	253,000	155,000
23,000	16,0	MK-2	253,000	155,000
24,000	16,6	MK-3	281,000	160,000
25,000	17,3	MK-3	281,000	160,000
25,700	18,0	MK-3	286,000	165,000
26,000	18,0	MK-3	286,000	165,000
26,700	18,6	MK-3	291,000	170,000
27,000	18,6	MK-3	291,000	170,000
27,700	19,3	MK-3	291,000	170,000
28,000	19,3	MK-3	291,000	170,000
29,000	20,0	MK-3	296,000	175,000
29,700	20,5	MK-3	296,000	175,000
30,000	20,5	MK-3	296,000	175,000
31,000	21,0	MK-3	301,000	180,000
31,600	22,0	MK-4	334,000	185,000
32,000	22,0	MK-4	334,000	185,000
32,600	23,0	MK-4	334,000	185,000
33,000	23,0	MK-4	334,000	185,000
34,000	24,0	MK-4	339,000	190,000
35,000	25,0	MK-4	339,000	190,000
35,600	25,5	MK-4	344,000	195,000
36,000	25,5	MK-4	344,000	195,000
36,600	26,0	MK-4	344,000	195,000
37,600	26,5	MK-4	349,000	200,000
38,000	26,5	MK-4	349,000	200,000
39,000	27,0	MK-4	349,000	200,000
40,000	28,0	MK-4	349,000	200,000

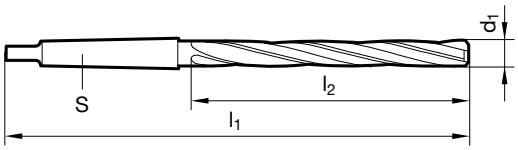
Forets aléseurs, queue CM

N° d'article 86111

P	M	K	N	S	H
●	○	●	●	○	

HSS-E | N | DIN 343 | 120° | R | MK

affûtage à dépouille conique • 3 dents • particulièrement rigide • pour les perçages préalablement coulés, percés ou estampés • précision d´alignement corrigée • erreur de circularité corrigée • état de surface du perçage amélioré • Ø d´entrée < que le Ø du perçage à aléser • respecter le Ø minimum de l´avant-perçage «d0» • après le foret aléseur, alésage final optimisé



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

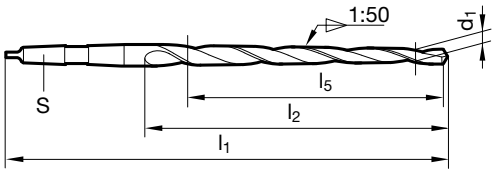
Forets de chaudronnerie

N° d'article 82810

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 1898 | 118° | R | MK

amin. de l'âme ≥ Ø 13,000 • affûtage à dépouille conique • pour les perçages coniques pour les logements de goupilles coniques selon normes DIN 1 (nouv. DIN EN 22 339), DIN 7978 (nouv. DIN EN 28 736), DIN 7977 (nouv. DIN EN 28737) et DIN 258



d1 mm	S	l1 mm	l2 mm	l5 mm
5,000	MK-1	155,000	81,000	75,000
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
12,000	MK-2	315,000	219,000	210,000
13,000	MK-2	325,000	229,000	220,000

d1 mm	S	l1 mm	l2 mm	l5 mm
14,000	MK-2	325,000	229,000	220,000
16,000	MK-2	335,000	239,000	230,000
20,000	MK-3	377,000	263,000	250,000

HARTNER

Precision Cutting Tools

Affûtage au sommet

- Affûtage conique avec tranchant concave - Rupture de copeaux courte
- Forme de coupe robuste avec protection d'arête de coupe (chanfrein négatif)

Rainure de serrage polie avec finition de surface supérieure

- Évacuation des copeaux optimale
- Réduction des forces de processus grâce à la réduction de la friction entre les copeaux et l'outil

Microgéométrie

- Préparation de l'arête de coupe par sablage humide et polissage
- Réduction des forces de coupe et des températures de processus

Quatre listels de guidage

pour une qualité de perçage optimale et une stabilité de marche maximale

TS 100 HPC

HARTNER

Precision Cutting Tools

TS-DRILLS

Outils de haute technologie, en CW polis et revêtus

TS-Drills sans trous d'huile

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
●	○	●	○	○	○	DIN 6537K	TS 100 U	**CW monobloc**	T	à droite	HE	3xD	3,000 - 19,500	**89264**	210
●	○	●	○	○	○	DIN 6537K	TS 100 U	**CW monobloc**	F	à droite	HA	3xD	3,000 - 20,000	**89413**	212
●	○	●	○	○	○	DIN 6537K	TS 100 U	**CW monobloc**	F	à droite	HE	3xD	3,000 - 20,000	**89402**	212
●				●	○	DIN 6537K	TS 100 H	**CW monobloc**	Y	à droite	HA	3xD	3,000 - 20,000	**89422**	214
●	○	●	○	○	○	DIN 6539	TS 100 U	**CW monobloc**	T	à droite	cyl.	3xD	3,000 - 16,000	**89237**	216
●	○	●	○	○	○	DIN 6539	TS 100 U	**CW monobloc**	F	à droite	cyl.	3xD	3,000 - 16,000	**89401**	216
●	○	●	○	○	○	DIN 6537L	TS 100 U	**CW monobloc**	F	à droite	HA	5xD	3,000 - 20,000	**89414**	218
●	○	●	○	○	○	DIN 6537L	TS 100 U	**CW monobloc**	F	à droite	HE	5xD	3,000 - 20,000	**89417**	218
●	○	●	○	○	○	Norme usine	TS 100 U	**CW monobloc**	T	à droite	cyl.	5xD	5,160 - 16,000	**89275**	220

TS-Drills avec refroidissement interne

●	○	○	○			DIN 6538K	TS 80 U	**CW rapportée**	T	à droite	HE	3xD	10,000 - 25,000	**89306**	221
●	○	●	○	○	○	DIN 6537K	TS 100 U	**CW monobloc**	T	à droite	HE	3xD	3,000 - 20,000	**89266**	222
●	○	●	○	○	○	DIN 6537K	TS 100 U	**CW monobloc**	F	à droite	HA	3xD	3,000 - 20,000	**89410**	223
●	○	●	○	○	○	DIN 6537K	TS 100 U	**CW monobloc**	F	à droite	HE	3xD	3,000 - 20,000	**89415**	223

TS-Drills avec refroidissement interne

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
															
●				●	○	DIN 6537K	TS 100 H	**CW monobloc**	Y	à droite	HA	3xD	3,000 - 20,000	**89423**	225
															
●				●	○	DIN 6537K	TS 100 H	**CW monobloc**	Y	à droite	HE	3xD	3,000 - 20,000	**89424**	225
															
○	●			○		DIN 6537K	TS 100 INOX	**CW monobloc**	a	à droite	HA	3xD	3,000 - 20,000	**89450**	227
															
○	●			○		DIN 6537K	TS 100 INOX	**CW monobloc**	a	à droite	HE	3xD	3,000 - 20,000	**89550**	227
															
		●	○			Norme usine	TS 150 GG	**CW monobloc**	○	à droite	HA	4xD	3,000 - 20,000	**89292**	229
															
●	○	○	○			DIN 6538M	TS 80 U	**CW rapportée**	T	à droite	HE	5xD	9,800 - 25,000	**89307**	230
															
●	○	●	○	○	○	DIN 6537L	TS 100 U	**CW monobloc**	T	à droite	HE	5xD	3,000 - 19,500	**89272**	231
															
●	○	●	○	○	○	DIN 6537L	TS 100 U	**CW monobloc**	F	à droite	HA	5xD	3,000 - 20,000	**89411**	232
															
●	○	●	○	○	○	DIN 6537L	TS 100 U	**CW monobloc**	F	à droite	HE	5xD	3,000 - 20,000	**89408**	232
															
		●				DIN 6537L	TS 100 R	**CW monobloc**	F	à droite	HA	5xD	3,000 - 20,000	**89420**	234
															
●				●	○	DIN 6537L	TS 100 H	**CW monobloc**	Y	à droite	HA	5xD	3,000 - 20,000	**89425**	236
															
●				●	○	DIN 6537L	TS 100 H	**CW monobloc**	Y	à droite	HE	5xD	3,000 - 20,000	**89426**	236
															
○	●			○		DIN 6537L	TS 100 INOX	**CW monobloc**	a	à droite	HA	5xD	3,000 - 20,000	**89451**	238
															
○	●			○		DIN 6537L	TS 100 INOX	**CW monobloc**	a	à droite	HE	5xD	3,000 - 20,000	**89551**	238

TS-Drills avec refroidissement interne

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
			●			DIN 6537L	TS 100 ALU	CW monobloc	◯	à droite	HA	5xD	3,000 - 20,000	**89560**	240
●	○	○		○	○	DIN 6537L	TS 100 HPC	CW monobloc	F	à droite	HA	5xD	3,000 - 20,000	**89460**	242
●	○	○	○			DIN 6538L	TS 80 U	CW rapportée	T	à droite	HE	7xD	10,000 - 22,000	**89308**	244
		●	○			Norme usine	TS 150 GG	CW monobloc	◯	à droite	HA	7xD	3,000 - 20,000	**89294**	245
●	○	●	○	○	○	Norme usine	TS 100 U	CW monobloc	F	à droite	HA	7xD	3,000 - 20,000	**89412**	246
●	○	●	○	○	○	Norme usine	TS 100 U	CW monobloc	F	à droite	HE	7xD	3,000 - 20,000	**89416**	246
		●				Norme usine	TS 100 R	CW monobloc	F	à droite	HA	7xD	4,000 - 20,000	**89421**	248
●				●	○	Norme usine	TS 100 H	CW monobloc	Y	à droite	HA	7xD	3,000 - 16,000	**89427**	250
●	○	○		○	○	Norme usine	TS 100 HPC	CW monobloc	F	à droite	HA	7xD	3,000 - 20,000	**89461**	251
		●	○			Norme usine	TS 150 GG	CW monobloc	◯	à droite	HA	10xD	3,000 - 20,000	**89293**	253
		○	●			Norme usine	TS 150 GG	CW monobloc	◯	à droite	HA	10xD	3,000 - 20,000	**89295**	253
●	○	●	○	○	○	Norme usine	TS 100 U	CW monobloc	F	à droite	HA	12xD	3,000 - 20,000	**89418**	255
●	●	●		○	○	Norme usine	TS 100 T	CW monobloc	A	à droite	HA	15xD	3,000 - 16,000	**86509**	257
●	●	●		○	○	Norme usine	TS 100 T	CW monobloc	A	à droite	HA	20xD	3,000 - 16,000	**86511**	258

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'ar-ticle	Progr. page

TS-Drills avec refroidissement interne

●	●	●		○	○	Norme usine	TS 100 T	**CW monobloc**	Ⓐ	à droite	HA	25xD	3,000 - 16,000	**86512**	259

●	●	●		○	○	Norme usine	TS 100 T	**CW monobloc**	Ⓐ	à droite	HA	30xD	3,000 - 14,000	**86513**	260

●	●	●		○	○	Norme usine	TS 100 T	**CW monobloc**	Ⓐ	à droite	HA	40xD	3,000 - 10,000	**86514**	261

Forets TS, 3 lèvres

		●	●			DIN 6537L	TS 3 G	**CW monobloc**	◯	à droite	HA	5xD	3,000 - 20,000	**89247**	262

		○	○			DIN 6539	TS 3 G	**CW monobloc**	◯	à droite	cyl.	5xD	3,000 - 20,000	**89239**	263

TS-Drills sans trous d‘huile

N° d’article 89264

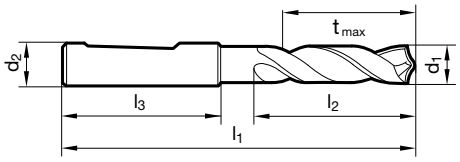
P	M	K	N	S	H
●	○	●	○	○	○

VHM | T | TS 100 U | 3xD | DIN 6537 K | 140° | m7 | R | HE

amin. de l’âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée

aciers de construction et de cémentation • aciers de décolletage, aciers d’amélioration • aciers (alliés / non alliés) jusqu’à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	62,000	20,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000
3,200		6,000	62,000	20,000	36,000
3,300		6,000	62,000	20,000	36,000
3,400		6,000	62,000	20,000	36,000
3,500		6,000	62,000	20,000	36,000
3,600		6,000	62,000	20,000	36,000
3,700		6,000	62,000	20,000	36,000
3,900		6,000	66,000	24,000	36,000
4,000		6,000	66,000	24,000	36,000
4,100		6,000	66,000	24,000	36,000
4,200		6,000	66,000	24,000	36,000
4,300		6,000	66,000	24,000	36,000
4,500		6,000	66,000	24,000	36,000
4,600		6,000	66,000	24,000	36,000
4,700		6,000	66,000	24,000	36,000
4,760	3/16	6,000	66,000	28,000	36,000
4,800		6,000	66,000	28,000	36,000
4,900		6,000	66,000	28,000	36,000
5,000		6,000	66,000	28,000	36,000
5,100		6,000	66,000	28,000	36,000
5,200		6,000	66,000	28,000	36,000
5,300		6,000	66,000	28,000	36,000
5,400		6,000	66,000	28,000	36,000
5,500		6,000	66,000	28,000	36,000
5,560	7/32	6,000	66,000	28,000	36,000
5,700		6,000	66,000	28,000	36,000
5,800		6,000	66,000	28,000	36,000
5,900		6,000	66,000	28,000	36,000
6,000		6,000	66,000	28,000	36,000
6,100		8,000	79,000	34,000	36,000
6,200		8,000	79,000	34,000	36,000
6,300		8,000	79,000	34,000	36,000
6,400		8,000	79,000	34,000	36,000
6,500		8,000	79,000	34,000	36,000
6,600		8,000	79,000	34,000	36,000
6,800		8,000	79,000	34,000	36,000
7,000		8,000	79,000	34,000	36,000
7,400		8,000	79,000	41,000	36,000
7,500		8,000	79,000	41,000	36,000
7,600		8,000	79,000	41,000	36,000
7,700		8,000	79,000	41,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,800		8,000	79,000	41,000	36,000
7,900		8,000	79,000	41,000	36,000
8,000		8,000	79,000	41,000	36,000
8,100		10,000	89,000	47,000	40,000
8,200		10,000	89,000	47,000	40,000
8,300		10,000	89,000	47,000	40,000
8,400		10,000	89,000	47,000	40,000
8,500		10,000	89,000	47,000	40,000
8,600		10,000	89,000	47,000	40,000
8,700		10,000	89,000	47,000	40,000
8,800		10,000	89,000	47,000	40,000
8,900		10,000	89,000	47,000	40,000
9,000		10,000	89,000	47,000	40,000
9,100		10,000	89,000	47,000	40,000
9,300		10,000	89,000	47,000	40,000
9,400		10,000	89,000	47,000	40,000
9,500		10,000	89,000	47,000	40,000
9,600		10,000	89,000	47,000	40,000
9,700		10,000	89,000	47,000	40,000
9,800		10,000	89,000	47,000	40,000
9,900		10,000	89,000	47,000	40,000
10,000		10,000	89,000	47,000	40,000
10,100		12,000	102,000	55,000	45,000
10,200		12,000	102,000	55,000	45,000
10,300		12,000	102,000	55,000	45,000
10,500		12,000	102,000	55,000	45,000
10,600		12,000	102,000	55,000	45,000
10,800		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
11,200		12,000	102,000	55,000	45,000
11,400		12,000	102,000	55,000	45,000
11,500		12,000	102,000	55,000	45,000
11,600		12,000	102,000	55,000	45,000
11,700		12,000	102,000	55,000	45,000
11,800		12,000	102,000	55,000	45,000
11,900		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
12,300	31/64	14,000	107,000	60,000	45,000
12,500		14,000	107,000	60,000	45,000
13,000		14,000	107,000	60,000	45,000

TS-Drills sans trous d‘huile

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
13,200		14,000	107,000	60,000	45,000
13,300		14,000	107,000	60,000	45,000
13,500		14,000	107,000	60,000	45,000
14,000		14,000	107,000	60,000	45,000
14,200		16,000	115,000	65,000	48,000
14,300		16,000	115,000	65,000	48,000
14,500		16,000	115,000	65,000	48,000
15,000		16,000	115,000	65,000	48,000
15,800		16,000	115,000	65,000	48,000
15,870	5/8	16,000	115,000	65,000	48,000
16,000		16,000	115,000	65,000	48,000
16,100		18,000	123,000	73,000	48,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
16,200		18,000	123,000	73,000	48,000
16,300		18,000	123,000	73,000	48,000
16,500		18,000	123,000	73,000	48,000
17,000		18,000	123,000	73,000	48,000
17,500		18,000	123,000	73,000	48,000
18,000		18,000	123,000	73,000	48,000
19,000		20,000	131,000	79,000	50,000
19,200		20,000	131,000	79,000	50,000
19,500		20,000	131,000	79,000	50,000

TS-Drills sans trous d‘huile

N° d’article 89413

P	M	K	N	S	H
●	○	●	○	○	○

VHM | F | TS 100 U | 3xD | DIN 6537 K | 140° | m7 | R | HA

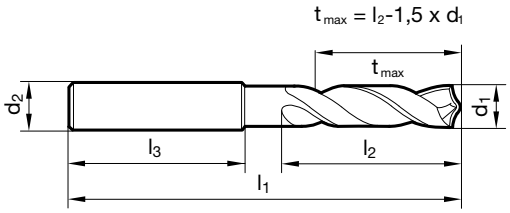
amin. de l’âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d’amélioration • aciers (alliés / non alliés) jusqu’à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

N° d’article 89402

P	M	K	N	S	H
●	○	●	○	○	○

VHM | F | TS 100 U | 3xD | DIN 6537 K | 140° | m7 | R | HE

amin. de l’âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d’amélioration • aciers (alliés / non alliés) jusqu’à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si



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	62,000	20,000	36,000	4,760	3/16	6,000	66,000	28,000	36,000
3,100		6,000	62,000	20,000	36,000	4,800		6,000	66,000	28,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000	4,900		6,000	66,000	28,000	36,000
3,200		6,000	62,000	20,000	36,000	5,000		6,000	66,000	28,000	36,000
3,250		6,000	62,000	20,000	36,000	5,100		6,000	66,000	28,000	36,000
3,300		6,000	62,000	20,000	36,000	5,160	13/64	6,000	66,000	28,000	36,000
3,400		6,000	62,000	20,000	36,000	5,200		6,000	66,000	28,000	36,000
3,500		6,000	62,000	20,000	36,000	5,300		6,000	66,000	28,000	36,000
3,570	9/64	6,000	62,000	20,000	36,000	5,400		6,000	66,000	28,000	36,000
3,600		6,000	62,000	20,000	36,000	5,500		6,000	66,000	28,000	36,000
3,700		6,000	62,000	20,000	36,000	5,550		6,000	66,000	28,000	36,000
3,800		6,000	66,000	24,000	36,000	5,560	7/32	6,000	66,000	28,000	36,000
3,900		6,000	66,000	24,000	36,000	5,600		6,000	66,000	28,000	36,000
3,970	5/32	6,000	66,000	24,000	36,000	5,700		6,000	66,000	28,000	36,000
4,000		6,000	66,000	24,000	36,000	5,800		6,000	66,000	28,000	36,000
4,100		6,000	66,000	24,000	36,000	5,900		6,000	66,000	28,000	36,000
4,200		6,000	66,000	24,000	36,000	5,950	15/64	6,000	66,000	28,000	36,000
4,300		6,000	66,000	24,000	36,000	6,000		6,000	66,000	28,000	36,000
4,370	11/64	6,000	66,000	24,000	36,000	6,100		8,000	79,000	34,000	36,000
4,400		6,000	66,000	24,000	36,000	6,200		8,000	79,000	34,000	36,000
4,500		6,000	66,000	24,000	36,000	6,300		8,000	79,000	34,000	36,000
4,600		6,000	66,000	24,000	36,000	6,350	1/4	8,000	79,000	34,000	36,000
4,650		6,000	66,000	24,000	36,000	6,400		8,000	79,000	34,000	36,000
4,700		6,000	66,000	24,000	36,000	6,500		8,000	79,000	34,000	36,000

TS-Drills sans trous d‘huile

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,600		8,000	79,000	34,000	36,000
6,700		8,000	79,000	34,000	36,000
6,750	17/64	8,000	79,000	34,000	36,000
6,800		8,000	79,000	34,000	36,000
6,900		8,000	79,000	34,000	36,000
7,000		8,000	79,000	34,000	36,000
7,100		8,000	79,000	41,000	36,000
7,140	9/32	8,000	79,000	41,000	36,000
7,200		8,000	79,000	41,000	36,000
7,300		8,000	79,000	41,000	36,000
7,400		8,000	79,000	41,000	36,000
7,500		8,000	79,000	41,000	36,000
7,540	19/64	8,000	79,000	41,000	36,000
7,600		8,000	79,000	41,000	36,000
7,700		8,000	79,000	41,000	36,000
7,800		8,000	79,000	41,000	36,000
7,900		8,000	79,000	41,000	36,000
7,940	5/16	8,000	79,000	41,000	36,000
8,000		8,000	79,000	41,000	36,000
8,100		10,000	89,000	47,000	40,000
8,200		10,000	89,000	47,000	40,000
8,300		10,000	89,000	47,000	40,000
8,330	21/64	10,000	89,000	47,000	40,000
8,400		10,000	89,000	47,000	40,000
8,500		10,000	89,000	47,000	40,000
8,600		10,000	89,000	47,000	40,000
8,700		10,000	89,000	47,000	40,000
8,730	11/32	10,000	89,000	47,000	40,000
8,800		10,000	89,000	47,000	40,000
8,900		10,000	89,000	47,000	40,000
9,000		10,000	89,000	47,000	40,000
9,100		10,000	89,000	47,000	40,000
9,130	23/64	10,000	89,000	47,000	40,000
9,200		10,000	89,000	47,000	40,000
9,250		10,000	89,000	47,000	40,000
9,300		10,000	89,000	47,000	40,000
9,400		10,000	89,000	47,000	40,000
9,500		10,000	89,000	47,000	40,000
9,520	3/8	10,000	89,000	47,000	40,000
9,600		10,000	89,000	47,000	40,000
9,700		10,000	89,000	47,000	40,000
9,800		10,000	89,000	47,000	40,000
9,900		10,000	89,000	47,000	40,000
9,920	25/64	10,000	89,000	47,000	40,000
10,000		10,000	89,000	47,000	40,000
10,100		12,000	102,000	55,000	45,000
10,200		12,000	102,000	55,000	45,000
10,300		12,000	102,000	55,000	45,000
10,320	13/32	12,000	102,000	55,000	45,000
10,400		12,000	102,000	55,000	45,000
10,500		12,000	102,000	55,000	45,000
10,600		12,000	102,000	55,000	45,000
10,700		12,000	102,000	55,000	45,000
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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
11,400		12,000	102,000	55,000	45,000
11,500		12,000	102,000	55,000	45,000
11,600		12,000	102,000	55,000	45,000
11,700		12,000	102,000	55,000	45,000
11,800		12,000	102,000	55,000	45,000
11,900		12,000	102,000	55,000	45,000
11,910	15/32	12,000	102,000	55,000	45,000
12,000		12,000	102,000	55,000	45,000
12,100		14,000	107,000	60,000	45,000
12,200		14,000	107,000	60,000	45,000
12,300	31/64	14,000	107,000	60,000	45,000
12,400		14,000	107,000	60,000	45,000
12,500		14,000	107,000	60,000	45,000
12,600		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
12,900		14,000	107,000	60,000	45,000
13,000		14,000	107,000	60,000	45,000
13,100	33/64	14,000	107,000	60,000	45,000
13,200		14,000	107,000	60,000	45,000
13,300		14,000	107,000	60,000	45,000
13,500		14,000	107,000	60,000	45,000
13,600		14,000	107,000	60,000	45,000
13,700		14,000	107,000	60,000	45,000
13,800		14,000	107,000	60,000	45,000
13,900		14,000	107,000	60,000	45,000
14,000		14,000	107,000	60,000	45,000
14,100		16,000	115,000	65,000	48,000
14,200		16,000	115,000	65,000	48,000
14,290	9/16	16,000	115,000	65,000	48,000
14,300		16,000	115,000	65,000	48,000
14,500		16,000	115,000	65,000	48,000
14,700		16,000	115,000	65,000	48,000
14,900		16,000	115,000	65,000	48,000
15,000		16,000	115,000	65,000	48,000
15,100		16,000	115,000	65,000	48,000
15,200		16,000	115,000	65,000	48,000
15,300		16,000	115,000	65,000	48,000
15,500		16,000	115,000	65,000	48,000
15,700		16,000	115,000	65,000	48,000
15,800		16,000	115,000	65,000	48,000
16,000		16,000	115,000	65,000	48,000
16,200		18,000	123,000	73,000	48,000
16,500		18,000	123,000	73,000	48,000
17,000		18,000	123,000	73,000	48,000
17,500		18,000	123,000	73,000	48,000
18,000		18,000	123,000	73,000	48,000
18,500		20,000	131,000	79,000	50,000
19,000		20,000	131,000	79,000	50,000
19,500		20,000	131,000	79,000	50,000
20,000		20,000	131,000	79,000	50,000

HARTNER

TS-Drills sans trous d‘huile

N° d’article 89422

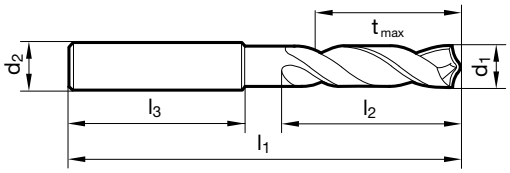
P	M	K	N	S	H
●				●	○

VHM | TS 100 H | 3xD | DIN 6537 K | 140° | m7 | R | HA

amin. de l’âme ≥ Ø 3,000 • affûtage à dépouille conique • forme de l´arête de coupe principale légèrement concave • géométrie de coupe optimisée

aciers alliés et à haute résistance jusqu’à 1400 N/mm² • Inconel, Hastelloy, Monel • Titane et ses alliages

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



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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,100		8,000	79,000	34,000	36,000
6,200		8,000	79,000	34,000	36,000
6,300		8,000	79,000	34,000	36,000
6,350	1/4	8,000	79,000	34,000	36,000
6,400		8,000	79,000	34,000	36,000
6,500		8,000	79,000	34,000	36,000
6,600		8,000	79,000	34,000	36,000
6,700		8,000	79,000	34,000	36,000
6,750	17/64	8,000	79,000	34,000	36,000
6,800		8,000	79,000	34,000	36,000
6,900		8,000	79,000	34,000	36,000
7,000		8,000	79,000	34,000	36,000
7,100		8,000	79,000	41,000	36,000
7,140	9/32	8,000	79,000	41,000	36,000
7,200		8,000	79,000	41,000	36,000
7,300		8,000	79,000	41,000	36,000
7,400		8,000	79,000	41,000	36,000
7,500		8,000	79,000	41,000	36,000
7,540	19/64	8,000	79,000	41,000	36,000
7,600		8,000	79,000	41,000	36,000
7,700		8,000	79,000	41,000	36,000
7,800		8,000	79,000	41,000	36,000
7,900		8,000	79,000	41,000	36,000
7,940	5/16	8,000	79,000	41,000	36,000
8,000		8,000	79,000	41,000	36,000
8,100		10,000	89,000	47,000	40,000
8,200		10,000	89,000	47,000	40,000
8,300		10,000	89,000	47,000	40,000
8,330	21/64	10,000	89,000	47,000	40,000
8,400		10,000	89,000	47,000	40,000
8,500		10,000	89,000	47,000	40,000
8,600		10,000	89,000	47,000	40,000
8,700		10,000	89,000	47,000	40,000
8,730	11/32	10,000	89,000	47,000	40,000
8,800		10,000	89,000	47,000	40,000
8,900		10,000	89,000	47,000	40,000
9,000		10,000	89,000	47,000	40,000
9,100		10,000	89,000	47,000	40,000
9,130	23/64	10,000	89,000	47,000	40,000
9,200		10,000	89,000	47,000	40,000
9,250		10,000	89,000	47,000	40,000
9,300		10,000	89,000	47,000	40,000

TS-Drills sans trous d‘huile

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,400		10,000	89,000	47,000	40,000
9,500		10,000	89,000	47,000	40,000
9,520	3/8	10,000	89,000	47,000	40,000
9,600		10,000	89,000	47,000	40,000
9,700		10,000	89,000	47,000	40,000
9,800		10,000	89,000	47,000	40,000
9,900		10,000	89,000	47,000	40,000
9,920	25/64	10,000	89,000	47,000	40,000
10,000		10,000	89,000	47,000	40,000
10,100		12,000	102,000	55,000	45,000
10,200		12,000	102,000	55,000	45,000
10,300		12,000	102,000	55,000	45,000
10,320	13/32	12,000	102,000	55,000	45,000
10,400		12,000	102,000	55,000	45,000
10,500		12,000	102,000	55,000	45,000
10,600		12,000	102,000	55,000	45,000
10,700		12,000	102,000	55,000	45,000
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
11,400		12,000	102,000	55,000	45,000
11,500		12,000	102,000	55,000	45,000
11,600		12,000	102,000	55,000	45,000
11,700		12,000	102,000	55,000	45,000
11,800		12,000	102,000	55,000	45,000
11,900		12,000	102,000	55,000	45,000
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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
13,000		14,000	107,000	60,000	45,000
13,300		14,000	107,000	60,000	45,000
13,500		14,000	107,000	60,000	45,000
13,700		14,000	107,000	60,000	45,000
14,000		14,000	107,000	60,000	45,000
14,200		16,000	115,000	65,000	48,000
14,290	9/16	16,000	115,000	65,000	48,000
14,300		16,000	115,000	65,000	48,000
14,500		16,000	115,000	65,000	48,000
14,700		16,000	115,000	65,000	48,000
15,000		16,000	115,000	65,000	48,000
15,200		16,000	115,000	65,000	48,000
15,300		16,000	115,000	65,000	48,000
15,500		16,000	115,000	65,000	48,000
15,700		16,000	115,000	65,000	48,000
16,000		16,000	115,000	65,000	48,000
16,300		18,000	123,000	73,000	48,000
16,500		18,000	123,000	73,000	48,000
16,900		18,000	123,000	73,000	48,000
17,000		18,000	123,000	73,000	48,000
17,300		18,000	123,000	73,000	48,000
17,500		18,000	123,000	73,000	48,000
18,000		18,000	123,000	73,000	48,000
18,500		20,000	131,000	79,000	50,000
18,900		20,000	131,000	79,000	50,000
19,000		20,000	131,000	79,000	50,000
19,050	3/4	20,000	131,000	79,000	50,000
19,300		20,000	131,000	79,000	50,000
19,500		20,000	131,000	79,000	50,000
20,000		20,000	131,000	79,000	50,000

TS-Drills sans trous d‘huile

N° d’article 89237

P	M	K	N	S	H
●	○	●	○	○	○

VHM | T | TS 100 U | 3xD | DIN 6539 | 140° | m7 | R | Cyl

amin. de l’âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d’amélioration • aciers (alliés / non alliés) jusqu’à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

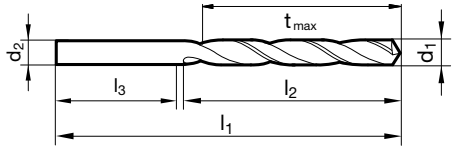
N° d’article 89401

P	M	K	N	S	H
●	○	●	○	○	○

VHM | F | TS 100 U | 3xD | DIN 6539 | 140° | m7 | R | Cyl

amin. de l’âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d’amélioration • aciers (alliés / non alliés) jusqu’à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

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



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

TS-Drills sans trous d‘huile

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
11,000		11,000	95,000	47,000	48,000
11,110	7/16	11,110	95,000	47,000	48,000
11,500		11,500	95,000	47,000	48,000
11,800		11,800	95,000	47,000	48,000
12,000		12,000	102,000	51,000	51,000
12,500		12,500	102,000	51,000	51,000
12,700	1/2	12,700	102,000	51,000	51,000
13,000		13,000	102,000	51,000	51,000
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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
15,500		15,500	115,000	58,000	57,000
16,000		16,000	115,000	58,000	57,000

TS-Drills sans trous d‘huile

N° d’article 89414

P	M	K	N	S	H
●	○	●	○	○	○

VHM | F | TS 100 U | 5xD | DIN 6537 L | 140° | m7 | R | HA

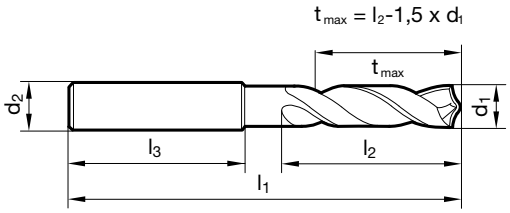
amin. de l’âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d’amélioration • aciers (alliés / non alliés) jusqu’à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

N° d’article 89417

P	M	K	N	S	H
●	○	●	○	○	○

VHM | F | TS 100 U | 5xD | DIN 6537 L | 140° | m7 | R | HE

amin. de l’âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d’amélioration • aciers (alliés / non alliés) jusqu’à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si



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

TS-Drills sans trous d‘huile

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,600		8,000	91,000	53,000	36,000
6,700		8,000	91,000	53,000	36,000
6,750	17/64	8,000	91,000	53,000	36,000
6,800		8,000	91,000	53,000	36,000
6,900		8,000	91,000	53,000	36,000
7,000		8,000	91,000	53,000	36,000
7,100		8,000	91,000	53,000	36,000
7,140	9/32	8,000	91,000	53,000	36,000
7,200		8,000	91,000	53,000	36,000
7,300		8,000	91,000	53,000	36,000
7,400		8,000	91,000	53,000	36,000
7,500		8,000	91,000	53,000	36,000
7,540	19/64	8,000	91,000	53,000	36,000
7,600		8,000	91,000	53,000	36,000
7,700		8,000	91,000	53,000	36,000
7,800		8,000	91,000	53,000	36,000
7,900		8,000	91,000	53,000	36,000
7,940	5/16	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
8,330	21/64	10,000	103,000	61,000	40,000
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
8,700		10,000	103,000	61,000	40,000
8,730	11/32	10,000	103,000	61,000	40,000
8,800		10,000	103,000	61,000	40,000
8,900		10,000	103,000	61,000	40,000
9,000		10,000	103,000	61,000	40,000
9,100		10,000	103,000	61,000	40,000
9,130	23/64	10,000	103,000	61,000	40,000
9,200		10,000	103,000	61,000	40,000
9,250		10,000	103,000	61,000	40,000
9,300		10,000	103,000	61,000	40,000
9,400		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
9,600		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
9,900		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
10,100		12,000	118,000	71,000	45,000
10,200		12,000	118,000	71,000	45,000
10,300		12,000	118,000	71,000	45,000
10,320	13/32	12,000	118,000	71,000	45,000
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
11,400		12,000	118,000	71,000	45,000
11,500		12,000	118,000	71,000	45,000
11,600		12,000	118,000	71,000	45,000
11,700		12,000	118,000	71,000	45,000
11,800		12,000	118,000	71,000	45,000
11,900		12,000	118,000	71,000	45,000
11,910	15/32	12,000	118,000	71,000	45,000
12,000		12,000	118,000	71,000	45,000
12,100		14,000	124,000	77,000	45,000
12,200		14,000	124,000	77,000	45,000
12,500		14,000	124,000	77,000	45,000
12,700	1/2	14,000	124,000	77,000	45,000
13,000		14,000	124,000	77,000	45,000
13,100	33/64	14,000	124,000	77,000	45,000
13,500		14,000	124,000	77,000	45,000
13,700		14,000	124,000	77,000	45,000
13,800		14,000	124,000	77,000	45,000
14,000		14,000	124,000	77,000	45,000
14,100		16,000	133,000	83,000	48,000
14,200		16,000	133,000	83,000	48,000
14,290	9/16	16,000	133,000	83,000	48,000
14,500		16,000	133,000	83,000	48,000
14,700		16,000	133,000	83,000	48,000
15,000		16,000	133,000	83,000	48,000
15,100		16,000	133,000	83,000	48,000
15,200		16,000	133,000	83,000	48,000
15,500		16,000	133,000	83,000	48,000
15,700		16,000	133,000	83,000	48,000
16,000		16,000	133,000	83,000	48,000
16,500		18,000	143,000	93,000	48,000
17,000		18,000	143,000	93,000	48,000
17,500		18,000	143,000	93,000	48,000
18,000		18,000	143,000	93,000	48,000
18,500		20,000	153,000	101,000	50,000
19,000		20,000	153,000	101,000	50,000
19,500		20,000	153,000	101,000	50,000
20,000		20,000	153,000	101,000	50,000

HARTNER

TS-Drills sans trous d‘huile

N° d’article 89275

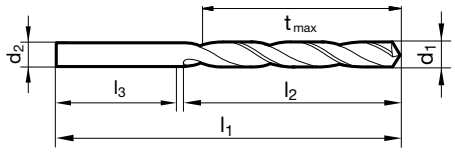
P	M	K	N	S	H
●	○	●	○	○	○

VHM | T | TS 100 U | 5xD | WN | 140° | m7 | R | Cyl

amin. de l’âme ≥ Ø 5,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée

aciers de construction et de cémentation • aciers de décolletage, aciers d’amélioration • aciers (alliés / non alliés) jusqu’à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
5,160	13/64	5,160	76,000	38,000	38,000
5,560	7/32	5,560	81,000	41,000	40,000
5,700		5,700	81,000	41,000	40,000
5,800		5,800	81,000	41,000	40,000
6,350	1/4	6,350	81,000	41,000	40,000
6,400		6,400	81,000	41,000	40,000
6,500		6,500	81,000	41,000	40,000
6,750	17/64	6,750	83,000	43,000	40,000
6,800		6,800	83,000	43,000	40,000
7,000		7,000	83,000	43,000	40,000
7,500		7,500	87,000	45,000	42,000
7,800		7,800	90,000	48,000	42,000
7,940	5/16	7,940	90,000	48,000	42,000
8,000		8,000	90,000	48,000	42,000
8,100		8,100	96,000	53,000	43,000
8,330	21/64	8,330	96,000	53,000	43,000
8,400		8,400	96,000	53,000	43,000
8,500		8,500	96,000	53,000	43,000
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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,520	3/8	9,520	105,000	60,000	45,000
9,800		9,800	105,000	60,000	45,000
10,000		10,000	105,000	60,000	45,000
10,200		10,200	112,000	66,000	46,000
10,300		10,300	112,000	66,000	46,000
10,320	13/32	10,320	112,000	66,000	46,000
10,500		10,500	112,000	66,000	46,000
10,720	27/64	10,720	114,000	68,000	46,000
10,800		10,800	114,000	68,000	46,000
11,110	7/16	11,110	118,000	71,000	47,000
11,500		11,500	118,000	71,000	47,000
11,800		11,800	121,000	73,000	48,000
11,910	15/32	11,910	121,000	73,000	48,000
12,000		12,000	121,000	73,000	48,000
12,700	1/2	12,700	137,000	78,000	59,000
13,000		13,000	137,000	78,000	59,000
13,500		13,500	144,000	84,000	60,000
14,000		14,000	147,000	86,000	61,000
14,500		14,500	151,000	89,000	62,000
15,000		15,000	153,000	91,000	62,000
15,500		15,500	157,000	94,000	63,000
16,000		16,000	160,000	96,000	64,000

TS-Drills avec refroidissement interne

N° d'article 89306

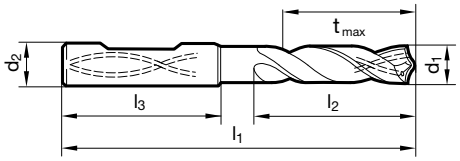
P	M	K	N	S	H
●	○	○	○		

HM | T | TS80 U | 3xD | DIN 6538K | 140° | h7 | R | HE

amin. de l'âme ≥ Ø 10,000 • affûtage à dépouille conique • amortit vibrations et chocs • support HSS avec plaquette CW brasée • affûtage en pente • à plaquette(s) cw rapportée(s) • avec tenon suiv. DIN 1809

aciers non alliés ou faiblement alliés • fontes grises, fontes à graphite sphéroïdal • laitons, bronzes, matières plastiques, graphite • matières synthétiques renforcées de fibres de verre • thermodurcissables abrasifs avec effet abrasif sur arêtes de coupe et listels

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



d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
10,000	16,000	103,000	51,000	48,000
10,500	16,000	103,000	51,000	48,000
10,600	16,000	103,000	51,000	48,000
11,000	16,000	103,000	51,000	48,000
12,000	16,000	103,000	51,000	48,000
12,200	16,000	111,000	59,000	48,000
12,500	16,000	111,000	59,000	48,000
13,000	16,000	111,000	59,000	48,000
13,700	16,000	111,000	59,000	48,000
14,000	16,000	111,000	59,000	48,000
14,200	20,000	122,000	68,000	50,000
14,500	20,000	122,000	68,000	50,000
14,600	20,000	122,000	68,000	50,000
15,000	20,000	122,000	68,000	50,000
15,300	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
17,000	20,000	130,000	76,000	50,000

d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
17,500	20,000	130,000	76,000	50,000
18,500	25,000	144,000	84,000	56,000
19,000	25,000	144,000	84,000	56,000
19,100	25,000	144,000	84,000	56,000
19,700	25,000	144,000	84,000	56,000
20,000	25,000	144,000	84,000	56,000
20,500	25,000	153,000	93,000	56,000
21,000	25,000	153,000	93,000	56,000
21,500	25,000	153,000	93,000	56,000
22,000	25,000	153,000	93,000	56,000
22,500	25,000	161,000	101,000	56,000
23,500	25,000	161,000	101,000	56,000
25,000	32,000	174,000	110,000	60,000

TS-Drills avec refroidissement interne

N° d'article 89266

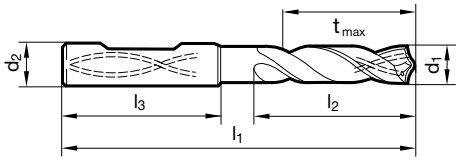
P	M	K	N	S	H
●	○	●	○	○	○

VHM | T | TS 100 U | 3xD | DIN 6537 K | 140° | m7 | R | HE

amin. de l'âme ≥ Ø 4,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	62,000	20,000	36,000
3,100		6,000	62,000	20,000	36,000
3,200		6,000	62,000	20,000	36,000
3,300		6,000	62,000	20,000	36,000
3,400		6,000	62,000	20,000	36,000
3,500		6,000	62,000	20,000	36,000
3,600		6,000	62,000	20,000	36,000
3,700		6,000	62,000	20,000	36,000
3,800		6,000	66,000	24,000	36,000
4,000		6,000	66,000	24,000	36,000
4,200		6,000	66,000	24,000	36,000
4,500		6,000	66,000	24,000	36,000
4,800		6,000	66,000	28,000	36,000
5,000		6,000	66,000	28,000	36,000
5,100		6,000	66,000	28,000	36,000
5,200		6,000	66,000	28,000	36,000
5,500		6,000	66,000	28,000	36,000
5,800		6,000	66,000	28,000	36,000
6,000		6,000	66,000	28,000	36,000
6,400		8,000	79,000	34,000	36,000
6,500		8,000	79,000	34,000	36,000
6,600		8,000	79,000	34,000	36,000
6,800		8,000	79,000	34,000	36,000
6,900		8,000	79,000	34,000	36,000
7,000		8,000	79,000	34,000	36,000
7,400		8,000	79,000	41,000	36,000
7,500		8,000	79,000	41,000	36,000
7,800		8,000	79,000	41,000	36,000
8,000		8,000	79,000	41,000	36,000
8,100		10,000	89,000	47,000	40,000
8,400		10,000	89,000	47,000	40,000
8,500		10,000	89,000	47,000	40,000
8,600		10,000	89,000	47,000	40,000
8,700		10,000	89,000	47,000	40,000
8,800		10,000	89,000	47,000	40,000
9,000		10,000	89,000	47,000	40,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,300		10,000	89,000	47,000	40,000
9,500		10,000	89,000	47,000	40,000
9,700		10,000	89,000	47,000	40,000
9,800		10,000	89,000	47,000	40,000
10,000		10,000	89,000	47,000	40,000
10,200		12,000	102,000	55,000	45,000
10,300		12,000	102,000	55,000	45,000
10,500		12,000	102,000	55,000	45,000
10,700		12,000	102,000	55,000	45,000
10,800		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
11,500		12,000	102,000	55,000	45,000
11,700		12,000	102,000	55,000	45,000
11,800		12,000	102,000	55,000	45,000
12,000		12,000	102,000	55,000	45,000
12,100		14,000	107,000	60,000	45,000
12,300	31/64	14,000	107,000	60,000	45,000
12,500		14,000	107,000	60,000	45,000
13,000		14,000	107,000	60,000	45,000
13,500		14,000	107,000	60,000	45,000
14,000		14,000	107,000	60,000	45,000
14,500		16,000	115,000	65,000	48,000
15,200		16,000	115,000	65,000	48,000
15,500		16,000	115,000	65,000	48,000
16,000		16,000	115,000	65,000	48,000
16,500		18,000	123,000	73,000	48,000
17,500		18,000	123,000	73,000	48,000
18,000		18,000	123,000	73,000	48,000
18,500		20,000	131,000	79,000	50,000
19,000		20,000	131,000	79,000	50,000
20,000		20,000	131,000	79,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89410

P	M	K	N	S	H
●	○	●	○	○	○

VHM · F · TS 100 U · 3xD · DIN 6537 K · 140° · m7 · R · HA

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

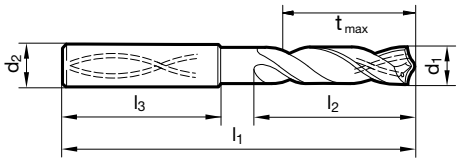
N° d'article 89415

P	M	K	N	S	H
●	○	●	○	○	○

VHM · F · TS 100 U · 3xD · DIN 6537 K · 140° · m7 · R · HE

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	62,000	20,000	36,000
3,100		6,000	62,000	20,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000
3,200		6,000	62,000	20,000	36,000
3,250		6,000	62,000	20,000	36,000
3,300		6,000	62,000	20,000	36,000
3,400		6,000	62,000	20,000	36,000
3,500		6,000	62,000	20,000	36,000
3,570	9/64	6,000	62,000	20,000	36,000
3,600		6,000	62,000	20,000	36,000
3,700		6,000	62,000	20,000	36,000
3,800		6,000	66,000	24,000	36,000
3,900		6,000	66,000	24,000	36,000
3,970	5/32	6,000	66,000	24,000	36,000
4,000		6,000	66,000	24,000	36,000
4,100		6,000	66,000	24,000	36,000
4,200		6,000	66,000	24,000	36,000
4,300		6,000	66,000	24,000	36,000
4,370	11/64	6,000	66,000	24,000	36,000
4,400		6,000	66,000	24,000	36,000
4,500		6,000	66,000	24,000	36,000
4,600		6,000	66,000	24,000	36,000
4,650		6,000	66,000	24,000	36,000
4,700		6,000	66,000	24,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
4,760	3/16	6,000	66,000	28,000	36,000
4,800		6,000	66,000	28,000	36,000
4,900		6,000	66,000	28,000	36,000
5,000		6,000	66,000	28,000	36,000
5,100		6,000	66,000	28,000	36,000
5,160	13/64	6,000	66,000	28,000	36,000
5,200		6,000	66,000	28,000	36,000
5,300		6,000	66,000	28,000	36,000
5,400		6,000	66,000	28,000	36,000
5,500		6,000	66,000	28,000	36,000
5,550		6,000	66,000	28,000	36,000
5,560	7/32	6,000	66,000	28,000	36,000
5,600		6,000	66,000	28,000	36,000
5,700		6,000	66,000	28,000	36,000
5,800		6,000	66,000	28,000	36,000
5,900		6,000	66,000	28,000	36,000
5,950	15/64	6,000	66,000	28,000	36,000
6,000		6,000	66,000	28,000	36,000
6,100		8,000	79,000	34,000	36,000
6,200		8,000	79,000	34,000	36,000
6,300		8,000	79,000	34,000	36,000
6,350	1/4	8,000	79,000	34,000	36,000
6,400		8,000	79,000	34,000	36,000
6,500		8,000	79,000	34,000	36,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,600		8,000	79,000	34,000	36,000
6,700		8,000	79,000	34,000	36,000
6,750	17/64	8,000	79,000	34,000	36,000
6,800		8,000	79,000	34,000	36,000
6,900		8,000	79,000	34,000	36,000
7,000		8,000	79,000	34,000	36,000
7,100		8,000	79,000	41,000	36,000
7,140	9/32	8,000	79,000	41,000	36,000
7,200		8,000	79,000	41,000	36,000
7,300		8,000	79,000	41,000	36,000
7,400		8,000	79,000	41,000	36,000
7,500		8,000	79,000	41,000	36,000
7,540	19/64	8,000	79,000	41,000	36,000
7,600		8,000	79,000	41,000	36,000
7,700		8,000	79,000	41,000	36,000
7,800		8,000	79,000	41,000	36,000
7,900		8,000	79,000	41,000	36,000
7,940	5/16	8,000	79,000	41,000	36,000
8,000		8,000	79,000	41,000	36,000
8,100		10,000	89,000	47,000	40,000
8,200		10,000	89,000	47,000	40,000
8,300		10,000	89,000	47,000	40,000
8,330	21/64	10,000	89,000	47,000	40,000
8,400		10,000	89,000	47,000	40,000
8,500		10,000	89,000	47,000	40,000
8,600		10,000	89,000	47,000	40,000
8,700		10,000	89,000	47,000	40,000
8,730	11/32	10,000	89,000	47,000	40,000
8,800		10,000	89,000	47,000	40,000
8,900		10,000	89,000	47,000	40,000
9,000		10,000	89,000	47,000	40,000
9,100		10,000	89,000	47,000	40,000
9,130	23/64	10,000	89,000	47,000	40,000
9,200		10,000	89,000	47,000	40,000
9,250		10,000	89,000	47,000	40,000
9,300		10,000	89,000	47,000	40,000
9,400		10,000	89,000	47,000	40,000
9,500		10,000	89,000	47,000	40,000
9,520	3/8	10,000	89,000	47,000	40,000
9,600		10,000	89,000	47,000	40,000
9,700		10,000	89,000	47,000	40,000
9,800		10,000	89,000	47,000	40,000
9,900		10,000	89,000	47,000	40,000
9,920	25/64	10,000	89,000	47,000	40,000
10,000		10,000	89,000	47,000	40,000
10,100		12,000	102,000	55,000	45,000
10,200		12,000	102,000	55,000	45,000
10,300		12,000	102,000	55,000	45,000
10,320	13/32	12,000	102,000	55,000	45,000
10,400		12,000	102,000	55,000	45,000
10,500		12,000	102,000	55,000	45,000
10,600		12,000	102,000	55,000	45,000
10,700		12,000	102,000	55,000	45,000
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
11,400		12,000	102,000	55,000	45,000
11,500		12,000	102,000	55,000	45,000
11,600		12,000	102,000	55,000	45,000
11,700		12,000	102,000	55,000	45,000
11,800		12,000	102,000	55,000	45,000
11,900		12,000	102,000	55,000	45,000
11,910	15/32	12,000	102,000	55,000	45,000
12,000		12,000	102,000	55,000	45,000
12,100		14,000	107,000	60,000	45,000
12,200		14,000	107,000	60,000	45,000
12,300	31/64	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
13,000		14,000	107,000	60,000	45,000
13,100	33/64	14,000	107,000	60,000	45,000
13,200		14,000	107,000	60,000	45,000
13,300		14,000	107,000	60,000	45,000
13,500		14,000	107,000	60,000	45,000
13,700		14,000	107,000	60,000	45,000
14,000		14,000	107,000	60,000	45,000
14,100		16,000	115,000	65,000	48,000
14,200		16,000	115,000	65,000	48,000
14,290	9/16	16,000	115,000	65,000	48,000
14,400		16,000	115,000	65,000	48,000
14,500		16,000	115,000	65,000	48,000
14,600		16,000	115,000	65,000	48,000
14,700		16,000	115,000	65,000	48,000
15,000		16,000	115,000	65,000	48,000
15,200		16,000	115,000	65,000	48,000
15,500		16,000	115,000	65,000	48,000
15,700		16,000	115,000	65,000	48,000
16,000		16,000	115,000	65,000	48,000
16,100		18,000	123,000	73,000	48,000
16,500		18,000	123,000	73,000	48,000
16,900		18,000	123,000	73,000	48,000
17,000		18,000	123,000	73,000	48,000
17,300		18,000	123,000	73,000	48,000
17,500		18,000	123,000	73,000	48,000
17,700		18,000	123,000	73,000	48,000
18,000		18,000	123,000	73,000	48,000
18,500		20,000	131,000	79,000	50,000
18,900		20,000	131,000	79,000	50,000
19,000		20,000	131,000	79,000	50,000
19,500		20,000	131,000	79,000	50,000
20,000		20,000	131,000	79,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89423

P	M	K	N	S	H
●				●	○

VHM | TS 100 H | 3xD | DIN 6537 K | 140° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • forme de l´arête de coupe principale légèrement concave • géométrie de coupe optimisée

aciers alliés et à haute résistance jusqu'à 1400 N/mm² • Inconel, Hastelloy, Monel • Titane et ses alliages

N° d'article 89424

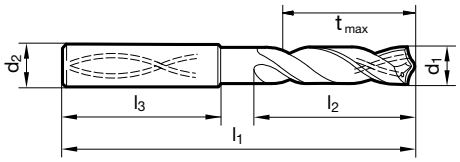
P	M	K	N	S	H
●				●	○

VHM | TS 100 H | 3xD | DIN 6537 K | 140° | m7 | R | HE

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • forme de l´arête de coupe principale légèrement concave • géométrie de coupe optimisée

aciers alliés et à haute résistance jusqu'à 1400 N/mm² • Inconel, Hastelloy, Monel • Titane et ses alliages

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



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	62,000	20,000	36,000	4,760	3/16	6,000	66,000	28,000	36,000
3,100		6,000	62,000	20,000	36,000	4,800		6,000	66,000	28,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000	4,900		6,000	66,000	28,000	36,000
3,200		6,000	62,000	20,000	36,000	5,000		6,000	66,000	28,000	36,000
3,250		6,000	62,000	20,000	36,000	5,100		6,000	66,000	28,000	36,000
3,300		6,000	62,000	20,000	36,000	5,160	13/64	6,000	66,000	28,000	36,000
3,400		6,000	62,000	20,000	36,000	5,200		6,000	66,000	28,000	36,000
3,500		6,000	62,000	20,000	36,000	5,300		6,000	66,000	28,000	36,000
3,570	9/64	6,000	62,000	20,000	36,000	5,400		6,000	66,000	28,000	36,000
3,600		6,000	62,000	20,000	36,000	5,500		6,000	66,000	28,000	36,000
3,700		6,000	62,000	20,000	36,000	5,550		6,000	66,000	28,000	36,000
3,800		6,000	66,000	24,000	36,000	5,560	7/32	6,000	66,000	28,000	36,000
3,900		6,000	66,000	24,000	36,000	5,600		6,000	66,000	28,000	36,000
3,970	5/32	6,000	66,000	24,000	36,000	5,700		6,000	66,000	28,000	36,000
4,000		6,000	66,000	24,000	36,000	5,800		6,000	66,000	28,000	36,000
4,100		6,000	66,000	24,000	36,000	5,900		6,000	66,000	28,000	36,000
4,200		6,000	66,000	24,000	36,000	5,950	15/64	6,000	66,000	28,000	36,000
4,300		6,000	66,000	24,000	36,000	6,000		6,000	66,000	28,000	36,000
4,370	11/64	6,000	66,000	24,000	36,000	6,100		8,000	79,000	34,000	36,000
4,400		6,000	66,000	24,000	36,000	6,200		8,000	79,000	34,000	36,000
4,500		6,000	66,000	24,000	36,000	6,300		8,000	79,000	34,000	36,000
4,600		6,000	66,000	24,000	36,000	6,350	1/4	8,000	79,000	34,000	36,000
4,650		6,000	66,000	24,000	36,000	6,400		8,000	79,000	34,000	36,000
4,700		6,000	66,000	24,000	36,000	6,500		8,000	79,000	34,000	36,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,600		8,000	79,000	34,000	36,000
6,700		8,000	79,000	34,000	36,000
6,750	17/64	8,000	79,000	34,000	36,000
6,800		8,000	79,000	34,000	36,000
6,900		8,000	79,000	34,000	36,000
7,000		8,000	79,000	34,000	36,000
7,100		8,000	79,000	41,000	36,000
7,140	9/32	8,000	79,000	41,000	36,000
7,200		8,000	79,000	41,000	36,000
7,300		8,000	79,000	41,000	36,000
7,400		8,000	79,000	41,000	36,000
7,500		8,000	79,000	41,000	36,000
7,540	19/64	8,000	79,000	41,000	36,000
7,600		8,000	79,000	41,000	36,000
7,700		8,000	79,000	41,000	36,000
7,800		8,000	79,000	41,000	36,000
7,900		8,000	79,000	41,000	36,000
7,940	5/16	8,000	79,000	41,000	36,000
8,000		8,000	79,000	41,000	36,000
8,100		10,000	89,000	47,000	40,000
8,200		10,000	89,000	47,000	40,000
8,300		10,000	89,000	47,000	40,000
8,330	21/64	10,000	89,000	47,000	40,000
8,400		10,000	89,000	47,000	40,000
8,500		10,000	89,000	47,000	40,000
8,600		10,000	89,000	47,000	40,000
8,700		10,000	89,000	47,000	40,000
8,730	11/32	10,000	89,000	47,000	40,000
8,800		10,000	89,000	47,000	40,000
8,900		10,000	89,000	47,000	40,000
9,000		10,000	89,000	47,000	40,000
9,100		10,000	89,000	47,000	40,000
9,130	23/64	10,000	89,000	47,000	40,000
9,200		10,000	89,000	47,000	40,000
9,250		10,000	89,000	47,000	40,000
9,300		10,000	89,000	47,000	40,000
9,400		10,000	89,000	47,000	40,000
9,500		10,000	89,000	47,000	40,000
9,520	3/8	10,000	89,000	47,000	40,000
9,600		10,000	89,000	47,000	40,000
9,700		10,000	89,000	47,000	40,000
9,800		10,000	89,000	47,000	40,000
9,900		10,000	89,000	47,000	40,000
9,920	25/64	10,000	89,000	47,000	40,000
10,000		10,000	89,000	47,000	40,000
10,100		12,000	102,000	55,000	45,000
10,200		12,000	102,000	55,000	45,000
10,300		12,000	102,000	55,000	45,000
10,320	13/32	12,000	102,000	55,000	45,000
10,400		12,000	102,000	55,000	45,000
10,500		12,000	102,000	55,000	45,000
10,600		12,000	102,000	55,000	45,000
10,700		12,000	102,000	55,000	45,000
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
11,400		12,000	102,000	55,000	45,000
11,500		12,000	102,000	55,000	45,000
11,600		12,000	102,000	55,000	45,000
11,700		12,000	102,000	55,000	45,000
11,800		12,000	102,000	55,000	45,000
11,900		12,000	102,000	55,000	45,000
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
13,000		14,000	107,000	60,000	45,000
13,300		14,000	107,000	60,000	45,000
13,500		14,000	107,000	60,000	45,000
13,700		14,000	107,000	60,000	45,000
14,000		14,000	107,000	60,000	45,000
14,200		16,000	115,000	65,000	48,000
14,290	9/16	16,000	115,000	65,000	48,000
14,300		16,000	115,000	65,000	48,000
14,500		16,000	115,000	65,000	48,000
14,700		16,000	115,000	65,000	48,000
15,000		16,000	115,000	65,000	48,000
15,200		16,000	115,000	65,000	48,000
15,300		16,000	115,000	65,000	48,000
15,500		16,000	115,000	65,000	48,000
15,700		16,000	115,000	65,000	48,000
16,000		16,000	115,000	65,000	48,000
16,300		18,000	123,000	73,000	48,000
16,500		18,000	123,000	73,000	48,000
16,900		18,000	123,000	73,000	48,000
17,000		18,000	123,000	73,000	48,000
17,300		18,000	123,000	73,000	48,000
17,500		18,000	123,000	73,000	48,000
18,000		18,000	123,000	73,000	48,000
18,500		20,000	131,000	79,000	50,000
18,900		20,000	131,000	79,000	50,000
19,000		20,000	131,000	79,000	50,000
19,050	3/4	20,000	131,000	79,000	50,000
19,300		20,000	131,000	79,000	50,000
19,500		20,000	131,000	79,000	50,000
20,000		20,000	131,000	79,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89450

P	M	K	N	S	H
○	●			○	

VHM | a | TS 100 INOX | 3xD | DIN 6537 K | 140° | m7 | R | HA | | |

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers inox., inaltérables aux acides et réfractaires • Titane et ses alliages • Inconel, Hastelloy, Monel

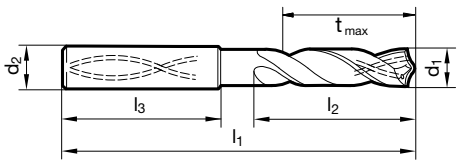
N° d'article 89550

P	M	K	N	S	H
○	●			○	

VHM | a | TS 100 INOX | 3xD | DIN 6537 K | 140° | m7 | R | HE | | |

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers inox., inaltérables aux acides et réfractaires • Titane et ses alliages • Inconel, Hastelloy, Monel

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



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	62,000	20,000	36,000	4,760	3/16	6,000	66,000	28,000	36,000
3,100		6,000	62,000	20,000	36,000	4,800		6,000	66,000	28,000	36,000
3,170	1/8	6,000	62,000	20,000	36,000	4,900		6,000	66,000	28,000	36,000
3,200		6,000	62,000	20,000	36,000	5,000		6,000	66,000	28,000	36,000
3,250		6,000	62,000	20,000	36,000	5,100		6,000	66,000	28,000	36,000
3,300		6,000	62,000	20,000	36,000	5,160	13/64	6,000	66,000	28,000	36,000
3,400		6,000	62,000	20,000	36,000	5,200		6,000	66,000	28,000	36,000
3,500		6,000	62,000	20,000	36,000	5,300		6,000	66,000	28,000	36,000
3,570	9/64	6,000	62,000	20,000	36,000	5,400		6,000	66,000	28,000	36,000
3,600		6,000	62,000	20,000	36,000	5,500		6,000	66,000	28,000	36,000
3,700		6,000	62,000	20,000	36,000	5,550		6,000	66,000	28,000	36,000
3,800		6,000	66,000	24,000	36,000	5,560	7/32	6,000	66,000	28,000	36,000
3,900		6,000	66,000	24,000	36,000	5,600		6,000	66,000	28,000	36,000
3,970	5/32	6,000	66,000	24,000	36,000	5,700		6,000	66,000	28,000	36,000
4,000		6,000	66,000	24,000	36,000	5,800		6,000	66,000	28,000	36,000
4,100		6,000	66,000	24,000	36,000	5,900		6,000	66,000	28,000	36,000
4,200		6,000	66,000	24,000	36,000	5,950	15/64	6,000	66,000	28,000	36,000
4,300		6,000	66,000	24,000	36,000	6,000		6,000	66,000	28,000	36,000
4,370	11/64	6,000	66,000	24,000	36,000	6,100		8,000	79,000	34,000	36,000
4,400		6,000	66,000	24,000	36,000	6,200		8,000	79,000	34,000	36,000
4,500		6,000	66,000	24,000	36,000	6,300		8,000	79,000	34,000	36,000
4,600		6,000	66,000	24,000	36,000	6,350	1/4	8,000	79,000	34,000	36,000
4,650		6,000	66,000	24,000	36,000	6,400		8,000	79,000	34,000	36,000
4,700		6,000	66,000	24,000	36,000	6,500		8,000	79,000	34,000	36,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,600		8,000	79,000	34,000	36,000
6,700		8,000	79,000	34,000	36,000
6,750	17/64	8,000	79,000	34,000	36,000
6,800		8,000	79,000	34,000	36,000
6,900		8,000	79,000	34,000	36,000
7,000		8,000	79,000	34,000	36,000
7,100		8,000	79,000	41,000	36,000
7,140	9/32	8,000	79,000	41,000	36,000
7,200		8,000	79,000	41,000	36,000
7,300		8,000	79,000	41,000	36,000
7,400		8,000	79,000	41,000	36,000
7,500		8,000	79,000	41,000	36,000
7,540	19/64	8,000	79,000	41,000	36,000
7,600		8,000	79,000	41,000	36,000
7,700		8,000	79,000	41,000	36,000
7,800		8,000	79,000	41,000	36,000
7,900		8,000	79,000	41,000	36,000
7,940	5/16	8,000	79,000	41,000	36,000
8,000		8,000	79,000	41,000	36,000
8,100		10,000	89,000	47,000	40,000
8,200		10,000	89,000	47,000	40,000
8,300		10,000	89,000	47,000	40,000
8,330	21/64	10,000	89,000	47,000	40,000
8,400		10,000	89,000	47,000	40,000
8,500		10,000	89,000	47,000	40,000
8,600		10,000	89,000	47,000	40,000
8,700		10,000	89,000	47,000	40,000
8,730	11/32	10,000	89,000	47,000	40,000
8,800		10,000	89,000	47,000	40,000
8,900		10,000	89,000	47,000	40,000
9,000		10,000	89,000	47,000	40,000
9,100		10,000	89,000	47,000	40,000
9,130	23/64	10,000	89,000	47,000	40,000
9,200		10,000	89,000	47,000	40,000
9,250		10,000	89,000	47,000	40,000
9,300		10,000	89,000	47,000	40,000
9,400		10,000	89,000	47,000	40,000
9,500		10,000	89,000	47,000	40,000
9,520	3/8	10,000	89,000	47,000	40,000
9,600		10,000	89,000	47,000	40,000
9,700		10,000	89,000	47,000	40,000
9,800		10,000	89,000	47,000	40,000
9,900		10,000	89,000	47,000	40,000
9,920	25/64	10,000	89,000	47,000	40,000
10,000		10,000	89,000	47,000	40,000
10,100		12,000	102,000	55,000	45,000
10,200		12,000	102,000	55,000	45,000
10,300		12,000	102,000	55,000	45,000
10,320	13/32	12,000	102,000	55,000	45,000
10,400		12,000	102,000	55,000	45,000
10,500		12,000	102,000	55,000	45,000
10,600		12,000	102,000	55,000	45,000
10,700		12,000	102,000	55,000	45,000
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
11,400		12,000	102,000	55,000	45,000
11,500		12,000	102,000	55,000	45,000
11,600		12,000	102,000	55,000	45,000
11,700		12,000	102,000	55,000	45,000
11,800		12,000	102,000	55,000	45,000
11,900		12,000	102,000	55,000	45,000
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
13,000		14,000	107,000	60,000	45,000
13,300		14,000	107,000	60,000	45,000
13,500		14,000	107,000	60,000	45,000
13,700		14,000	107,000	60,000	45,000
14,000		14,000	107,000	60,000	45,000
14,200		16,000	115,000	65,000	48,000
14,290	9/16	16,000	115,000	65,000	48,000
14,300		16,000	115,000	65,000	48,000
14,500		16,000	115,000	65,000	48,000
14,700		16,000	115,000	65,000	48,000
15,000		16,000	115,000	65,000	48,000
15,200		16,000	115,000	65,000	48,000
15,300		16,000	115,000	65,000	48,000
15,500		16,000	115,000	65,000	48,000
15,700		16,000	115,000	65,000	48,000
16,000		16,000	115,000	65,000	48,000
16,300		18,000	123,000	73,000	48,000
16,500		18,000	123,000	73,000	48,000
16,900		18,000	123,000	73,000	48,000
17,000		18,000	123,000	73,000	48,000
17,300		18,000	123,000	73,000	48,000
17,500		18,000	123,000	73,000	48,000
18,000		18,000	123,000	73,000	48,000
18,500		20,000	131,000	79,000	50,000
18,900		20,000	131,000	79,000	50,000
19,000		20,000	131,000	79,000	50,000
19,300		20,000	131,000	79,000	50,000
19,500		20,000	131,000	79,000	50,000
20,000		20,000	131,000	79,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89292

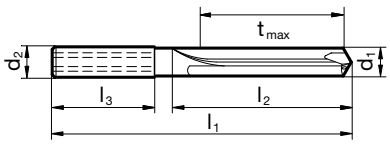
P	M	K	N	S	H
		●	○		

VHM | TS 150 GG | 4xD | WN | 120° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • tolérances serrées des diamètres • état de surface des perçages de qualité supérieure • respecter la pression du liquide de refroid.

fontes grises, fontes malléables, fontes à graphite sphéroïdal

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	66,000	24,000	36,000
3,100		6,000	66,000	24,000	36,000
3,200		6,000	66,000	24,000	36,000
3,300		6,000	66,000	24,000	36,000
3,400		6,000	66,000	24,000	36,000
3,500		6,000	66,000	24,000	36,000
3,700		6,000	66,000	24,000	36,000
4,000		6,000	74,000	30,000	36,000
4,200		6,000	74,000	30,000	36,000
5,000		6,000	74,000	36,000	36,000
5,100		6,000	74,000	36,000	36,000
5,300		6,000	74,000	36,000	36,000
5,400		6,000	74,000	36,000	36,000
5,900		6,000	74,000	36,000	36,000
6,000		6,000	74,000	36,000	36,000
6,200		8,000	91,000	53,000	36,000
6,300		8,000	91,000	53,000	36,000
6,400		8,000	91,000	53,000	36,000
6,600		8,000	91,000	53,000	36,000
6,700		8,000	91,000	53,000	36,000
6,800		8,000	91,000	53,000	36,000
7,000		8,000	91,000	53,000	36,000
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
8,400		10,000	103,000	61,000	40,000
8,500		10,000	103,000	61,000	40,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
8,700		10,000	103,000	61,000	40,000
9,000		10,000	103,000	61,000	40,000
9,400		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
10,500		12,000	118,000	71,000	45,000
11,000		12,000	118,000	71,000	45,000
11,500		12,000	118,000	71,000	45,000
12,000		12,000	118,000	71,000	45,000
12,300	31/64	14,000	124,000	74,000	45,000
12,500		14,000	124,000	74,000	45,000
12,700	1/2	14,000	124,000	74,000	45,000
13,000		14,000	124,000	74,000	45,000
14,000		14,000	124,000	74,000	45,000
15,000		16,000	133,000	83,000	48,000
16,000		16,000	133,000	83,000	48,000
16,500		18,000	143,000	93,000	48,000
17,000		18,000	143,000	93,000	48,000
17,500		18,000	143,000	93,000	48,000
19,000		20,000	153,000	101,000	50,000
20,000		20,000	153,000	101,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89307

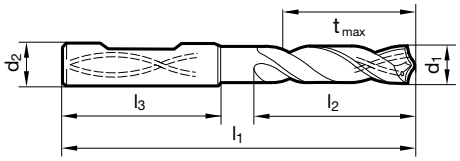
P	M	K	N	S	H
●	○	○	○		

HM | T | TS80 U | 5xD | DIN 6538M | 140° | h7 | R | HE

amin. de l'âme ≥ Ø 9,800 • affûtage à dépouille conique • support HSS avec plaquette CW brasée • amortit vibrations et chocs

aciers non alliés ou faiblement alliés • fontes grises, fontes à graphite sphéroïdal • laitons, bronzes, matières plastiques, graphite

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



d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,800	16,000	127,000	75,000	48,000
10,000	16,000	127,000	75,000	48,000
10,200	16,000	127,000	75,000	48,000
10,500	16,000	127,000	75,000	48,000
10,600	16,000	127,000	75,000	48,000
10,800	16,000	127,000	75,000	48,000
11,000	16,000	127,000	75,000	48,000
11,800	16,000	127,000	75,000	48,000
12,000	16,000	127,000	75,000	48,000
12,200	16,000	139,000	87,000	48,000
12,300	16,000	139,000	87,000	48,000
12,500	16,000	139,000	87,000	48,000
12,700	16,000	139,000	87,000	48,000
12,900	16,000	139,000	87,000	48,000
13,000	16,000	139,000	87,000	48,000
13,100	16,000	139,000	87,000	48,000
13,500	16,000	139,000	87,000	48,000
13,600	16,000	139,000	87,000	48,000
13,700	16,000	139,000	87,000	48,000
14,000	16,000	139,000	87,000	48,000
14,500	20,000	154,000	100,000	50,000
14,800	20,000	154,000	100,000	50,000
15,000	20,000	154,000	100,000	50,000
15,100	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
16,500	20,000	166,000	112,000	50,000
17,000	20,000	166,000	112,000	50,000

d1 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm
17,200	20,000	166,000	112,000	50,000
17,300	20,000	166,000	112,000	50,000
17,500	20,000	166,000	112,000	50,000
18,000	20,000	166,000	112,000	50,000
18,300	25,000	184,000	124,000	56,000
19,000	25,000	184,000	124,000	56,000
19,500	25,000	184,000	124,000	56,000
19,700	25,000	184,000	124,000	56,000
20,000	25,000	184,000	124,000	56,000
20,500	25,000	197,000	137,000	56,000
21,000	25,000	197,000	137,000	56,000
22,000	25,000	197,000	137,000	56,000
22,220	25,000	209,000	149,000	56,000
22,500	25,000	209,000	149,000	56,000
23,000	25,000	209,000	149,000	56,000
23,500	25,000	209,000	149,000	56,000
24,000	25,000	209,000	149,000	56,000
24,500	32,000	226,000	162,000	60,000
25,000	32,000	226,000	162,000	60,000

TS-Drills avec refroidissement interne

N° d'article 89272

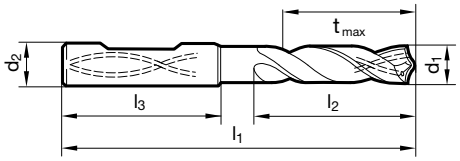
P	M	K	N	S	H
●	○	●	○	○	○

VHM | T | TS 100 U | 5xD | DIN 6537 L | 140° | m7 | R | HE

amin. de l'âme ≥ Ø 3,700 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	66,000	28,000	36,000
3,100		6,000	66,000	28,000	36,000
3,200		6,000	66,000	28,000	36,000
3,300		6,000	66,000	28,000	36,000
3,400		6,000	66,000	28,000	36,000
3,500		6,000	66,000	28,000	36,000
3,600		6,000	66,000	28,000	36,000
3,700		6,000	66,000	28,000	36,000
3,800		6,000	74,000	36,000	36,000
3,900		6,000	74,000	36,000	36,000
5,000		6,000	82,000	44,000	36,000
5,500		6,000	82,000	44,000	36,000
5,800		6,000	82,000	44,000	36,000
5,950	15/64	6,000	82,000	44,000	36,000
6,000		6,000	82,000	44,000	36,000
6,400		8,000	91,000	53,000	36,000
6,500		8,000	91,000	53,000	36,000
6,750	17/64	8,000	91,000	53,000	36,000
6,800		8,000	91,000	53,000	36,000
7,000		8,000	91,000	53,000	36,000
7,140	9/32	8,000	91,000	53,000	36,000
7,500		8,000	91,000	53,000	36,000
7,800		8,000	91,000	53,000	36,000
8,000		8,000	91,000	53,000	36,000
8,500		10,000	103,000	61,000	40,000
8,600		10,000	103,000	61,000	40,000
8,800		10,000	103,000	61,000	40,000
9,000		10,000	103,000	61,000	40,000
9,300		10,000	103,000	61,000	40,000
9,500		10,000	103,000	61,000	40,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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
10,000		10,000	103,000	61,000	40,000
10,200		12,000	118,000	71,000	45,000
10,500		12,000	118,000	71,000	45,000
10,800		12,000	118,000	71,000	45,000
11,000		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
11,500		12,000	118,000	71,000	45,000
11,800		12,000	118,000	71,000	45,000
12,000		12,000	118,000	71,000	45,000
12,500		14,000	124,000	77,000	45,000
13,000		14,000	124,000	77,000	45,000
13,500		14,000	124,000	77,000	45,000
14,000		14,000	124,000	77,000	45,000
14,500		16,000	133,000	83,000	48,000
15,000		16,000	133,000	83,000	48,000
15,500		16,000	133,000	83,000	48,000
15,870	5/8	16,000	133,000	83,000	48,000
16,000		16,000	133,000	83,000	48,000
16,500		18,000	143,000	93,000	48,000
17,000		18,000	143,000	93,000	48,000
17,500		18,000	143,000	93,000	48,000
18,000		18,000	143,000	93,000	48,000
19,000		20,000	153,000	101,000	50,000
19,500		20,000	153,000	101,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89411

P	M	K	N	S	H
●	○	●	○	○	○

VHM · F · TS 100 U · 5xD · DIN 6537 L · 140° · m7 · R · HA

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

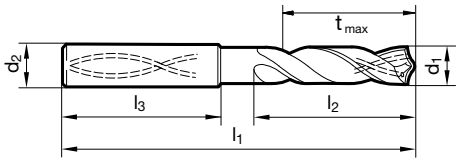
N° d'article 89408

P	M	K	N	S	H
●	○	●	○	○	○

VHM · F · TS 100 U · 5xD · DIN 6537 L · 140° · m7 · R · HE

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	66,000	28,000	36,000
3,100		6,000	66,000	28,000	36,000
3,170	1/8	6,000	66,000	28,000	36,000
3,200		6,000	66,000	28,000	36,000
3,250		6,000	66,000	28,000	36,000
3,300		6,000	66,000	28,000	36,000
3,400		6,000	66,000	28,000	36,000
3,500		6,000	66,000	28,000	36,000
3,570	9/64	6,000	66,000	28,000	36,000
3,600		6,000	66,000	28,000	36,000
3,700		6,000	66,000	28,000	36,000
3,800		6,000	74,000	36,000	36,000
3,900		6,000	74,000	36,000	36,000
3,970	5/32	6,000	74,000	36,000	36,000
4,000		6,000	74,000	36,000	36,000
4,100		6,000	74,000	36,000	36,000
4,200		6,000	74,000	36,000	36,000
4,300		6,000	74,000	36,000	36,000
4,370	11/64	6,000	74,000	36,000	36,000
4,400		6,000	74,000	36,000	36,000
4,500		6,000	74,000	36,000	36,000
4,600		6,000	74,000	36,000	36,000
4,650		6,000	74,000	36,000	36,000
4,700		6,000	74,000	36,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
4,760	3/16	6,000	82,000	44,000	36,000
4,800		6,000	82,000	44,000	36,000
4,900		6,000	82,000	44,000	36,000
5,000		6,000	82,000	44,000	36,000
5,100		6,000	82,000	44,000	36,000
5,160	13/64	6,000	82,000	44,000	36,000
5,200		6,000	82,000	44,000	36,000
5,300		6,000	82,000	44,000	36,000
5,400		6,000	82,000	44,000	36,000
5,500		6,000	82,000	44,000	36,000
5,550		6,000	82,000	44,000	36,000
5,560	7/32	6,000	82,000	44,000	36,000
5,600		6,000	82,000	44,000	36,000
5,700		6,000	82,000	44,000	36,000
5,800		6,000	82,000	44,000	36,000
5,900		6,000	82,000	44,000	36,000
5,950	15/64	6,000	82,000	44,000	36,000
6,000		6,000	82,000	44,000	36,000
6,100		8,000	91,000	53,000	36,000
6,200		8,000	91,000	53,000	36,000
6,300		8,000	91,000	53,000	36,000
6,350	1/4	8,000	91,000	53,000	36,000
6,400		8,000	91,000	53,000	36,000
6,500		8,000	91,000	53,000	36,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,600		8,000	91,000	53,000	36,000
6,700		8,000	91,000	53,000	36,000
6,750	17/64	8,000	91,000	53,000	36,000
6,800		8,000	91,000	53,000	36,000
6,900		8,000	91,000	53,000	36,000
7,000		8,000	91,000	53,000	36,000
7,100		8,000	91,000	53,000	36,000
7,140	9/32	8,000	91,000	53,000	36,000
7,200		8,000	91,000	53,000	36,000
7,300		8,000	91,000	53,000	36,000
7,400		8,000	91,000	53,000	36,000
7,500		8,000	91,000	53,000	36,000
7,540	19/64	8,000	91,000	53,000	36,000
7,600		8,000	91,000	53,000	36,000
7,700		8,000	91,000	53,000	36,000
7,800		8,000	91,000	53,000	36,000
7,900		8,000	91,000	53,000	36,000
7,940	5/16	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
8,330	21/64	10,000	103,000	61,000	40,000
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
8,700		10,000	103,000	61,000	40,000
8,730	11/32	10,000	103,000	61,000	40,000
8,800		10,000	103,000	61,000	40,000
8,900		10,000	103,000	61,000	40,000
9,000		10,000	103,000	61,000	40,000
9,100		10,000	103,000	61,000	40,000
9,130	23/64	10,000	103,000	61,000	40,000
9,200		10,000	103,000	61,000	40,000
9,250		10,000	103,000	61,000	40,000
9,300		10,000	103,000	61,000	40,000
9,400		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
9,600		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
9,900		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
10,100		12,000	118,000	71,000	45,000
10,200		12,000	118,000	71,000	45,000
10,300		12,000	118,000	71,000	45,000
10,320	13/32	12,000	118,000	71,000	45,000
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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
11,400		12,000	118,000	71,000	45,000
11,500		12,000	118,000	71,000	45,000
11,600		12,000	118,000	71,000	45,000
11,700		12,000	118,000	71,000	45,000
11,800		12,000	118,000	71,000	45,000
11,900		12,000	118,000	71,000	45,000
11,910	15/32	12,000	118,000	71,000	45,000
12,000		12,000	118,000	71,000	45,000
12,100		14,000	124,000	77,000	45,000
12,200		14,000	124,000	77,000	45,000
12,300	31/64	14,000	124,000	77,000	45,000
12,400		14,000	124,000	77,000	45,000
12,500		14,000	124,000	77,000	45,000
12,600		14,000	124,000	77,000	45,000
12,700	1/2	14,000	124,000	77,000	45,000
12,800		14,000	124,000	77,000	45,000
13,000		14,000	124,000	77,000	45,000
13,100	33/64	14,000	124,000	77,000	45,000
13,300		14,000	124,000	77,000	45,000
13,500		14,000	124,000	77,000	45,000
13,700		14,000	124,000	77,000	45,000
13,800		14,000	124,000	77,000	45,000
14,000		14,000	124,000	77,000	45,000
14,100		16,000	133,000	83,000	48,000
14,200		16,000	133,000	83,000	48,000
14,290	9/16	16,000	133,000	83,000	48,000
14,500		16,000	133,000	83,000	48,000
14,600		16,000	133,000	83,000	48,000
14,700		16,000	133,000	83,000	48,000
14,800		16,000	133,000	83,000	48,000
15,000		16,000	133,000	83,000	48,000
15,100		16,000	133,000	83,000	48,000
15,200		16,000	133,000	83,000	48,000
15,300		16,000	133,000	83,000	48,000
15,500		16,000	133,000	83,000	48,000
15,700		16,000	133,000	83,000	48,000
15,800		16,000	133,000	83,000	48,000
16,000		16,000	133,000	83,000	48,000
16,500		18,000	143,000	93,000	48,000
16,900		18,000	143,000	93,000	48,000
17,000		18,000	143,000	93,000	48,000
17,500		18,000	143,000	93,000	48,000
18,000		18,000	143,000	93,000	48,000
18,500		20,000	153,000	101,000	50,000
18,900		20,000	153,000	101,000	50,000
19,000		20,000	153,000	101,000	50,000
19,050	3/4	20,000	153,000	101,000	50,000
19,500		20,000	153,000	101,000	50,000
20,000		20,000	153,000	101,000	50,000

TS-Drills avec refroidissement interne

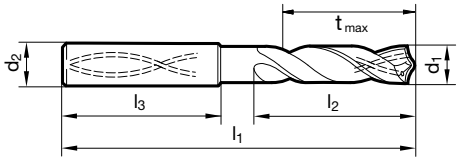
N° d'article 89420

P	M	K	N	S	H
		•			

VHM | F | TS 100 R | 5xD | DIN 6537 L | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage des rayons, breveté • forme de l´arête de coupe rectiligne (par correction)
fontes vermiculaires GGV et ADI, CDI • fontes grises, fontes malléables, fontes à graphite sphéroïdal

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



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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,100		8,000	91,000	53,000	36,000
6,200		8,000	91,000	53,000	36,000
6,300		8,000	91,000	53,000	36,000
6,350	1/4	8,000	91,000	53,000	36,000
6,400		8,000	91,000	53,000	36,000
6,500		8,000	91,000	53,000	36,000
6,600		8,000	91,000	53,000	36,000
6,700		8,000	91,000	53,000	36,000
6,750	17/64	8,000	91,000	53,000	36,000
6,800		8,000	91,000	53,000	36,000
6,900		8,000	91,000	53,000	36,000
7,000		8,000	91,000	53,000	36,000
7,100		8,000	91,000	53,000	36,000
7,140	9/32	8,000	91,000	53,000	36,000
7,200		8,000	91,000	53,000	36,000
7,300		8,000	91,000	53,000	36,000
7,400		8,000	91,000	53,000	36,000
7,500		8,000	91,000	53,000	36,000
7,540	19/64	8,000	91,000	53,000	36,000
7,600		8,000	91,000	53,000	36,000
7,700		8,000	91,000	53,000	36,000
7,800		8,000	91,000	53,000	36,000
7,900		8,000	91,000	53,000	36,000
7,940	5/16	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
8,330	21/64	10,000	103,000	61,000	40,000
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
8,700		10,000	103,000	61,000	40,000
8,730	11/32	10,000	103,000	61,000	40,000
8,800		10,000	103,000	61,000	40,000
8,900		10,000	103,000	61,000	40,000
9,000		10,000	103,000	61,000	40,000
9,100		10,000	103,000	61,000	40,000
9,130	23/64	10,000	103,000	61,000	40,000
9,200		10,000	103,000	61,000	40,000
9,250		10,000	103,000	61,000	40,000
9,300		10,000	103,000	61,000	40,000

TS-Drills avec refroidissement interne

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

TS-Drills avec refroidissement interne

N° d'article 89425

P	M	K	N	S	H
●				●	○

VHM | TS 100 H | 5xD | DIN 6537 L | 140° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • forme de l´arête de coupe principale légèrement concave • géométrie de coupe optimisée

aciers alliés et à haute résistance jusqu'à 1400 N/mm² • Inconel, Hastelloy, Monel • Titane et ses alliages

N° d'article 89426

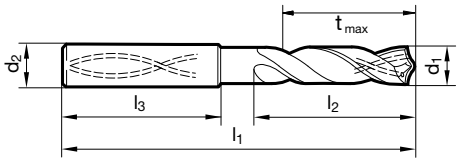
P	M	K	N	S	H
●				●	○

VHM | TS 100 H | 5xD | DIN 6537 L | 140° | m7 | R | HE

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • forme de l´arête de coupe principale légèrement concave • géométrie de coupe optimisée

aciers alliés et à haute résistance jusqu'à 1400 N/mm² • Inconel, Hastelloy, Monel • Titane et ses alliages

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



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

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,600		8,000	91,000	53,000	36,000
6,700		8,000	91,000	53,000	36,000
6,750	17/64	8,000	91,000	53,000	36,000
6,800		8,000	91,000	53,000	36,000
6,900		8,000	91,000	53,000	36,000
7,000		8,000	91,000	53,000	36,000
7,100		8,000	91,000	53,000	36,000
7,140	9/32	8,000	91,000	53,000	36,000
7,200		8,000	91,000	53,000	36,000
7,300		8,000	91,000	53,000	36,000
7,400		8,000	91,000	53,000	36,000
7,500		8,000	91,000	53,000	36,000
7,540	19/64	8,000	91,000	53,000	36,000
7,600		8,000	91,000	53,000	36,000
7,700		8,000	91,000	53,000	36,000
7,800		8,000	91,000	53,000	36,000
7,900		8,000	91,000	53,000	36,000
7,940	5/16	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
8,330	21/64	10,000	103,000	61,000	40,000
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
8,700		10,000	103,000	61,000	40,000
8,730	11/32	10,000	103,000	61,000	40,000
8,800		10,000	103,000	61,000	40,000
8,900		10,000	103,000	61,000	40,000
9,000		10,000	103,000	61,000	40,000
9,100		10,000	103,000	61,000	40,000
9,130	23/64	10,000	103,000	61,000	40,000
9,200		10,000	103,000	61,000	40,000
9,250		10,000	103,000	61,000	40,000
9,300		10,000	103,000	61,000	40,000
9,400		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
9,600		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
9,900		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
10,100		12,000	118,000	71,000	45,000
10,200		12,000	118,000	71,000	45,000
10,300		12,000	118,000	71,000	45,000
10,320	13/32	12,000	118,000	71,000	45,000
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
11,400		12,000	118,000	71,000	45,000
11,500		12,000	118,000	71,000	45,000
11,600		12,000	118,000	71,000	45,000
11,700		12,000	118,000	71,000	45,000
11,800		12,000	118,000	71,000	45,000
11,900		12,000	118,000	71,000	45,000
11,910	15/32	12,000	118,000	71,000	45,000
12,000		12,000	118,000	71,000	45,000
12,200		14,000	124,000	77,000	45,000
12,500		14,000	124,000	77,000	45,000
12,700	1/2	14,000	124,000	77,000	45,000
12,800		14,000	124,000	77,000	45,000
13,000		14,000	124,000	77,000	45,000
13,300		14,000	124,000	77,000	45,000
13,500		14,000	124,000	77,000	45,000
13,700		14,000	124,000	77,000	45,000
14,000		14,000	124,000	77,000	45,000
14,200		16,000	133,000	83,000	48,000
14,290	9/16	16,000	133,000	83,000	48,000
14,300		16,000	133,000	83,000	48,000
14,500		16,000	133,000	83,000	48,000
14,700		16,000	133,000	83,000	48,000
15,000		16,000	133,000	83,000	48,000
15,200		16,000	133,000	83,000	48,000
15,300		16,000	133,000	83,000	48,000
15,500		16,000	133,000	83,000	48,000
15,700		16,000	133,000	83,000	48,000
16,000		16,000	133,000	83,000	48,000
16,300		18,000	143,000	93,000	48,000
16,500		18,000	143,000	93,000	48,000
16,900		18,000	143,000	93,000	48,000
17,000		18,000	143,000	93,000	48,000
17,300		18,000	143,000	93,000	48,000
17,500		18,000	143,000	93,000	48,000
18,000		18,000	143,000	93,000	48,000
18,500		20,000	153,000	101,000	50,000
18,900		20,000	153,000	101,000	50,000
19,000		20,000	153,000	101,000	50,000
19,050	3/4	20,000	153,000	101,000	50,000
19,300		20,000	153,000	101,000	50,000
19,500		20,000	153,000	101,000	50,000
20,000		20,000	153,000	101,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89451

P	M	K	N	S	H
○	●			○	

VHM | a | TS 100 INOX | 5xD | DIN 6537 L | 140° | m7 | R | HA | | |

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers inox., inaltérables aux acides et réfractaires • Titane et ses alliages • Inconel, Hastelloy, Monel

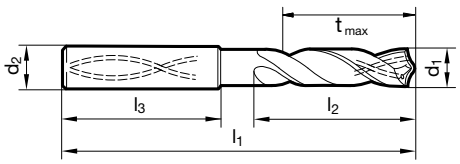
N° d'article 89551

P	M	K	N	S	H
○	●			○	

VHM | a | TS 100 INOX | 5xD | DIN 6537 L | 140° | m7 | R | HE | | |

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers inox., inaltérables aux acides et réfractaires • Titane et ses alliages • Inconel, Hastelloy, Monel

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



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

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,600		8,000	91,000	53,000	36,000
6,700		8,000	91,000	53,000	36,000
6,750	17/64	8,000	91,000	53,000	36,000
6,800		8,000	91,000	53,000	36,000
6,900		8,000	91,000	53,000	36,000
7,000		8,000	91,000	53,000	36,000
7,100		8,000	91,000	53,000	36,000
7,140	9/32	8,000	91,000	53,000	36,000
7,200		8,000	91,000	53,000	36,000
7,300		8,000	91,000	53,000	36,000
7,400		8,000	91,000	53,000	36,000
7,500		8,000	91,000	53,000	36,000
7,540	19/64	8,000	91,000	53,000	36,000
7,600		8,000	91,000	53,000	36,000
7,700		8,000	91,000	53,000	36,000
7,800		8,000	91,000	53,000	36,000
7,900		8,000	91,000	53,000	36,000
7,940	5/16	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
8,330	21/64	10,000	103,000	61,000	40,000
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
8,700		10,000	103,000	61,000	40,000
8,730	11/32	10,000	103,000	61,000	40,000
8,800		10,000	103,000	61,000	40,000
8,900		10,000	103,000	61,000	40,000
9,000		10,000	103,000	61,000	40,000
9,100		10,000	103,000	61,000	40,000
9,130	23/64	10,000	103,000	61,000	40,000
9,200		10,000	103,000	61,000	40,000
9,250		10,000	103,000	61,000	40,000
9,300		10,000	103,000	61,000	40,000
9,400		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
9,600		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
9,900		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
10,100		12,000	118,000	71,000	45,000
10,200		12,000	118,000	71,000	45,000
10,300		12,000	118,000	71,000	45,000
10,320	13/32	12,000	118,000	71,000	45,000
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
11,400		12,000	118,000	71,000	45,000
11,500		12,000	118,000	71,000	45,000
11,600		12,000	118,000	71,000	45,000
11,700		12,000	118,000	71,000	45,000
11,800		12,000	118,000	71,000	45,000
11,900		12,000	118,000	71,000	45,000
11,910	15/32	12,000	118,000	71,000	45,000
12,000		12,000	118,000	71,000	45,000
12,200		14,000	124,000	77,000	45,000
12,500		14,000	124,000	77,000	45,000
12,700	1/2	14,000	124,000	77,000	45,000
12,800		14,000	124,000	77,000	45,000
13,000		14,000	124,000	77,000	45,000
13,300		14,000	124,000	77,000	45,000
13,500		14,000	124,000	77,000	45,000
13,700		14,000	124,000	77,000	45,000
14,000		14,000	124,000	77,000	45,000
14,200		16,000	133,000	83,000	48,000
14,290	9/16	16,000	133,000	83,000	48,000
14,300		16,000	133,000	83,000	48,000
14,500		16,000	133,000	83,000	48,000
14,700		16,000	133,000	83,000	48,000
15,000		16,000	133,000	83,000	48,000
15,200		16,000	133,000	83,000	48,000
15,300		16,000	133,000	83,000	48,000
15,500		16,000	133,000	83,000	48,000
15,700		16,000	133,000	83,000	48,000
16,000		16,000	133,000	83,000	48,000
16,300		18,000	143,000	93,000	48,000
16,500		18,000	143,000	93,000	48,000
16,900		18,000	143,000	93,000	48,000
17,000		18,000	143,000	93,000	48,000
17,300		18,000	143,000	93,000	48,000
17,500		18,000	143,000	93,000	48,000
18,000		18,000	143,000	93,000	48,000
18,500		20,000	153,000	101,000	50,000
18,900		20,000	153,000	101,000	50,000
19,000		20,000	153,000	101,000	50,000
19,050	3/4	20,000	153,000	101,000	50,000
19,300		20,000	153,000	101,000	50,000
19,500		20,000	153,000	101,000	50,000
20,000		20,000	153,000	101,000	50,000

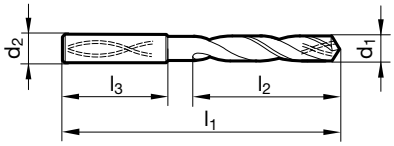
TS-Drills avec refroidissement interne

N° d'article 89560

P	M	K	N	S	H
			•		

VHM | TS 100 ALU | 5xD | DIN 6537 L | 140° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • forme concave de l´arête de coupe principale • géométrie de coupe optimisée aluminium et alliages d'aluminium • les alliages de cuivre, de laiton et de bronze • matériaux synthétiques



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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,100		8,000	91,000	53,000	36,000
6,200		8,000	91,000	53,000	36,000
6,300		8,000	91,000	53,000	36,000
6,350	1/4	8,000	91,000	53,000	36,000
6,400		8,000	91,000	53,000	36,000
6,500		8,000	91,000	53,000	36,000
6,600		8,000	91,000	53,000	36,000
6,700		8,000	91,000	53,000	36,000
6,750	17/64	8,000	91,000	53,000	36,000
6,800		8,000	91,000	53,000	36,000
6,900		8,000	91,000	53,000	36,000
7,000		8,000	91,000	53,000	36,000
7,100		8,000	91,000	53,000	36,000
7,140	9/32	8,000	91,000	53,000	36,000
7,200		8,000	91,000	53,000	36,000
7,300		8,000	91,000	53,000	36,000
7,400		8,000	91,000	53,000	36,000
7,500		8,000	91,000	53,000	36,000
7,540	19/64	8,000	91,000	53,000	36,000
7,600		8,000	91,000	53,000	36,000
7,700		8,000	91,000	53,000	36,000
7,800		8,000	91,000	53,000	36,000
7,900		8,000	91,000	53,000	36,000
7,940	5/16	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
8,330	21/64	10,000	103,000	61,000	40,000
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
8,700		10,000	103,000	61,000	40,000
8,730	11/32	10,000	103,000	61,000	40,000
8,800		10,000	103,000	61,000	40,000
8,900		10,000	103,000	61,000	40,000
9,000		10,000	103,000	61,000	40,000
9,100		10,000	103,000	61,000	40,000
9,130	23/64	10,000	103,000	61,000	40,000
9,200		10,000	103,000	61,000	40,000
9,250		10,000	103,000	61,000	40,000
9,300		10,000	103,000	61,000	40,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,340		10,000	103,000	61,000	40,000
9,400		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
9,600		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
9,900		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
10,100		12,000	118,000	71,000	45,000
10,200		12,000	118,000	71,000	45,000
10,300		12,000	118,000	71,000	45,000
10,320	13/32	12,000	118,000	71,000	45,000
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
11,400		12,000	118,000	71,000	45,000
11,500		12,000	118,000	71,000	45,000
11,600		12,000	118,000	71,000	45,000
11,700		12,000	118,000	71,000	45,000
11,800		12,000	118,000	71,000	45,000
11,900		12,000	118,000	71,000	45,000
11,910	15/32	12,000	118,000	71,000	45,000
12,000		12,000	118,000	71,000	45,000
12,100		14,000	124,000	77,000	45,000
12,200		14,000	124,000	77,000	45,000
12,500		14,000	124,000	77,000	45,000
12,600		14,000	124,000	77,000	45,000
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
13,000		14,000	124,000	77,000	45,000
13,100	33/64	14,000	124,000	77,000	45,000
13,300		14,000	124,000	77,000	45,000
13,400		14,000	124,000	77,000	45,000
13,500		14,000	124,000	77,000	45,000
13,700		14,000	124,000	77,000	45,000
13,800		14,000	124,000	77,000	45,000
14,000		14,000	124,000	77,000	45,000
14,100		16,000	133,000	83,000	48,000
14,200		16,000	133,000	83,000	48,000
14,290	9/16	16,000	133,000	83,000	48,000
14,300		16,000	133,000	83,000	48,000
14,400		16,000	133,000	83,000	48,000
14,500		16,000	133,000	83,000	48,000
14,700		16,000	133,000	83,000	48,000
14,800		16,000	133,000	83,000	48,000
15,000		16,000	133,000	83,000	48,000
15,100		16,000	133,000	83,000	48,000
15,200		16,000	133,000	83,000	48,000
15,300		16,000	133,000	83,000	48,000
15,500		16,000	133,000	83,000	48,000
15,700		16,000	133,000	83,000	48,000
15,800		16,000	133,000	83,000	48,000
16,000		16,000	133,000	83,000	48,000
16,500		18,000	143,000	93,000	48,000
16,700		18,000	143,000	93,000	48,000
16,900		18,000	143,000	93,000	48,000
17,000		18,000	143,000	93,000	48,000
17,500		18,000	143,000	93,000	48,000
17,700		18,000	143,000	93,000	48,000
18,000		18,000	143,000	93,000	48,000
18,500		20,000	153,000	101,000	50,000
18,900		20,000	153,000	101,000	50,000
19,000		20,000	153,000	101,000	50,000
19,050	3/4	20,000	153,000	101,000	50,000
19,300		20,000	153,000	101,000	50,000
19,500		20,000	153,000	101,000	50,000
20,000		20,000	153,000	101,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89460

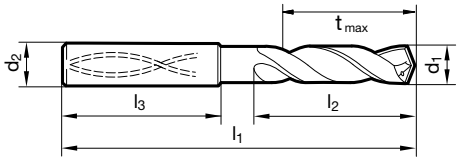
P	M	K	N	S	H
●	○	○		○	○

VHM | F | TS 100 HPC | 5xD | DIN 6537 L | 140° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • arête de coupe principale concave • géométrie de coupe optimisée • performance maximale

pour l'usinage haute performance des aciers de construction et des aciers de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1400 N/mm² • aciers inox., inaltérables aux acides et réfractaires • Titane et ses alliages • alliages spéciaux

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



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	66,000	28,000	36,000	5,900		6,000	82,000	44,000	36,000
3,100		6,000	66,000	28,000	36,000	5,950	15/64	6,000	82,000	44,000	36,000
3,170	1/8	6,000	66,000	28,000	36,000	6,000		6,000	82,000	44,000	36,000
3,200		6,000	66,000	28,000	36,000	6,100		8,000	91,000	53,000	36,000
3,250		6,000	66,000	28,000	36,000	6,200		8,000	91,000	53,000	36,000
3,300		6,000	66,000	28,000	36,000	6,300		8,000	91,000	53,000	36,000
3,400		6,000	66,000	28,000	36,000	6,350	1/4	8,000	91,000	53,000	36,000
3,500		6,000	66,000	28,000	36,000	6,400		8,000	91,000	53,000	36,000
3,570	9/64	6,000	66,000	28,000	36,000	6,500		8,000	91,000	53,000	36,000
3,600		6,000	66,000	28,000	36,000	6,530		8,000	91,000	53,000	36,000
3,700		6,000	66,000	28,000	36,000	6,550		8,000	91,000	53,000	36,000
3,800		6,000	74,000	36,000	36,000	6,600		8,000	91,000	53,000	36,000
3,900		6,000	74,000	36,000	36,000	6,700		8,000	91,000	53,000	36,000
3,970	5/32	6,000	74,000	36,000	36,000	6,750	17/64	8,000	91,000	53,000	36,000
4,000		6,000	74,000	36,000	36,000	6,800		8,000	91,000	53,000	36,000
4,040		6,000	74,000	36,000	36,000	6,900		8,000	91,000	53,000	36,000
4,100		6,000	74,000	36,000	36,000	7,000		8,000	91,000	53,000	36,000
4,200		6,000	74,000	36,000	36,000	7,100		8,000	91,000	53,000	36,000
4,300		6,000	74,000	36,000	36,000	7,140	9/32	8,000	91,000	53,000	36,000
4,370	11/64	6,000	74,000	36,000	36,000	7,200		8,000	91,000	53,000	36,000
4,400		6,000	74,000	36,000	36,000	7,300		8,000	91,000	53,000	36,000
4,500		6,000	74,000	36,000	36,000	7,400		8,000	91,000	53,000	36,000
4,600		6,000	74,000	36,000	36,000	7,500		8,000	91,000	53,000	36,000
4,650		6,000	74,000	36,000	36,000	7,540	19/64	8,000	91,000	53,000	36,000
4,700		6,000	74,000	36,000	36,000	7,550		8,000	91,000	53,000	36,000
4,760	3/16	6,000	82,000	44,000	36,000	7,600		8,000	91,000	53,000	36,000
4,800		6,000	82,000	44,000	36,000	7,650		8,000	91,000	53,000	36,000
4,900		6,000	82,000	44,000	36,000	7,700		8,000	91,000	53,000	36,000
5,000		6,000	82,000	44,000	36,000	7,800		8,000	91,000	53,000	36,000
5,100		6,000	82,000	44,000	36,000	7,900		8,000	91,000	53,000	36,000
5,110		6,000	82,000	44,000	36,000	7,940	5/16	8,000	91,000	53,000	36,000
5,160	13/64	6,000	82,000	44,000	36,000	8,000		8,000	91,000	53,000	36,000
5,200		6,000	82,000	44,000	36,000	8,100		10,000	103,000	61,000	40,000
5,300		6,000	82,000	44,000	36,000	8,200		10,000	103,000	61,000	40,000
5,400		6,000	82,000	44,000	36,000	8,300		10,000	103,000	61,000	40,000
5,410		6,000	82,000	44,000	36,000	8,330	21/64	10,000	103,000	61,000	40,000
5,500		6,000	82,000	44,000	36,000	8,400		10,000	103,000	61,000	40,000
5,550		6,000	82,000	44,000	36,000	8,500		10,000	103,000	61,000	40,000
5,560	7/32	6,000	82,000	44,000	36,000	8,600		10,000	103,000	61,000	40,000
5,600		6,000	82,000	44,000	36,000	8,700		10,000	103,000	61,000	40,000
5,700		6,000	82,000	44,000	36,000	8,730	11/32	10,000	103,000	61,000	40,000
5,800		6,000	82,000	44,000	36,000	8,800		10,000	103,000	61,000	40,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
8,900		10,000	103,000	61,000	40,000
9,000		10,000	103,000	61,000	40,000
9,100		10,000	103,000	61,000	40,000
9,130	23/64	10,000	103,000	61,000	40,000
9,200		10,000	103,000	61,000	40,000
9,250		10,000	103,000	61,000	40,000
9,300		10,000	103,000	61,000	40,000
9,340		10,000	103,000	61,000	40,000
9,400		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
9,550		10,000	103,000	61,000	40,000
9,600		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
9,900		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
10,100		12,000	118,000	71,000	45,000
10,200		12,000	118,000	71,000	45,000
10,300		12,000	118,000	71,000	45,000
10,320	13/32	12,000	118,000	71,000	45,000
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
10,720	27/64	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
11,400		12,000	118,000	71,000	45,000
11,500		12,000	118,000	71,000	45,000
11,510	29/64	12,000	118,000	71,000	45,000
11,550		12,000	118,000	71,000	45,000
11,600		12,000	118,000	71,000	45,000
11,700		12,000	118,000	71,000	45,000
11,800		12,000	118,000	71,000	45,000
11,900		12,000	118,000	71,000	45,000
11,910	15/32	12,000	118,000	71,000	45,000
12,000		12,000	118,000	71,000	45,000
12,100		14,000	124,000	77,000	45,000
12,200		14,000	124,000	77,000	45,000
12,300	31/64	14,000	124,000	77,000	45,000
12,400		14,000	124,000	77,000	45,000
12,500		14,000	124,000	77,000	45,000
12,600		14,000	124,000	77,000	45,000
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
13,000		14,000	124,000	77,000	45,000
13,100	33/64	14,000	124,000	77,000	45,000
13,200		14,000	124,000	77,000	45,000
13,300		14,000	124,000	77,000	45,000
13,400		14,000	124,000	77,000	45,000
13,490	17/32	14,000	124,000	77,000	45,000
13,500		14,000	124,000	77,000	45,000
13,600		14,000	124,000	77,000	45,000
13,700		14,000	124,000	77,000	45,000
13,800		14,000	124,000	77,000	45,000
13,890	35/64	14,000	124,000	77,000	45,000
13,900		14,000	124,000	77,000	45,000
14,000		14,000	124,000	77,000	45,000
14,100		16,000	133,000	83,000	48,000
14,200		16,000	133,000	83,000	48,000
14,290	9/16	16,000	133,000	83,000	48,000
14,300		16,000	133,000	83,000	48,000
14,400		16,000	133,000	83,000	48,000
14,500		16,000	133,000	83,000	48,000
14,600		16,000	133,000	83,000	48,000
14,680	37/64	16,000	133,000	83,000	48,000
14,700		16,000	133,000	83,000	48,000
14,800		16,000	133,000	83,000	48,000
14,900		16,000	133,000	83,000	48,000
15,000		16,000	133,000	83,000	48,000
15,080	19/32	16,000	133,000	83,000	48,000
15,100		16,000	133,000	83,000	48,000
15,200		16,000	133,000	83,000	48,000
15,300		16,000	133,000	83,000	48,000
15,400		16,000	133,000	83,000	48,000
15,480	39/64	16,000	133,000	83,000	48,000
15,500		16,000	133,000	83,000	48,000
15,550		16,000	133,000	83,000	48,000
15,600		16,000	133,000	83,000	48,000
15,700		16,000	133,000	83,000	48,000
15,800		16,000	133,000	83,000	48,000
15,870	5/8	16,000	133,000	83,000	48,000
15,900		16,000	133,000	83,000	48,000
16,000		16,000	133,000	83,000	48,000
16,270	41/64	18,000	143,000	93,000	48,000
16,300		18,000	143,000	93,000	48,000
16,500		18,000	143,000	93,000	48,000
16,670	21/32	18,000	143,000	93,000	48,000
16,700		18,000	143,000	93,000	48,000
16,900		18,000	143,000	93,000	48,000
17,000		18,000	143,000	93,000	48,000
17,070	43/64	18,000	143,000	93,000	48,000
17,460	11/16	18,000	143,000	93,000	48,000
17,500		18,000	143,000	93,000	48,000
17,550		18,000	143,000	93,000	48,000
17,700		18,000	143,000	93,000	48,000
17,860	45/64	18,000	143,000	93,000	48,000
18,000		18,000	143,000	93,000	48,000
18,260	23/32	20,000	153,000	101,000	50,000
18,500		20,000	153,000	101,000	50,000
18,700		20,000	153,000	101,000	50,000
18,900		20,000	153,000	101,000	50,000
19,000		20,000	153,000	101,000	50,000
19,050	3/4	20,000	153,000	101,000	50,000
19,250		20,000	153,000	101,000	50,000
19,300		20,000	153,000	101,000	50,000
19,450	49/64	20,000	153,000	101,000	50,000
19,500		20,000	153,000	101,000	50,000
19,550		20,000	153,000	101,000	50,000
19,700		20,000	153,000	101,000	50,000
19,800		20,000	153,000	101,000	50,000
19,840	25/32	20,000	153,000	101,000	50,000
20,000		20,000	153,000	101,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89308

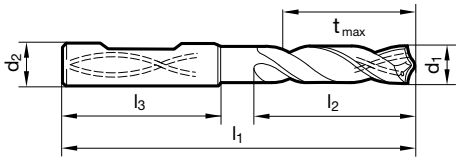
P	M	K	N	S	H
●	○	○	○		

HM | T | TS80 U | 7xD | DIN 6538L | 140° | h7 | R | HE

amin. de l'âme ≥ Ø 10,000 • affûtage à dépouille conique • amortit vibrations et chocs • support HSS avec plaquette CW brasée

aciers non alliés ou faiblement alliés • fontes grises, fontes à graphite sphéroïdal • laitons, bronzes, matières plastiques, graphite

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



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	16,500	20,000	202,000	148,000	50,000
13,000	16,000	167,000	115,000	48,000	17,000	20,000	202,000	148,000	50,000
13,500	16,000	167,000	115,000	48,000	18,000	20,000	202,000	148,000	50,000
14,000	16,000	167,000	115,000	48,000	19,000	25,000	224,000	164,000	56,000
15,000	20,000	186,000	132,000	50,000	20,000	25,000	224,000	164,000	56,000
16,000	20,000	186,000	132,000	50,000	22,000	25,000	241,000	181,000	56,000

TS-Drills avec refroidissement interne

N° d'article 89294

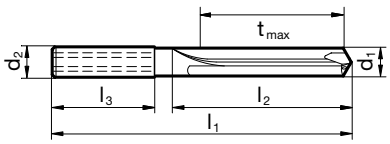
P	M	K	N	S	H
		●	○		

VHM | TS 150 GG | 7xD | WN | 120° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • tolérances serrées des diamètres • état de surface des perçages de qualité supérieure • respecter la pression optimale du liqu.de refroid.

fontes grises, fontes malléables, fontes à graphite sphéroïdal

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	74,000	32,000	36,000
3,100		6,000	74,000	32,000	36,000
3,200		6,000	74,000	32,000	36,000
3,500		6,000	74,000	34,000	36,000
3,600		6,000	74,000	34,000	36,000
3,700		6,000	74,000	34,000	36,000
3,800		6,000	97,000	45,000	36,000
4,000		6,000	97,000	45,000	36,000
4,100		6,000	97,000	45,000	36,000
4,200		6,000	97,000	45,000	36,000
4,300		6,000	97,000	45,000	36,000
4,400		6,000	97,000	45,000	36,000
4,500		6,000	97,000	45,000	36,000
4,700		6,000	97,000	45,000	36,000
4,800		6,000	97,000	57,000	36,000
4,900		6,000	97,000	57,000	36,000
5,000		6,000	97,000	57,000	36,000
5,500		6,000	97,000	57,000	36,000
6,000		6,000	97,000	57,000	36,000
6,500		8,000	116,000	76,000	36,000
6,800		8,000	116,000	76,000	36,000
7,000		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
10,000		10,000	139,000	95,000	40,000
10,200		12,000	163,000	114,000	45,000
10,500		12,000	163,000	114,000	45,000
11,000		12,000	163,000	114,000	45,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
11,500		12,000	163,000	114,000	45,000
12,000		12,000	163,000	114,000	45,000
12,300	31/64	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
13,500		14,000	182,000	133,000	45,000
14,000		14,000	182,000	133,000	45,000
14,500		16,000	204,000	152,000	48,000
15,000		16,000	204,000	152,000	48,000
15,500		16,000	204,000	152,000	48,000
16,000		16,000	204,000	152,000	48,000
16,500		18,000	223,000	171,000	48,000
17,000		18,000	223,000	171,000	48,000
17,500		18,000	223,000	171,000	48,000
18,000		18,000	223,000	171,000	48,000
18,500		20,000	244,000	190,000	50,000
19,000		20,000	244,000	190,000	50,000
19,500		20,000	244,000	190,000	50,000
20,000		20,000	244,000	190,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89412

P	M	K	N	S	H
●	○	●	○	○	○

VHM | F | TS 100 U | 7xD | WN | 140° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

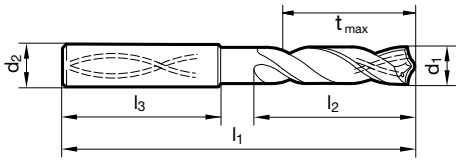
N° d'article 89416

P	M	K	N	S	H
●	○	●	○	○	○

VHM | F | TS 100 U | 7xD | WN | 140° | m7 | R | HE

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si

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



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	70,000	30,000	36,000	4,760	3/16	6,000	90,000	50,000	36,000
3,100		6,000	70,000	30,000	36,000	4,800		6,000	90,000	50,000	36,000
3,170	1/8	6,000	70,000	30,000	36,000	4,900		6,000	90,000	50,000	36,000
3,200		6,000	70,000	30,000	36,000	5,000		6,000	90,000	50,000	36,000
3,250		6,000	70,000	30,000	36,000	5,100		6,000	90,000	50,000	36,000
3,300		6,000	70,000	30,000	36,000	5,160	13/64	6,000	90,000	50,000	36,000
3,400		6,000	75,000	35,500	36,000	5,200		6,000	90,000	50,000	36,000
3,500		6,000	75,000	35,500	36,000	5,300		6,000	90,000	50,000	36,000
3,570	9/64	6,000	75,000	35,500	36,000	5,400		6,000	97,000	57,000	36,000
3,600		6,000	75,000	35,500	36,000	5,500		6,000	97,000	57,000	36,000
3,700		6,000	75,000	35,500	36,000	5,560	7/32	6,000	97,000	57,000	36,000
3,800		6,000	75,000	37,500	36,000	5,600		6,000	97,000	57,000	36,000
3,900		6,000	75,000	37,500	36,000	5,700		6,000	97,000	57,000	36,000
3,970	5/32	6,000	75,000	37,500	36,000	5,800		6,000	97,000	57,000	36,000
4,000		6,000	75,000	37,500	36,000	5,900		6,000	97,000	57,000	36,000
4,100		6,000	75,000	37,500	36,000	5,950	15/64	6,000	97,000	57,000	36,000
4,200		6,000	75,000	37,500	36,000	6,000		6,000	97,000	57,000	36,000
4,300		6,000	85,000	45,000	36,000	6,100		8,000	106,000	66,000	36,000
4,370	11/64	6,000	85,000	45,000	36,000	6,200		8,000	106,000	66,000	36,000
4,400		6,000	85,000	45,000	36,000	6,300		8,000	106,000	66,000	36,000
4,500		6,000	85,000	45,000	36,000	6,350	1/4	8,000	106,000	66,000	36,000
4,600		6,000	85,000	45,000	36,000	6,400		8,000	106,000	66,000	36,000
4,650		6,000	85,000	45,000	36,000	6,500		8,000	106,000	66,000	36,000
4,700		6,000	85,000	45,000	36,000	6,600		8,000	106,000	66,000	36,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,700		8,000	106,000	66,000	36,000
6,800		8,000	106,000	66,000	36,000
6,900		8,000	116,000	76,000	36,000
7,000		8,000	116,000	76,000	36,000
7,100		8,000	116,000	76,000	36,000
7,140	9/32	8,000	116,000	76,000	36,000
7,200		8,000	116,000	76,000	36,000
7,300		8,000	116,000	76,000	36,000
7,400		8,000	116,000	76,000	36,000
7,500		8,000	116,000	76,000	36,000
7,540	19/64	8,000	116,000	76,000	36,000
7,600		8,000	116,000	76,000	36,000
7,700		8,000	116,000	76,000	36,000
7,800		8,000	116,000	76,000	36,000
7,900		8,000	116,000	76,000	36,000
7,940	5/16	8,000	116,000	76,000	36,000
8,000		8,000	116,000	76,000	36,000
8,100		10,000	131,000	87,000	40,000
8,200		10,000	131,000	87,000	40,000
8,300		10,000	131,000	87,000	40,000
8,330	21/64	10,000	131,000	87,000	40,000
8,400		10,000	131,000	87,000	40,000
8,500		10,000	131,000	87,000	40,000
8,600		10,000	131,000	87,000	40,000
8,700		10,000	131,000	87,000	40,000
8,730	11/32	10,000	131,000	87,000	40,000
8,800		10,000	131,000	87,000	40,000
8,900		10,000	131,000	87,000	40,000
9,000		10,000	131,000	87,000	40,000
9,100		10,000	139,000	95,000	40,000
9,130	23/64	10,000	139,000	95,000	40,000
9,200		10,000	139,000	95,000	40,000
9,250		10,000	139,000	95,000	40,000
9,300		10,000	139,000	95,000	40,000
9,400		10,000	139,000	95,000	40,000
9,500		10,000	139,000	95,000	40,000
9,520	3/8	10,000	139,000	95,000	40,000
9,600		10,000	139,000	95,000	40,000
9,700		10,000	139,000	95,000	40,000
9,800		10,000	139,000	95,000	40,000
9,900		10,000	139,000	95,000	40,000
9,920	25/64	10,000	139,000	95,000	40,000
10,000		10,000	139,000	95,000	40,000
10,100		12,000	155,000	106,000	45,000
10,200		12,000	155,000	106,000	45,000
10,300		12,000	155,000	106,000	45,000
10,400		12,000	155,000	106,000	45,000
10,500		12,000	155,000	106,000	45,000
10,600		12,000	155,000	106,000	45,000
10,700		12,000	155,000	106,000	45,000
10,800		12,000	155,000	106,000	45,000
10,900		12,000	155,000	106,000	45,000
11,000		12,000	155,000	106,000	45,000
11,110	7/16	12,000	163,000	114,000	45,000
11,200		12,000	163,000	114,000	45,000
11,300		12,000	163,000	114,000	45,000
11,400		12,000	163,000	114,000	45,000
11,500		12,000	163,000	114,000	45,000
11,600		12,000	163,000	114,000	45,000
11,700		12,000	163,000	114,000	45,000
11,800		12,000	163,000	114,000	45,000
11,900		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
12,300	31/64	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
14,000		14,000	182,000	133,000	45,000
14,100		16,000	204,000	152,000	48,000
14,200		16,000	204,000	152,000	48,000
14,290	9/16	16,000	204,000	152,000	48,000
14,500		16,000	204,000	152,000	48,000
15,000		16,000	204,000	152,000	48,000
15,100		16,000	204,000	152,000	48,000
15,500		16,000	204,000	152,000	48,000
16,000		16,000	204,000	152,000	48,000
16,500		18,000	223,000	171,000	48,000
16,900		18,000	223,000	171,000	48,000
17,000		18,000	223,000	171,000	48,000
17,500		18,000	223,000	171,000	48,000
18,000		18,000	223,000	171,000	48,000
18,500		20,000	244,000	190,000	50,000
18,900		20,000	244,000	190,000	50,000
19,000		20,000	244,000	190,000	50,000
19,050	3/4	20,000	244,000	190,000	50,000
19,500		20,000	244,000	190,000	50,000
20,000		20,000	244,000	190,000	50,000

HARTNER

TS-Drills avec refroidissement interne

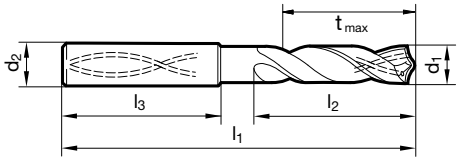
N° d'article 89421

P	M	K	N	S	H
		•			

VHM | F | TS 100 R | 7xD | WN | m7 | R | HA

amin. de l'âme ≥ Ø 4,000 • affûtage des rayons, breveté • forme de l´arête de coupe rectiligne (par correction)
fontes vermiculaires GGV et ADI, CDI • fontes grises, fontes malléables, fontes à graphite sphéroïdal

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
4,000		6,000	75,000	37,500	36,000
4,100		6,000	75,000	37,500	36,000
4,200		6,000	75,000	37,500	36,000
4,300		6,000	85,000	45,000	36,000
4,370	11/64	6,000	85,000	45,000	36,000
4,400		6,000	85,000	45,000	36,000
4,500		6,000	85,000	45,000	36,000
4,600		6,000	85,000	45,000	36,000
4,650		6,000	85,000	45,000	36,000
4,700		6,000	85,000	45,000	36,000
4,760	3/16	6,000	90,000	50,000	36,000
4,800		6,000	90,000	50,000	36,000
4,900		6,000	90,000	50,000	36,000
5,000		6,000	90,000	50,000	36,000
5,100		6,000	90,000	50,000	36,000
5,160	13/64	6,000	90,000	50,000	36,000
5,200		6,000	90,000	50,000	36,000
5,300		6,000	90,000	50,000	36,000
5,400		6,000	97,000	57,000	36,000
5,500		6,000	97,000	57,000	36,000
5,550		6,000	97,000	57,000	36,000
5,560	7/32	6,000	97,000	57,000	36,000
5,600		6,000	97,000	57,000	36,000
5,700		6,000	97,000	57,000	36,000
5,800		6,000	97,000	57,000	36,000
5,900		6,000	97,000	57,000	36,000
5,950	15/64	6,000	97,000	57,000	36,000
6,000		6,000	97,000	57,000	36,000
6,100		8,000	106,000	66,000	36,000
6,200		8,000	106,000	66,000	36,000
6,300		8,000	106,000	66,000	36,000
6,350	1/4	8,000	106,000	66,000	36,000
6,400		8,000	106,000	66,000	36,000
6,500		8,000	106,000	66,000	36,000
6,600		8,000	106,000	66,000	36,000
6,700		8,000	106,000	66,000	36,000
6,750	17/64	8,000	106,000	66,000	36,000
6,800		8,000	106,000	66,000	36,000
6,900		8,000	116,000	76,000	36,000
7,000		8,000	116,000	76,000	36,000
7,100		8,000	116,000	76,000	36,000
7,140	9/32	8,000	116,000	76,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,200		8,000	116,000	76,000	36,000
7,300		8,000	116,000	76,000	36,000
7,400		8,000	116,000	76,000	36,000
7,500		8,000	116,000	76,000	36,000
7,540	19/64	8,000	116,000	76,000	36,000
7,600		8,000	116,000	76,000	36,000
7,700		8,000	116,000	76,000	36,000
7,800		8,000	116,000	76,000	36,000
7,900		8,000	116,000	76,000	36,000
7,940	5/16	8,000	116,000	76,000	36,000
8,000		8,000	116,000	76,000	36,000
8,100		10,000	131,000	87,000	40,000
8,200		10,000	131,000	87,000	40,000
8,300		10,000	131,000	87,000	40,000
8,330	21/64	10,000	131,000	87,000	40,000
8,400		10,000	131,000	87,000	40,000
8,500		10,000	131,000	87,000	40,000
8,600		10,000	131,000	87,000	40,000
8,700		10,000	131,000	87,000	40,000
8,730	11/32	10,000	131,000	87,000	40,000
8,800		10,000	131,000	87,000	40,000
8,900		10,000	131,000	87,000	40,000
9,000		10,000	131,000	87,000	40,000
9,100		10,000	139,000	95,000	40,000
9,130	23/64	10,000	139,000	95,000	40,000
9,200		10,000	139,000	95,000	40,000
9,250		10,000	139,000	95,000	40,000
9,300		10,000	139,000	95,000	40,000
9,400		10,000	139,000	95,000	40,000
9,500		10,000	139,000	95,000	40,000
9,520	3/8	10,000	139,000	95,000	40,000
9,600		10,000	139,000	95,000	40,000
9,700		10,000	139,000	95,000	40,000
9,800		10,000	139,000	95,000	40,000
9,900		10,000	139,000	95,000	40,000
9,920	25/64	10,000	139,000	95,000	40,000
10,000		10,000	139,000	95,000	40,000
10,100		12,000	155,000	106,000	45,000
10,200		12,000	155,000	106,000	45,000
10,300		12,000	155,000	106,000	45,000
10,320	13/32	12,000	155,000	106,000	45,000
10,400		12,000	155,000	106,000	45,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
10,500		12,000	155,000	106,000	45,000
10,600		12,000	155,000	106,000	45,000
10,700		12,000	155,000	106,000	45,000
10,720	27/64	12,000	155,000	106,000	45,000
10,800		12,000	155,000	106,000	45,000
10,900		12,000	155,000	106,000	45,000
11,000		12,000	155,000	106,000	45,000
11,100		12,000	163,000	114,000	45,000
11,110	7/16	12,000	163,000	114,000	45,000
11,200		12,000	163,000	114,000	45,000
11,300		12,000	163,000	114,000	45,000
11,400		12,000	163,000	114,000	45,000
11,500		12,000	163,000	114,000	45,000
11,600		12,000	163,000	114,000	45,000
11,700		12,000	163,000	114,000	45,000
11,800		12,000	163,000	114,000	45,000
11,900		12,000	163,000	114,000	45,000
11,910	15/32	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
12,300	31/64	14,000	182,000	133,000	45,000
12,400		14,000	182,000	133,000	45,000
12,500		14,000	182,000	133,000	45,000
12,600		14,000	182,000	133,000	45,000
12,700	1/2	14,000	182,000	133,000	45,000
12,800		14,000	182,000	133,000	45,000
12,900		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
13,300		14,000	182,000	133,000	45,000
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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
14,000		14,000	182,000	133,000	45,000
14,100		16,000	204,000	152,000	48,000
14,200		16,000	204,000	152,000	48,000
14,290	9/16	16,000	204,000	152,000	48,000
14,300		16,000	204,000	152,000	48,000
14,400		16,000	204,000	152,000	48,000
14,500		16,000	204,000	152,000	48,000
14,600		16,000	204,000	152,000	48,000
14,700		16,000	204,000	152,000	48,000
14,900		16,000	204,000	152,000	48,000
15,000		16,000	204,000	152,000	48,000
15,100		16,000	204,000	152,000	48,000
15,200		16,000	204,000	152,000	48,000
15,300		16,000	204,000	152,000	48,000
15,400		16,000	204,000	152,000	48,000
15,500		16,000	204,000	152,000	48,000
15,600		16,000	204,000	152,000	48,000
15,700		16,000	204,000	152,000	48,000
15,800		16,000	204,000	152,000	48,000
15,870	5/8	16,000	204,000	152,000	48,000
15,900		16,000	204,000	152,000	48,000
16,000		16,000	204,000	152,000	48,000
16,500		18,000	223,000	171,000	48,000
16,670	21/32	18,000	223,000	171,000	48,000
17,000		18,000	223,000	171,000	48,000
17,500		18,000	223,000	171,000	48,000
18,000		18,000	223,000	171,000	48,000
18,500		20,000	244,000	190,000	50,000
19,000		20,000	244,000	190,000	50,000
19,500		20,000	244,000	190,000	50,000
20,000		20,000	244,000	190,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89427

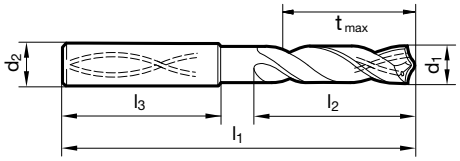
P	M	K	N	S	H
●				●	○

VHM | TS 100 H | 7xD | WN | 140° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • forme de l´arête de coupe principale légèrement concave • géométrie de coupe optimisée

aciers alliés et à haute résistance jusqu'à 1400 N/mm² • Inconel, Hastelloy, Monel • Titane et ses alliages

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	70,000	30,000	36,000
3,250		6,000	70,000	30,000	36,000
3,300		6,000	70,000	30,000	36,000
3,400		6,000	75,000	35,500	36,000
3,500		6,000	75,000	35,500	36,000
3,700		6,000	75,000	35,500	36,000
4,000		6,000	75,000	37,500	36,000
4,200		6,000	75,000	37,500	36,000
4,300		6,000	85,000	45,000	36,000
4,500		6,000	85,000	45,000	36,000
4,650		6,000	85,000	45,000	36,000
5,000		6,000	90,000	50,000	36,000
5,100		6,000	90,000	50,000	36,000
5,200		6,000	90,000	50,000	36,000
5,500		6,000	97,000	57,000	36,000
5,550		6,000	97,000	57,000	36,000
6,000		6,000	97,000	57,000	36,000
6,500		8,000	106,000	66,000	36,000
6,750	17/64	8,000	106,000	66,000	36,000
6,800		8,000	106,000	66,000	36,000
6,900		8,000	116,000	76,000	36,000
7,000		8,000	116,000	76,000	36,000
7,400		8,000	116,000	76,000	36,000
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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,250		10,000	139,000	95,000	40,000
9,400		10,000	139,000	95,000	40,000
9,500		10,000	139,000	95,000	40,000
10,000		10,000	139,000	95,000	40,000
10,200		12,000	155,000	106,000	45,000
10,400		12,000	155,000	106,000	45,000
10,500		12,000	155,000	106,000	45,000
10,800		12,000	155,000	106,000	45,000
11,000		12,000	155,000	106,000	45,000
11,300		12,000	163,000	114,000	45,000
11,400		12,000	163,000	114,000	45,000
11,500		12,000	163,000	114,000	45,000
12,000		12,000	163,000	114,000	45,000
12,500		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
14,000		14,000	182,000	133,000	45,000
14,500		16,000	204,000	152,000	48,000
15,000		16,000	204,000	152,000	48,000
15,100		16,000	204,000	152,000	48,000
15,500		16,000	204,000	152,000	48,000
16,000		16,000	204,000	152,000	48,000

TS-Drills avec refroidissement interne

N° d'article 89461

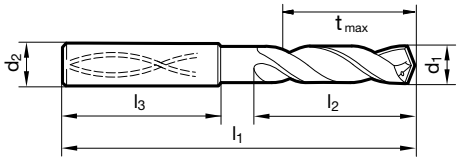
P	M	K	N	S	H
●	○	○		○	○

VHM | F | TS 100 HPC | 7xD | WN | 140° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • arête de coupe principale concave • affûtage à dépouille conique • géométrie de coupe optimisée • performance maximale

aciers de décolletage, aciers d'amélioration • aciers inox., inaltérables aux acides et réfractaires • Titane et ses alliages • aciers (alliés / non alliés) jusqu'à 1400 N/mm² • pour l'usinage haute performance des aciers de construction et des aciers de cémentation • alliages spéciaux

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	70,000	30,000	36,000
3,100		6,000	70,000	30,000	36,000
3,170	1/8	6,000	70,000	30,000	36,000
3,200		6,000	70,000	30,000	36,000
3,250		6,000	70,000	30,000	36,000
3,300		6,000	70,000	30,000	36,000
3,400		6,000	75,000	35,500	36,000
3,500		6,000	75,000	35,500	36,000
3,570	9/64	6,000	75,000	35,500	36,000
3,600		6,000	75,000	35,500	36,000
3,700		6,000	75,000	35,500	36,000
3,800		6,000	75,000	37,500	36,000
3,900		6,000	75,000	37,500	36,000
3,970	5/32	6,000	75,000	37,500	36,000
4,000		6,000	75,000	37,500	36,000
4,040		6,000	75,000	37,500	36,000
4,100		6,000	75,000	37,500	36,000
4,200		6,000	75,000	37,500	36,000
4,300		6,000	85,000	45,000	36,000
4,370	11/64	6,000	85,000	45,000	36,000
4,400		6,000	85,000	45,000	36,000
4,500		6,000	85,000	45,000	36,000
4,600		6,000	85,000	45,000	36,000
4,650		6,000	85,000	45,000	36,000
4,700		6,000	85,000	45,000	36,000
4,760	3/16	6,000	90,000	50,000	36,000
4,800		6,000	90,000	50,000	36,000
4,900		6,000	90,000	50,000	36,000
5,000		6,000	90,000	50,000	36,000
5,100		6,000	90,000	50,000	36,000
5,110		6,000	90,000	50,000	36,000
5,160	13/64	6,000	90,000	50,000	36,000
5,200		6,000	90,000	50,000	36,000
5,300		6,000	90,000	50,000	36,000
5,400		6,000	97,000	57,000	36,000
5,410		6,000	97,000	57,000	36,000
5,500		6,000	97,000	57,000	36,000
5,550		6,000	97,000	57,000	36,000
5,560	7/32	6,000	97,000	57,000	36,000
5,600		6,000	97,000	57,000	36,000
5,700		6,000	97,000	57,000	36,000
5,800		6,000	97,000	57,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
5,900		6,000	97,000	57,000	36,000
5,950	15/64	6,000	97,000	57,000	36,000
6,000		6,000	97,000	57,000	36,000
6,100		8,000	106,000	66,000	36,000
6,200		8,000	106,000	66,000	36,000
6,300		8,000	106,000	66,000	36,000
6,350	1/4	8,000	106,000	66,000	36,000
6,400		8,000	106,000	66,000	36,000
6,500		8,000	106,000	66,000	36,000
6,530		8,000	106,000	66,000	36,000
6,550		8,000	106,000	66,000	36,000
6,600		8,000	106,000	66,000	36,000
6,700		8,000	106,000	66,000	36,000
6,750	17/64	8,000	106,000	66,000	36,000
6,800		8,000	106,000	66,000	36,000
6,900		8,000	116,000	76,000	36,000
7,000		8,000	116,000	76,000	36,000
7,100		8,000	116,000	76,000	36,000
7,140	9/32	8,000	116,000	76,000	36,000
7,200		8,000	116,000	76,000	36,000
7,300		8,000	116,000	76,000	36,000
7,400		8,000	116,000	76,000	36,000
7,500		8,000	116,000	76,000	36,000
7,540	19/64	8,000	116,000	76,000	36,000
7,600		8,000	116,000	76,000	36,000
7,700		8,000	116,000	76,000	36,000
7,800		8,000	116,000	76,000	36,000
7,900		8,000	116,000	76,000	36,000
7,940	5/16	8,000	116,000	76,000	36,000
8,000		8,000	116,000	76,000	36,000
8,100		10,000	131,000	87,000	40,000
8,200		10,000	131,000	87,000	40,000
8,300		10,000	131,000	87,000	40,000
8,330	21/64	10,000	131,000	87,000	40,000
8,400		10,000	131,000	87,000	40,000
8,500		10,000	131,000	87,000	40,000
8,600		10,000	131,000	87,000	40,000
8,700		10,000	131,000	87,000	40,000
8,730	11/32	10,000	131,000	87,000	40,000
8,800		10,000	131,000	87,000	40,000
8,900		10,000	131,000	87,000	40,000
9,000		10,000	131,000	87,000	40,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,100		10,000	139,000	95,000	40,000
9,130	23/64	10,000	139,000	95,000	40,000
9,200		10,000	139,000	95,000	40,000
9,250		10,000	139,000	95,000	40,000
9,300		10,000	139,000	95,000	40,000
9,340		10,000	139,000	95,000	40,000
9,400		10,000	139,000	95,000	40,000
9,500		10,000	139,000	95,000	40,000
9,520	3/8	10,000	139,000	95,000	40,000
9,600		10,000	139,000	95,000	40,000
9,700		10,000	139,000	95,000	40,000
9,800		10,000	139,000	95,000	40,000
9,900		10,000	139,000	95,000	40,000
9,920	25/64	10,000	139,000	95,000	40,000
10,000		10,000	139,000	95,000	40,000
10,100		12,000	155,000	106,000	45,000
10,200		12,000	155,000	106,000	45,000
10,300		12,000	155,000	106,000	45,000
10,320	13/32	12,000	155,000	106,000	45,000
10,400		12,000	155,000	106,000	45,000
10,500		12,000	155,000	106,000	45,000
10,600		12,000	155,000	106,000	45,000
10,700		12,000	155,000	106,000	45,000
10,720	27/64	12,000	155,000	106,000	45,000
10,800		12,000	155,000	106,000	45,000
10,900		12,000	155,000	106,000	45,000
11,000		12,000	155,000	106,000	45,000
11,100		12,000	163,000	114,000	45,000
11,110	7/16	12,000	163,000	114,000	45,000
11,200		12,000	163,000	114,000	45,000
11,300		12,000	163,000	114,000	45,000
11,400		12,000	163,000	114,000	45,000
11,500		12,000	163,000	114,000	45,000
11,510	29/64	12,000	163,000	114,000	45,000
11,600		12,000	163,000	114,000	45,000
11,700		12,000	163,000	114,000	45,000
11,800		12,000	163,000	114,000	45,000
11,900		12,000	163,000	114,000	45,000
11,910	15/32	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
12,300	31/64	14,000	182,000	133,000	45,000
12,400		14,000	182,000	133,000	45,000
12,500		14,000	182,000	133,000	45,000
12,600		14,000	182,000	133,000	45,000
12,700	1/2	14,000	182,000	133,000	45,000
12,800		14,000	182,000	133,000	45,000
12,900		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
13,490	17/32	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
13,890	35/64	14,000	182,000	133,000	45,000
14,000		14,000	182,000	133,000	45,000
14,100		16,000	204,000	152,000	48,000
14,200		16,000	204,000	152,000	48,000
14,290	9/16	16,000	204,000	152,000	48,000
14,300		16,000	204,000	152,000	48,000
14,500		16,000	204,000	152,000	48,000
14,700		16,000	204,000	152,000	48,000
14,800		16,000	204,000	152,000	48,000
15,000		16,000	204,000	152,000	48,000
15,100		16,000	204,000	152,000	48,000
15,300		16,000	204,000	152,000	48,000
15,480	39/64	16,000	204,000	152,000	48,000
15,500		16,000	204,000	152,000	48,000
15,700		16,000	204,000	152,000	48,000
15,800		16,000	204,000	152,000	48,000
15,870	5/8	16,000	204,000	152,000	48,000
16,000		16,000	204,000	152,000	48,000
16,300		18,000	223,000	171,000	48,000
16,500		18,000	223,000	171,000	48,000
16,700		18,000	223,000	171,000	48,000
16,900		18,000	223,000	171,000	48,000
17,000		18,000	223,000	171,000	48,000
17,500		18,000	223,000	171,000	48,000
17,700		18,000	223,000	171,000	48,000
18,000		18,000	223,000	171,000	48,000
18,500		20,000	244,000	190,000	50,000
18,900		20,000	244,000	190,000	50,000
19,000		20,000	244,000	190,000	50,000
19,050	3/4	20,000	244,000	190,000	50,000
19,500		20,000	244,000	190,000	50,000
19,800		20,000	244,000	190,000	50,000
20,000		20,000	244,000	190,000	50,000

TS-Drills avec refroidissement interne

N° d'article 89293

P	M	K	N	S	H
		●	○		

VHM | TS 150 GG | 10xD | WN | 120° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • tolérances serrées des diamètres • état de surface des perçages de qualité supérieure • respecter la pression optimale du liqu.de refroid.

fontes grises, fontes malléables, fontes à graphite sphéroïdal

N° d'article 89295

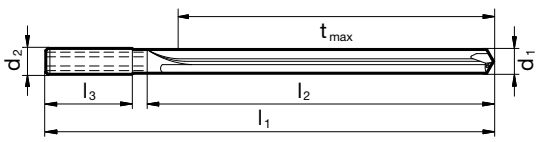
P	M	K	N	S	H
		○	●		

VHM | TS 150 GG | 10xD | WN | 130° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • tolérances serrées des diamètres • état de surface des perçages de qualité supérieure • respecter la pression optimale du liqu.de refroid.

fontes grises, fontes malléables, fontes à graphite sphéroïdal

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	91,000	42,000	36,000
3,100		6,000	91,000	42,000	36,000
3,170	1/8	6,000	91,000	42,000	36,000
3,200		6,000	91,000	42,000	36,000
3,250		6,000	91,000	42,000	36,000
3,300		6,000	91,000	42,000	36,000
3,400		6,000	91,000	48,000	36,000
3,500		6,000	91,000	48,000	36,000
3,570	9/64	6,000	91,000	48,000	36,000
3,600		6,000	91,000	48,000	36,000
3,700		6,000	91,000	48,000	36,000
3,800		6,000	121,000	77,000	36,000
3,900		6,000	121,000	77,000	36,000
3,970	5/32	6,000	121,000	77,000	36,000
4,000		6,000	121,000	77,000	36,000
4,200		6,000	121,000	77,000	36,000
4,300		6,000	121,000	77,000	36,000
4,400		6,000	121,000	77,000	36,000
4,500		6,000	121,000	77,000	36,000
4,700		6,000	121,000	77,000	36,000
4,800		6,000	121,000	82,000	36,000
5,000		6,000	121,000	82,000	36,000
5,160	13/64	6,000	121,000	82,000	36,000
5,500		6,000	121,000	82,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,000		6,000	121,000	82,000	36,000
6,350	1/4	8,000	146,000	106,000	36,000
6,500		8,000	146,000	106,000	36,000
6,800		8,000	146,000	106,000	36,000
7,000		8,000	146,000	106,000	36,000
7,140	9/32	8,000	146,000	106,000	36,000
7,500		8,000	146,000	106,000	36,000
7,800		8,000	146,000	106,000	36,000
7,940	5/16	8,000	146,000	106,000	36,000
8,000		8,000	146,000	106,000	36,000
8,500		10,000	175,000	130,000	40,000
8,730	11/32	10,000	175,000	130,000	40,000
9,000		10,000	175,000	130,000	40,000
9,500		10,000	175,000	130,000	40,000
9,520	3/8	10,000	175,000	130,000	40,000
10,000		10,000	175,000	130,000	40,000
10,200		12,000	209,000	159,000	45,000
10,500		12,000	209,000	159,000	45,000
10,720	27/64	12,000	209,000	159,000	45,000
11,000		12,000	209,000	159,000	45,000
11,110	7/16	12,000	209,000	159,000	45,000
11,500		12,000	209,000	159,000	45,000
12,000		12,000	209,000	159,000	45,000
12,500		14,000	233,000	183,000	45,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
12,700	1/2	14,000	233,000	183,000	45,000
13,000		14,000	233,000	183,000	45,000
13,500		14,000	233,000	183,000	45,000
14,000		14,000	233,000	183,000	45,000
14,500		16,000	260,000	207,000	48,000
15,000		16,000	260,000	207,000	48,000
15,500		16,000	260,000	207,000	48,000
16,000		16,000	260,000	207,000	48,000
16,500		18,000	284,000	231,000	48,000
17,000		18,000	284,000	231,000	48,000
17,500		18,000	284,000	231,000	48,000
18,000		18,000	284,000	231,000	48,000

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

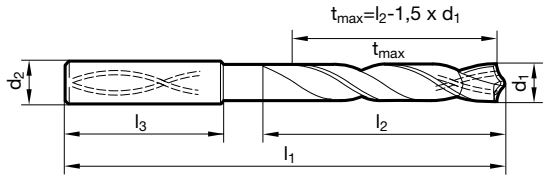
TS-Drills avec refroidissement interne

N° d'article 89418

P	M	K	N	S	H
●	○	●	○	○	○

VHM | F | TS 100 U | 12xD | WN | 135° | h7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • pointe revêtue • arête de coupe principale rectiligne • géométrie de coupe optimisée
aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers (alliés / non alliés) jusqu'à 1200 N/mm² • fontes • bronze, laiton • alliages Al haut % en Si



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	90,000	50,000	36,000
3,100		6,000	90,000	50,000	36,000
3,170	1/8	6,000	90,000	50,000	36,000
3,200		6,000	90,000	50,000	36,000
3,300		6,000	90,000	50,000	36,000
3,400		6,000	90,000	50,000	36,000
3,500		6,000	90,000	50,000	36,000
3,570	9/64	6,000	90,000	50,000	36,000
3,600		6,000	90,000	50,000	36,000
3,700		6,000	90,000	50,000	36,000
3,800		6,000	102,000	64,000	36,000
3,900		6,000	102,000	64,000	36,000
3,970	5/32	6,000	102,000	64,000	36,000
4,000		6,000	102,000	64,000	36,000
4,100		6,000	102,000	64,000	36,000
4,200		6,000	102,000	64,000	36,000
4,300		6,000	102,000	64,000	36,000
4,370	11/64	6,000	102,000	64,000	36,000
4,400		6,000	102,000	64,000	36,000
4,500		6,000	102,000	64,000	36,000
4,600		6,000	102,000	64,000	36,000
4,700		6,000	102,000	64,000	36,000
4,760	3/16	6,000	116,000	78,000	36,000
4,800		6,000	116,000	78,000	36,000
4,900		6,000	116,000	78,000	36,000
5,000		6,000	116,000	78,000	36,000
5,100		6,000	116,000	78,000	36,000
5,160	13/64	6,000	116,000	78,000	36,000
5,200		6,000	116,000	78,000	36,000
5,300		6,000	116,000	78,000	36,000
5,400		6,000	116,000	78,000	36,000
5,500		6,000	116,000	78,000	36,000
5,560	7/32	6,000	116,000	78,000	36,000
5,600		6,000	116,000	78,000	36,000
5,700		6,000	116,000	78,000	36,000
5,800		6,000	116,000	78,000	36,000
5,900		6,000	116,000	78,000	36,000
5,950	15/64	6,000	116,000	78,000	36,000
6,000		6,000	116,000	78,000	36,000
6,100		8,000	146,000	108,000	36,000
6,200		8,000	146,000	108,000	36,000
6,300		8,000	146,000	108,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,350	1/4	8,000	146,000	108,000	36,000
6,400		8,000	146,000	108,000	36,000
6,500		8,000	146,000	108,000	36,000
6,600		8,000	146,000	108,000	36,000
6,700		8,000	146,000	108,000	36,000
6,750	17/64	8,000	146,000	108,000	36,000
6,800		8,000	146,000	108,000	36,000
6,900		8,000	146,000	108,000	36,000
7,000		8,000	146,000	108,000	36,000
7,100		8,000	146,000	108,000	36,000
7,140	9/32	8,000	146,000	108,000	36,000
7,200		8,000	146,000	108,000	36,000
7,300		8,000	146,000	108,000	36,000
7,400		8,000	146,000	108,000	36,000
7,500		8,000	146,000	108,000	36,000
7,540	19/64	8,000	146,000	108,000	36,000
7,600		8,000	146,000	108,000	36,000
7,700		8,000	146,000	108,000	36,000
7,800		8,000	146,000	108,000	36,000
7,900		8,000	146,000	108,000	36,000
7,940	5/16	8,000	146,000	108,000	36,000
8,000		8,000	146,000	108,000	36,000
8,100		10,000	162,000	120,000	40,000
8,200		10,000	162,000	120,000	40,000
8,300		10,000	162,000	120,000	40,000
8,330	21/64	10,000	162,000	120,000	40,000
8,400		10,000	162,000	120,000	40,000
8,500		10,000	162,000	120,000	40,000
8,600		10,000	162,000	120,000	40,000
8,700		10,000	162,000	120,000	40,000
8,730	11/32	10,000	162,000	120,000	40,000
8,800		10,000	162,000	120,000	40,000
8,900		10,000	162,000	120,000	40,000
9,000		10,000	162,000	120,000	40,000
9,100		10,000	162,000	120,000	40,000
9,130	23/64	10,000	162,000	120,000	40,000
9,200		10,000	162,000	120,000	40,000
9,300		10,000	162,000	120,000	40,000
9,400		10,000	162,000	120,000	40,000
9,500		10,000	162,000	120,000	40,000
9,520	3/8	10,000	162,000	120,000	40,000
9,600		10,000	162,000	120,000	40,000

TS-Drills avec refroidissement interne

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,700		10,000	162,000	120,000	40,000
9,800		10,000	162,000	120,000	40,000
9,900		10,000	162,000	120,000	40,000
9,920	25/64	10,000	162,000	120,000	40,000
10,000		10,000	162,000	120,000	40,000
10,100		12,000	204,000	156,000	45,000
10,200		12,000	204,000	156,000	45,000
10,300		12,000	204,000	156,000	45,000
10,320	13/32	12,000	204,000	156,000	45,000
10,500		12,000	204,000	156,000	45,000
10,600		12,000	204,000	156,000	45,000
10,700		12,000	204,000	156,000	45,000
10,720	27/64	12,000	204,000	156,000	45,000
10,800		12,000	204,000	156,000	45,000
10,900		12,000	204,000	156,000	45,000
11,000		12,000	204,000	156,000	45,000
11,110	7/16	12,000	204,000	156,000	45,000
11,500		12,000	204,000	156,000	45,000
11,510	29/64	12,000	204,000	156,000	45,000
11,910	15/32	12,000	204,000	156,000	45,000
12,000		12,000	204,000	156,000	45,000
12,300	31/64	14,000	230,000	182,000	45,000
12,500		14,000	230,000	182,000	45,000
12,700	1/2	14,000	230,000	182,000	45,000
13,000		14,000	230,000	182,000	45,000
13,500		14,000	230,000	182,000	45,000
13,890	35/64	14,000	230,000	182,000	45,000
14,000		14,000	230,000	182,000	45,000
14,500		16,000	260,000	208,000	48,000
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
20,000		20,000	310,000	258,000	50,000

TS-Drills avec refroidissement interne

N° d'article 86509

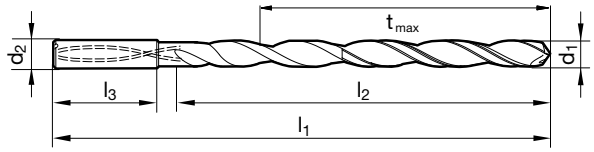
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 15xD | WN | 135° | h7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • pointe revêtue • forme concave de l´arête de coupe principale • section des goujures optimisée • section maximale des canaux de lubrification • respecter la pression du liquide de refroid.

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	95,000	55,000	36,000
3,100		6,000	106,000	66,000	36,000
3,170	1/8	6,000	106,000	66,000	36,000
3,200		6,000	106,000	66,000	36,000
3,300		6,000	106,000	66,000	36,000
3,500		6,000	116,000	76,000	36,000
3,570	9/64	6,000	116,000	76,000	36,000
3,700		6,000	116,000	76,000	36,000
3,800		6,000	116,000	76,000	36,000
3,970	5/32	6,000	116,000	76,000	36,000
4,000		6,000	116,000	76,000	36,000
4,200		6,000	133,000	93,000	36,000
4,300		6,000	133,000	93,000	36,000
4,370	11/64	6,000	133,000	93,000	36,000
4,500		6,000	133,000	93,000	36,000
4,600		6,000	133,000	93,000	36,000
4,760	3/16	6,000	133,000	93,000	36,000
4,800		6,000	133,000	93,000	36,000
5,000		6,000	133,000	93,000	36,000
5,100		6,000	150,000	110,000	36,000
5,160	13/64	6,000	150,000	110,000	36,000
5,410		6,000	150,000	110,000	36,000
5,500		6,000	150,000	110,000	36,000
5,560	7/32	6,000	150,000	110,000	36,000
5,600		6,000	150,000	110,000	36,000
5,800		6,000	150,000	110,000	36,000
5,950	15/64	6,000	150,000	110,000	36,000
6,000		6,000	150,000	110,000	36,000
6,300		8,000	167,000	127,000	36,000
6,350	1/4	8,000	167,000	127,000	36,000
6,500		8,000	167,000	127,000	36,000
6,750	17/64	8,000	167,000	127,000	36,000
6,800		8,000	167,000	127,000	36,000
7,000		8,000	167,000	127,000	36,000
7,140	9/32	8,000	183,000	143,000	36,000
7,500		8,000	183,000	143,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,540	19/64	8,000	183,000	143,000	36,000
7,800		8,000	183,000	143,000	36,000
7,940	5/16	8,000	183,000	143,000	36,000
8,000		8,000	183,000	143,000	36,000
8,330	21/64	10,000	204,000	160,000	40,000
8,500		10,000	204,000	160,000	40,000
8,730	11/32	10,000	204,000	160,000	40,000
8,800		10,000	204,000	160,000	40,000
9,000		10,000	204,000	160,000	40,000
9,130	23/64	10,000	221,000	177,000	40,000
9,500		10,000	221,000	177,000	40,000
9,520	3/8	10,000	221,000	177,000	40,000
9,800		10,000	221,000	177,000	40,000
9,920	25/64	10,000	221,000	177,000	40,000
10,000		10,000	221,000	177,000	40,000
10,320	13/32	12,000	247,000	198,000	45,000
10,500		12,000	247,000	198,000	45,000
10,720	27/64	12,000	247,000	198,000	45,000
11,000		12,000	247,000	198,000	45,000
11,110	7/16	12,000	263,000	214,000	45,000
11,510	29/64	12,000	263,000	214,000	45,000
11,800		12,000	263,000	214,000	45,000
11,910	15/32	12,000	263,000	214,000	45,000
12,000		12,000	263,000	214,000	45,000
12,300	31/64	14,000	297,000	248,000	45,000
12,500		14,000	297,000	248,000	45,000
12,700	1/2	14,000	297,000	248,000	45,000
13,000		14,000	297,000	248,000	45,000
13,100	33/64	14,000	297,000	248,000	45,000
13,490	17/32	14,000	297,000	248,000	45,000
13,890	35/64	14,000	297,000	248,000	45,000
14,000		14,000	297,000	248,000	45,000
14,290	9/16	16,000	333,000	281,000	48,000
15,000		16,000	333,000	281,000	48,000
15,870	5/8	16,000	333,000	281,000	48,000
16,000		16,000	333,000	281,000	48,000

TS-Drills avec refroidissement interne

N° d'article 86511

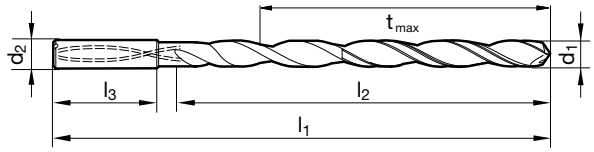
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 20xD | WN | 135° | h7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • pointe revêtue • forme concave de l´arête de coupe principale • section des goujures optimisée • section maximale des canaux de lubrification • respecter la pression du liquide de refroid.

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	110,000	70,000	36,000
3,100		6,000	123,000	83,000	36,000
3,170	1/8	6,000	123,000	83,000	36,000
3,200		6,000	123,000	83,000	36,000
3,300		6,000	123,000	83,000	36,000
3,500		6,000	136,000	96,000	36,000
3,570	9/64	6,000	136,000	96,000	36,000
3,700		6,000	136,000	96,000	36,000
3,800		6,000	136,000	96,000	36,000
3,970	5/32	6,000	136,000	96,000	36,000
4,000		6,000	136,000	96,000	36,000
4,200		6,000	158,000	118,000	36,000
4,300		6,000	158,000	118,000	36,000
4,370	11/64	6,000	158,000	118,000	36,000
4,500		6,000	158,000	118,000	36,000
4,600		6,000	158,000	118,000	36,000
4,760	3/16	6,000	158,000	118,000	36,000
4,800		6,000	158,000	118,000	36,000
5,000		6,000	158,000	118,000	36,000
5,100		6,000	180,000	140,000	36,000
5,160	13/64	6,000	180,000	140,000	36,000
5,410		6,000	180,000	140,000	36,000
5,500		6,000	180,000	140,000	36,000
5,560	7/32	6,000	180,000	140,000	36,000
5,800		6,000	180,000	140,000	36,000
5,950	15/64	6,000	180,000	140,000	36,000
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
6,750	17/64	8,000	202,000	162,000	36,000
6,800		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
7,540	19/64	8,000	223,000	183,000	36,000
7,800		8,000	223,000	183,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,940	5/16	8,000	223,000	183,000	36,000
8,000		8,000	223,000	183,000	36,000
8,330	21/64	10,000	249,000	205,000	40,000
8,500		10,000	249,000	205,000	40,000
8,730	11/32	10,000	249,000	205,000	40,000
8,800		10,000	249,000	205,000	40,000
9,000		10,000	249,000	205,000	40,000
9,130	23/64	10,000	271,000	227,000	40,000
9,520	3/8	10,000	271,000	227,000	40,000
9,920	25/64	10,000	271,000	227,000	40,000
10,000		10,000	271,000	227,000	40,000
10,200		12,000	302,000	253,000	45,000
10,320	13/32	12,000	302,000	253,000	45,000
10,500		12,000	302,000	253,000	45,000
10,720	27/64	12,000	302,000	253,000	45,000
11,000		12,000	302,000	253,000	45,000
11,110	7/16	12,000	323,000	274,000	45,000
11,510	29/64	12,000	323,000	274,000	45,000
11,800		12,000	323,000	274,000	45,000
11,910	15/32	12,000	323,000	274,000	45,000
12,000		12,000	323,000	274,000	45,000
12,300	31/64	14,000	367,000	318,000	45,000
12,500		14,000	367,000	318,000	45,000
12,700	1/2	14,000	367,000	318,000	45,000
13,000		14,000	367,000	318,000	45,000
13,100	33/64	14,000	367,000	318,000	45,000
13,490	17/32	14,000	367,000	318,000	45,000
13,890	35/64	14,000	367,000	318,000	45,000
14,000		14,000	367,000	318,000	45,000
14,290	9/16	16,000	413,000	361,000	48,000
15,000		16,000	413,000	361,000	48,000
15,870	5/8	16,000	413,000	361,000	48,000
16,000		16,000	413,000	361,000	48,000

TS-Drills avec refroidissement interne

N° d'article 86512

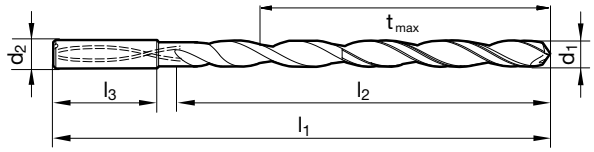
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 25xD | WN | 135° | h7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • pointe revêtue • forme concave de l´arête de coupe principale • section des goujures optimisée • section maximale des canaux de lubrification • respecter la pression du liquide de refroid.

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	125,000	85,000	36,000
3,100		6,000	141,000	101,000	36,000
3,170	1/8	6,000	141,000	101,000	36,000
3,200		6,000	141,000	101,000	36,000
3,300		6,000	141,000	101,000	36,000
3,500		6,000	156,000	116,000	36,000
3,570	9/64	6,000	156,000	116,000	36,000
3,700		6,000	156,000	116,000	36,000
3,800		6,000	156,000	116,000	36,000
3,970	5/32	6,000	156,000	116,000	36,000
4,000		6,000	156,000	116,000	36,000
4,200		6,000	183,000	143,000	36,000
4,300		6,000	183,000	143,000	36,000
4,370	11/64	6,000	183,000	143,000	36,000
4,500		6,000	183,000	143,000	36,000
4,600		6,000	183,000	143,000	36,000
4,760	3/16	6,000	183,000	143,000	36,000
4,800		6,000	183,000	143,000	36,000
5,000		6,000	183,000	143,000	36,000
5,100		6,000	210,000	170,000	36,000
5,160	13/64	6,000	210,000	170,000	36,000
5,410		6,000	210,000	170,000	36,000
5,500		6,000	210,000	170,000	36,000
5,560	7/32	6,000	210,000	170,000	36,000
5,800		6,000	210,000	170,000	36,000
5,950	15/64	6,000	210,000	170,000	36,000
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
6,750	17/64	8,000	237,000	197,000	36,000
6,800		8,000	237,000	197,000	36,000
7,000		8,000	237,000	197,000	36,000
7,140	9/32	8,000	263,000	223,000	36,000
7,500		8,000	263,000	223,000	36,000
7,540	19/64	8,000	263,000	223,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,940	5/16	8,000	263,000	223,000	36,000
8,000		8,000	263,000	223,000	36,000
8,330	21/64	10,000	294,000	250,000	40,000
8,500		10,000	294,000	250,000	40,000
8,730	11/32	10,000	294,000	250,000	40,000
8,800		10,000	294,000	250,000	40,000
9,000		10,000	294,000	250,000	40,000
9,130	23/64	10,000	321,000	277,000	40,000
9,520	3/8	10,000	321,000	277,000	40,000
9,920	25/64	10,000	321,000	277,000	40,000
10,000		10,000	321,000	277,000	40,000
10,320	13/32	12,000	359,000	310,000	45,000
10,720	27/64	12,000	359,000	310,000	45,000
11,000		12,000	359,000	310,000	45,000
11,110	7/16	12,000	386,000	337,000	45,000
11,510	29/64	12,000	386,000	337,000	45,000
11,910	15/32	12,000	386,000	337,000	45,000
12,000		12,000	386,000	337,000	45,000
12,300	31/64	14,000	437,000	388,000	45,000
12,700	1/2	14,000	437,000	388,000	45,000
13,000		14,000	437,000	388,000	45,000
13,100	33/64	14,000	437,000	388,000	45,000
13,490	17/32	14,000	437,000	388,000	45,000
13,890	35/64	14,000	437,000	388,000	45,000
14,000		14,000	437,000	388,000	45,000
14,290	9/16	16,000	493,000	441,000	48,000
15,000		16,000	493,000	441,000	48,000
15,870	5/8	16,000	493,000	441,000	48,000
16,000		16,000	493,000	441,000	48,000

TS-Drills avec refroidissement interne

N° d'article 86513

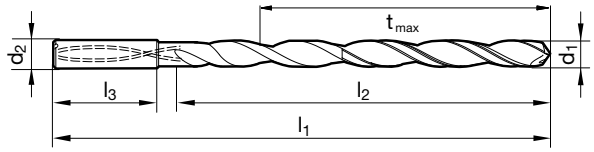
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 30xD | WN | 135° | h7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • pointe revêtue • forme concave de l´arête de coupe principale • section des goujures optimisée • section maximale des canaux de lubrification • respecter la pression du liquide de refroid.

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	140,000	100,000	36,000
3,100		6,000	158,000	118,000	36,000
3,170	1/8	6,000	158,000	118,000	36,000
3,200		6,000	158,000	118,000	36,000
3,300		6,000	158,000	118,000	36,000
3,500		6,000	176,000	136,000	36,000
3,570	9/64	6,000	176,000	136,000	36,000
3,700		6,000	176,000	136,000	36,000
3,800		6,000	176,000	136,000	36,000
3,970	5/32	6,000	176,000	136,000	36,000
4,000		6,000	176,000	136,000	36,000
4,200		6,000	208,000	168,000	36,000
4,370	11/64	6,000	208,000	168,000	36,000
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
5,100		6,000	240,000	200,000	36,000
5,160	13/64	6,000	240,000	200,000	36,000
5,410		6,000	240,000	200,000	36,000
5,500		6,000	240,000	200,000	36,000
5,560	7/32	6,000	240,000	200,000	36,000
5,950	15/64	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
6,750	17/64	8,000	272,000	232,000	36,000
6,800		8,000	272,000	232,000	36,000
7,000		8,000	272,000	232,000	36,000
7,140	9/32	8,000	303,000	263,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
7,500		8,000	303,000	263,000	36,000
7,540	19/64	8,000	303,000	263,000	36,000
7,940	5/16	8,000	303,000	263,000	36,000
8,000		8,000	303,000	263,000	36,000
8,330	21/64	10,000	339,000	295,000	40,000
8,500		10,000	339,000	295,000	40,000
8,730	11/32	10,000	339,000	295,000	40,000
8,800		10,000	339,000	295,000	40,000
9,000		10,000	339,000	295,000	40,000
9,130	23/64	10,000	371,000	327,000	40,000
9,520	3/8	10,000	371,000	327,000	40,000
9,920	25/64	10,000	371,000	327,000	40,000
10,000		10,000	371,000	327,000	40,000
10,320	13/32	12,000	412,000	363,000	45,000
10,720	27/64	12,000	412,000	363,000	45,000
11,000		12,000	412,000	363,000	45,000
11,110	7/16	12,000	443,000	394,000	45,000
11,510	29/64	12,000	443,000	394,000	45,000
11,910	15/32	12,000	443,000	394,000	45,000
12,000		12,000	443,000	394,000	45,000
12,300	31/64	14,000	507,000	458,000	45,000
12,700	1/2	14,000	507,000	458,000	45,000
13,000		14,000	507,000	458,000	45,000
13,100	33/64	14,000	507,000	458,000	45,000
13,490	17/32	14,000	507,000	458,000	45,000
13,890	35/64	14,000	507,000	458,000	45,000
14,000		14,000	507,000	458,000	45,000

TS-Drills avec refroidissement interne

N° d'article 86514

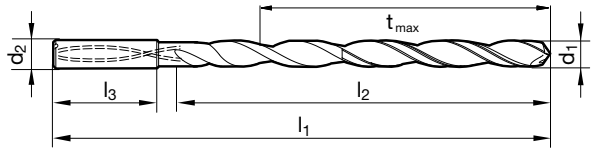
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 40xD | WN | 135° | h7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage à dépouille conique • pointe revêtue • forme concave de l´arête de coupe principale • section des goujures optimisée • section maximale des canaux de lubrification • respecter la pression du liquide de refroid.

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	170,000	130,000	36,000
3,100		6,000	193,000	153,000	36,000
3,170	1/8	6,000	193,000	153,000	36,000
3,200		6,000	193,000	153,000	36,000
3,300		6,000	193,000	153,000	36,000
3,500		6,000	193,000	153,000	36,000
3,570	9/64	6,000	216,000	176,000	36,000
3,800		6,000	216,000	176,000	36,000
3,970	5/32	6,000	216,000	176,000	36,000
4,000		6,000	216,000	176,000	36,000
4,200		6,000	238,000	198,000	36,000
4,370	11/64	6,000	238,000	198,000	36,000
4,500		6,000	238,000	198,000	36,000
4,760	3/16	6,000	258,000	218,000	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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
5,500		6,000	280,000	240,000	36,000
5,560	7/32	6,000	300,000	260,000	36,000
5,950	15/64	6,000	300,000	260,000	36,000
6,000		6,000	300,000	260,000	36,000
6,300		8,000	322,000	282,000	36,000
6,350	1/4	8,000	322,000	282,000	36,000
6,500		8,000	322,000	282,000	36,000
6,750	17/64	8,000	342,000	302,000	36,000
6,800		8,000	342,000	302,000	36,000
7,000		8,000	342,000	302,000	36,000
7,140	9/32	8,000	363,000	323,000	36,000
7,500		8,000	363,000	323,000	36,000
7,540	19/64	8,000	383,000	343,000	36,000
7,940	5/16	8,000	383,000	343,000	36,000
8,000		8,000	383,000	343,000	36,000
8,500		10,000	409,000	365,000	40,000
9,000		10,000	429,000	386,000	40,000
10,000		10,000	471,000	427,000	40,000

HARTNER

Forets TS, 3 lèvres

N° d'article 89247

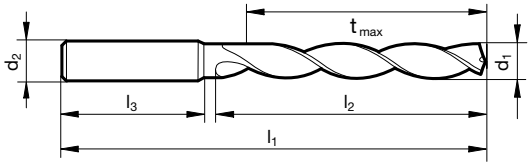
P	M	K	N	S	H
		•	•		

VHM | TS 3 G | 5xD | DIN 6537 L | 130° | m7 | R | HA

amin. de l'âme ≥ Ø 3,000 • affûtage Spiropoint • goujures larges • centrage optimal • pour une coupe interrompue

fonte • alliages Al à copeaux longs • laitons, bronzes

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



d1 mm	d2 mm	l1 mm	l2 mm	l3 mm
3,000	6,000	66,000	28,000	36,000
3,100	6,000	66,000	28,000	36,000
3,200	6,000	66,000	28,000	36,000
3,300	6,000	66,000	28,000	36,000
3,500	6,000	66,000	28,000	36,000
3,700	6,000	66,000	28,000	36,000
3,800	6,000	74,000	36,000	36,000
4,000	6,000	74,000	36,000	36,000
4,100	6,000	74,000	36,000	36,000
4,200	6,000	74,000	36,000	36,000
4,500	6,000	74,000	36,000	36,000
4,800	6,000	82,000	44,000	36,000
5,000	6,000	82,000	44,000	36,000
5,100	6,000	82,000	44,000	36,000
5,200	6,000	82,000	44,000	36,000
5,300	6,000	82,000	44,000	36,000
5,500	6,000	82,000	44,000	36,000
5,800	6,000	82,000	44,000	36,000
6,000	6,000	82,000	44,000	36,000
6,100	8,000	91,000	53,000	36,000
6,200	8,000	91,000	53,000	36,000
6,400	8,000	91,000	53,000	36,000
6,500	8,000	91,000	53,000	36,000
6,700	8,000	91,000	53,000	36,000
6,800	8,000	91,000	53,000	36,000
6,900	8,000	91,000	53,000	36,000
7,000	8,000	91,000	53,000	36,000
7,100	8,000	91,000	53,000	36,000
7,400	8,000	91,000	53,000	36,000
7,500	8,000	91,000	53,000	36,000
7,800	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
8,400	10,000	103,000	61,000	40,000
8,500	10,000	103,000	61,000	40,000

d1 mm	d2 mm	l1 mm	l2 mm	l3 mm
8,600	10,000	103,000	61,000	40,000
8,700	10,000	103,000	61,000	40,000
8,800	10,000	103,000	61,000	40,000
9,000	10,000	103,000	61,000	40,000
9,100	10,000	103,000	61,000	40,000
9,500	10,000	103,000	61,000	40,000
9,800	10,000	103,000	61,000	40,000
10,000	10,000	103,000	61,000	40,000
10,100	12,000	118,000	71,000	45,000
10,200	12,000	118,000	71,000	45,000
10,300	12,000	118,000	71,000	45,000
10,500	12,000	118,000	71,000	45,000
11,000	12,000	118,000	71,000	45,000
11,200	12,000	118,000	71,000	45,000
11,500	12,000	118,000	71,000	45,000
11,800	12,000	118,000	71,000	45,000
12,000	12,000	118,000	71,000	45,000
12,100	14,000	124,000	77,000	45,000
12,500	14,000	124,000	77,000	45,000
13,000	14,000	124,000	77,000	45,000
13,500	14,000	124,000	77,000	45,000
14,000	14,000	124,000	77,000	45,000
14,100	16,000	133,000	83,000	48,000
14,500	16,000	133,000	83,000	48,000
15,000	16,000	133,000	83,000	48,000
15,500	16,000	133,000	83,000	48,000
16,000	16,000	133,000	83,000	48,000
16,500	18,000	143,000	93,000	48,000
17,000	18,000	143,000	93,000	48,000
17,500	18,000	143,000	93,000	48,000
18,000	18,000	143,000	93,000	48,000
18,500	20,000	153,000	101,000	50,000
19,000	20,000	153,000	101,000	50,000
19,500	20,000	153,000	101,000	50,000
20,000	20,000	153,000	101,000	50,000

Forets TS, 3 lèvres

N° d'article 89239

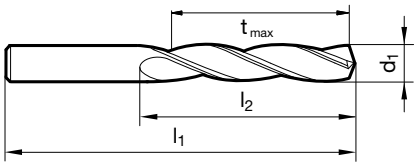
P	M	K	N	S	H
		○	○		

VHM | TS 3 G | 5xD | DIN 6539 | 150° | h7 | R | Cyl

amin. de l'âme ≥ Ø 3,000 • affûtage en pente • pour les perçages de grande précision • état de surface des perçages de qualité supérieure • pour une coupe interrompue

fontes • alliages de fontes d'aluminium

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



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

Forets TS, 3 lèvres

d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
16,000	115,000	73,000			
16,500	119,000	73,000			
17,000	119,000	73,000			
18,500	127,000	76,000			
19,000	127,000	76,000			
20,000	131,000	79,000			

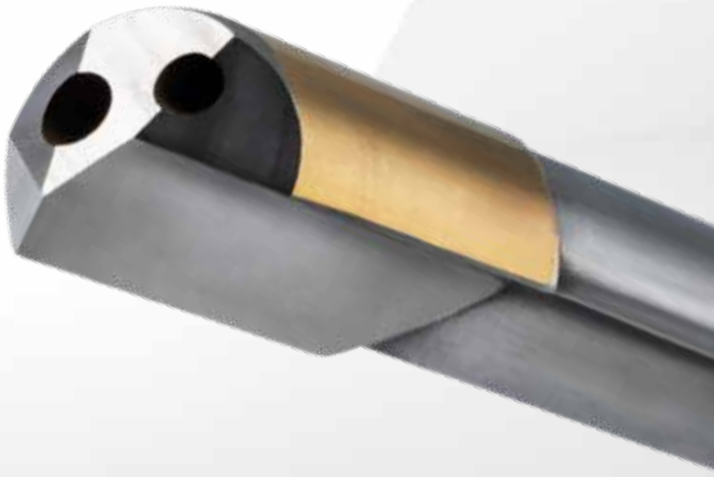
HARTNER

Precision Cutting Tools

MULTIPLEX

E 80 XXL

- idéal pour centre de forage
- longueurs totales 800 mm / 1.200 mm / 1.600 mm / 2.000 mm
- application pas seulement dans l'industrie de moules et de matrices
- goujure polie pour une meilleure évacuation des copeaux
- revêtement TiN pour applications universelles
- attachement de serrage pour centres de forage T 3.1

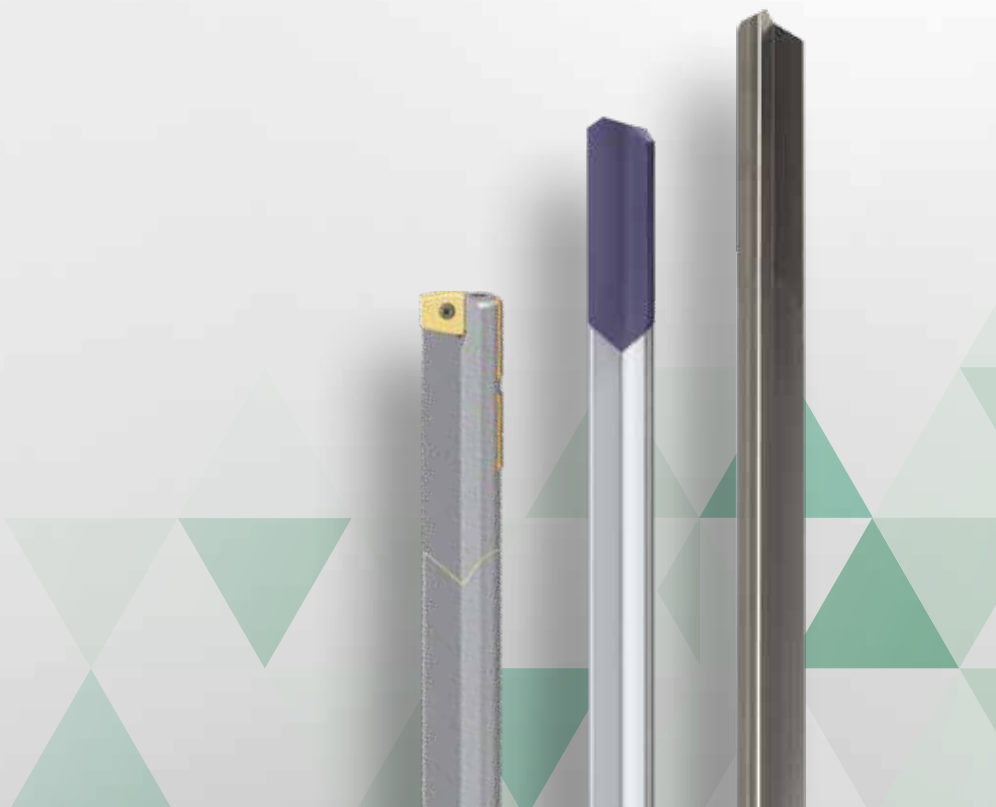


HARTNER

Precision Cutting Tools

FORETS À TROUS PROFONDS

CW mono, embout CW ou plaquettes interchangeables
polis et revêtus



Forets à une lèvre E 100

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
○	○	○	●	●	○	Norme usine	TLB E 100	CW monobloc	◯	à droite	HA	25xD	1,000 - 16,000	89523	271
●	●	○	●	○	○	Norme usine	TLB E 100	CW monobloc	a	à droite	HA	25xD	1,000 - 16,000	89520	271
○	○	○	●	●	○	Norme usine	TLB E 100	CW monobloc	◯	à droite	HA	50xD	1,000 - 10,000	89524	273
●	●	○	●	○	○	Norme usine	TLB E 100	CW monobloc	a	à droite	HA	50xD	1,000 - 10,000	89521	273
○	○	○	●	●	○	Norme usine	TLB E 100	CW monobloc	◯	à droite	HA	75xD	1,000 - 7,144	89525	275
●	●	○	●	○	○	Norme usine	TLB E 100	CW monobloc	a	à droite	HA	75xD	1,000 - 7,144	89522	275
○	○	○	●	●	○	Norme usine	TLB E 100	CW monobloc	◯	à droite	HA	45.000	1,200 - 3,200	89503	276
●	○	●	○	○	○	Norme usine	TLB E 100	CW monobloc	A	à droite	HA	45.000	1,200 - 3,200	89510	276
○	○	○	●	●	○	Norme usine	TLB E 100	CW monobloc	◯	à droite	HA	80.000	1,200 - 5,000	89501	277
●	○	●	○	○	○	Norme usine	TLB E 100	CW monobloc	A	à droite	HA	80.000	1,200 - 5,000	89511	277
○	○	○	●	●	○	Norme usine	TLB E 100	CW monobloc	◯	à droite	HA	120.000	1,500 - 5,000	89504	278
●	○	●	○	○	○	Norme usine	TLB E 100	CW monobloc	A	à droite	HA	120.000	1,500 - 5,000	89512	278
○	○	○	●	●	○	Norme usine	TLB E 100	CW monobloc	◯	à droite	HA	160.000	1,500 - 8,000	89502	279
●	○	●	○	○	○	Norme usine	TLB E 100	CW monobloc	A	à droite	HA	160.000	1,500 - 8,000	89513	279

Forets à une lèvre E 80

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
															
●	○	●	○	○	○	Norme usine	TLB E 80	CW rapportée	T	à droite	HA	20xD	3,970 - 12,700	**89505**	280
															
●	●	○	○	●	○	Norme usine	TLB E 80	CW rapportée	C	à droite	HA	20xD	3,970 - 12,700	**89514**	280
															
●	○	●	○	○	○	Norme usine	TLB E 80	CW rapportée	T	à droite	HA	30xD	3,970 - 12,700	**89509**	281
															
●	●	○	○	●	○	Norme usine	TLB E 80	CW rapportée	C	à droite	HA	30xD	3,970 - 12,700	**89515**	281
															
●	○	●	○	○	○	Norme usine	TLB E 80	CW rapportée	T	à droite	HA	40xD	3,970 - 12,700	**89506**	282
															
●	●	○	○	●	○	Norme usine	TLB E 80	CW rapportée	C	à droite	HA	40xD	3,970 - 12,700	**89516**	282
															
●	○	●	○	○	○	Norme usine	TLB E 80	CW rapportée	T	à droite	HA	80xD	4,950 - 12,650	**89507**	283
															
●	●	○	○	●	○	Norme usine	TLB E 80	CW rapportée	C	à droite	HA	80xD	4,950 - 12,650	**89517**	283

Forets à une lèvre E 80 XXL

															
●	○	●	○	○	○	Norme usine	TLB E 80	CW rapportée	T	à droite	T 3.1	GL 600	3,000 - 25,000	**89539**	284
															
●	○	●	○	○	○	Norme usine	TLB E 80	CW rapportée	T	à droite	T 3.1	GL 800	3,000 - 25,000	**89540**	285
															
●	○	●	○	○	○	Norme usine	TLB E 80	CW rapportée	T	à droite	T 3.1	GL1000	3,000 - 25,000	**89544**	286
															
●	○	●	○	○	○	Norme usine	TLB E 80	CW rapportée	T	à droite	T 3.1	GL1200	3,000 - 25,000	**89541**	287
															
●	○	●	○	○	○	Norme usine	TLB E 80	CW rapportée	T	à droite	T 3.1	GL1400	4,000 - 25,000	**89545**	288

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
Forets à une lèvre E 80 XXL															
															
●	○	●	○	○	○	Norme usine	TLB E 80	**CW rapportée**	Ⓣ	à droite	T 3.1	GL1600	4,000 - 25,000	**89542**	289
															
●	○	●	○	○	○	Norme usine	TLB E 80	**CW rapportée**	Ⓣ	à droite	T 3.1	GL1800	4,000 - 32,000	**89546**	290
															
●	○	●	○	○	○	Norme usine	TLB E 80	**CW rapportée**	Ⓣ	à droite	T 3.1	GL2000	4,000 - 32,000	**89543**	291
Forets à une lèvre E 800 avec plaquettes interchangeables															
															
●	○	○	●	○		Norme usine	TLB E 800	**CW rapportée**	Ⓣ	à droite	HB	30xD	12,000 - 24,000	**89530**	292
Plaquettes de coupe pour forets à une lèvre E 800															
															
●	○	○	●	○		Norme usine		**CW monobloc**	Ⓣ	à droite			12,000 - 40,000	**89535**	293
Patins de guidage pour les forets à une lèvre E 800															
															
●	○	○	●	○		Norme usine		**CW monobloc**	Ⓣ				12,000 - 40,000	**89536**	294
Outils de forage à deux lèvres Z 80															
															
			●			Norme usine	TLB Z 80	**CW rapportée**	◯	à droite	HA	30xD	8,000 - 12,000	**89508**	295
															
		●				Norme usine	TLB Z 80	**CW rapportée**	◯	à droite	HA	30xD	8,000 - 12,000	**89518**	295

HARTNER

Forets à une lèvre E 100

N° d'article 89523

P	M	K	N	S	H
○	○	○	●	●	○

VHM | TLB E 100 | 25xD | WN | h5 | R | HA

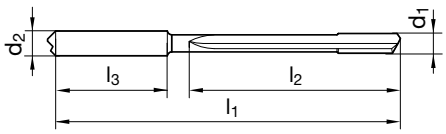
profondeur jusqu'à 25xD • forme périphérique G • attachement cyl.cw monobloc av.extrémité conique MQL

N° d'article 89520

P	M	K	N	S	H
●	●	○	●	○	○

VHM | a | TLB E 100 | 25xD | WN | h5 | R | HA

profondeur jusqu'à 25xD • forme périphérique G • attachement cyl.cw monobloc av.extrémité conique MQL



d1 mm	 inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
1,000		3,000	65,000	32,000	28,000
1,191	3/64	3,000	70,000	39,000	28,000
1,500		4,000	80,000	49,000	28,000
1,588	1/16	4,000	85,000	51,000	28,000
1,984	5/64	4,000	95,000	64,000	28,000
2,000		4,000	95,000	65,000	28,000
2,381	3/32	4,000	100,000	70,000	28,000
2,500		4,000	115,000	85,000	28,000
2,778	7/64	4,000	115,000	85,000	28,000
3,000		6,000	145,000	105,000	36,000
3,175	1/8	6,000	145,000	105,000	36,000
3,500		6,000	145,000	105,000	36,000
3,572	9/64	6,000	160,000	120,000	36,000
3,969	5/32	6,000	160,000	120,000	36,000
4,000		6,000	160,000	120,000	36,000
4,366	11/64	6,000	220,000	180,000	36,000
4,763	3/16	6,000	220,000	180,000	36,000
5,000		6,000	220,000	180,000	36,000
5,159	13/64	6,000	220,000	180,000	36,000
5,556	7/32	6,000	220,000	180,000	36,000
5,953	15/64	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
6,500		8,000	260,000	210,000	36,000
6,747	17/64	8,000	260,000	210,000	36,000
7,000		8,000	260,000	210,000	36,000
7,144	9/32	8,000	285,000	240,000	36,000
7,541	19/64	8,000	285,000	240,000	36,000
7,938	5/16	8,000	285,000	240,000	36,000
8,000		8,000	285,000	240,000	36,000

Forets à une lèvre E 100

d1 mm	 inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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
11,113	7/16	12,000	420,000	360,000	45,000
12,000		12,000	420,000	360,000	45,000
12,700	1/2	14,000	455,000	396,000	45,000
14,000		14,000	500,000	437,000	45,000
15,000		16,000	535,000	468,000	48,000
15,875	5/8	16,000	560,000	495,000	48,000
16,000		16,000	565,000	499,000	48,000

HARTNER

Forets à une lèvre E 100

N° d'article 89524

P	M	K	N	S	H
○	○	○	●	●	○

VHM | TLB E 100 | 50xD | WN | h5 | R | HA

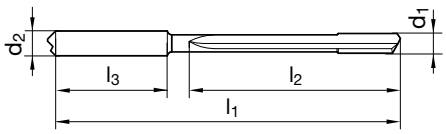
profondeur jusqu'à 25xD • forme périphérique G • attachement cyl.cw monobloc av.extrémité conique MQL

N° d'article 89521

P	M	K	N	S	H
●	●	○	●	○	○

VHM | a | TLB E 100 | 50xD | WN | h5 | R | HA

profondeur jusqu'à 50xD • forme périphérique G • attachement cyl.cw monobloc av.extrémité conique MQL



d1 mm	 inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
1,000		3,000	90,000	57,000	28,000
1,191	3/64	3,000	100,000	68,000	28,000
1,500		4,000	120,000	86,000	28,000
1,588	1/16	4,000	125,000	91,000	28,000
1,984	5/64	4,000	145,000	114,000	28,000
2,000		4,000	145,000	115,000	28,000
2,381	3/32	4,000	160,000	130,000	28,000
2,500		4,000	185,000	155,000	28,000
2,778	7/64	4,000	185,000	155,000	28,000
3,000		6,000	230,000	190,000	36,000
3,175	1/8	6,000	230,000	190,000	36,000
3,500		6,000	230,000	190,000	36,000
3,572	9/64	6,000	260,000	220,000	36,000
3,969	5/32	6,000	260,000	220,000	36,000
4,000		6,000	260,000	220,000	36,000
4,366	11/64	6,000	290,000	245,000	36,000
4,763	3/16	6,000	310,000	268,000	36,000
5,000		6,000	370,000	330,000	36,000
5,159	13/64	6,000	370,000	330,000	36,000
5,556	7/32	6,000	370,000	330,000	36,000
5,953	15/64	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
6,500		8,000	430,000	385,000	36,000
6,747	17/64	8,000	430,000	385,000	36,000
7,000		8,000	430,000	385,000	36,000
7,144	9/32	8,000	485,000	440,000	36,000
7,541	19/64	8,000	485,000	440,000	36,000
7,938	5/16	8,000	485,000	440,000	36,000
8,000		8,000	485,000	440,000	36,000

Forets à une lèvre E 100

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
9,000		10,000	555,000	506,000	40,000
10,000		10,000	615,000	562,000	40,000

Forets à une lèvre E 100

N° d'article 89525

P	M	K	N	S	H
○	○	○	●	●	○

VHM | ○ | TLB E 100 | 75xD | WN | h5 | R | HA

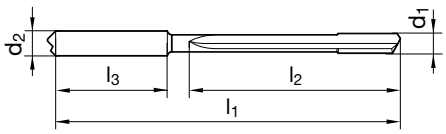
profondeur jusqu'à 25xD • forme périphérique G • attachement cyl.cw monobloc av.extrémité conique MQL

N° d'article 89522

P	M	K	N	S	H
●	●	○	●	○	○

VHM | a | TLB E 100 | 75xD | WN | h5 | R | HA

profondeur jusqu'à 75xD • forme périphérique G • attachement cyl.cw monobloc av.extrémité conique MQL



d1 mm	 inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
1,000		3,000	115,000	82,000	28,000
1,191	3/64	3,000	130,000	98,000	28,000
1,500		4,000	155,000	124,000	28,000
1,588	1/16	4,000	165,000	131,000	28,000
1,984	5/64	4,000	195,000	163,000	28,000
2,000		4,000	195,000	165,000	28,000
2,381	3/32	4,000	220,000	190,000	28,000
2,500		4,000	255,000	220,000	28,000
2,778	7/64	4,000	255,000	220,000	28,000
3,000		6,000	290,000	274,000	36,000
3,175	1/8	6,000	320,000	280,000	36,000
3,500		6,000	320,000	280,000	36,000
3,572	9/64	6,000	360,000	320,000	36,000
3,969	5/32	6,000	360,000	320,000	36,000
4,000		6,000	360,000	320,000	36,000
4,366	11/64	6,000	395,000	355,000	36,000
4,763	3/16	6,000	430,000	387,000	36,000
5,000		6,000	450,000	406,000	36,000
5,159	13/64	6,000	465,000	419,000	36,000
5,556	7/32	6,000	525,000	485,000	36,000
5,953	15/64	6,000	525,000	485,000	36,000
6,000		6,000	525,000	485,000	36,000
6,350	1/4	8,000	560,000	516,000	36,000
6,500		8,000	575,000	528,000	36,000
6,747	17/64	8,000	595,000	548,000	36,000
7,000		8,000	615,000	568,000	36,000
7,144	9/32	8,000	625,000	580,000	36,000

Forets à une lèvre E 100

N° d'article 89503

P	M	K	N	S	H
○	○	○	●	●	○

VHM | ◯ | TLB E 100 | SPL 45,00 | WN | h5 | R | HA

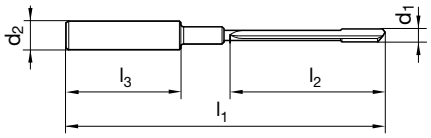
longueur taillée 45 mm • forme périphérique G

N° d'article 89510

P	M	K	N	S	H
●	○	●	○	○	○

VHM | A | TLB E 100 | SPL 45,00 | WN | h5 | R | HA

longueur taillée 45 mm • forme périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
1,200		4,000	90,000	45,000	28,000
1,500		4,000	90,000	45,000	28,000
1,590	1/16	4,000	90,000	45,000	28,000
1,600		4,000	90,000	45,000	28,000
1,980	5/64	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

Forets à une lèvre E 100

N° d'article 89501

P	M	K	N	S	H
○	○	○	●	●	○

VHM | ◯ | TLB E 100 | SPL 80,00 | WN | h5 | R | HA

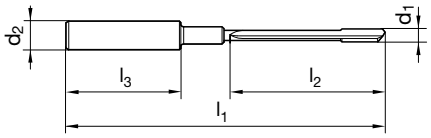
longueur taillée 80 mm • forme périphérique G

N° d'article 89511

P	M	K	N	S	H
●	○	●	○	○	○

VHM | A | TLB E 100 | SPL 80,00 | WN | h5 | R | HA

longueur taillée 80 mm • forme périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
1,200		4,000	125,000	80,000	28,000
1,500		4,000	125,000	80,000	28,000
1,590	1/16	4,000	125,000	80,000	28,000
1,600		4,000	125,000	80,000	28,000
1,980	5/64	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

Forets à une lèvre E 100

N° d'article 89504

P	M	K	N	S	H
○	○	○	●	●	○

VHM | TLB E 100 | SPL 120,00 | WN | h5 | R | HA

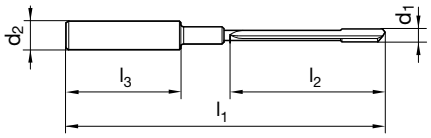
longueur taillée 120 mm • forme périphérique G

N° d'article 89512

P	M	K	N	S	H
●	○	●	○	○	○

VHM | A | TLB E 100 | SPL 120,00 | WN | h5 | R | HA

longueur taillée 120 mm • forme périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
1,500		4,000	165,000	120,000	28,000
1,590	1/16	4,000	165,000	120,000	28,000
1,600		4,000	165,000	120,000	28,000
1,980	5/64	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

Forets à une lèvre E 100

N° d'article 89502

P	M	K	N	S	H
○	○	○	●	●	○

VHM | ◯ | TLB E 100 | SPL 160,00 | WN | h5 | R | HA

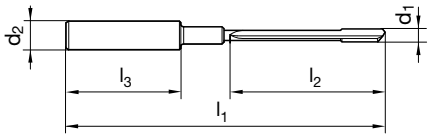
longueur taillée 160 mm • forme périphérique G

N° d'article 89513

P	M	K	N	S	H
●	○	●	○	○	○

VHM | A | TLB E 100 | SPL 160,00 | WN | h5 | R | HA

longueur taillée 160 mm • forme périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
1,500		4,000	205,000	160,000	28,000
1,590	1/16	4,000	205,000	160,000	28,000
1,600		4,000	205,000	160,000	28,000
1,980	5/64	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

Forets à une lèvre E 80

N° d'article 89505

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | 20xD | WN | h5 | R | HA

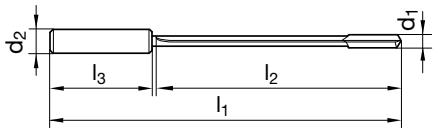
profondeur jusqu'à 20xD • forme périphérique G • avec brise-copeaux latéral

N° d'article 89514

P	M	K	N	S	H
●	●	○	○	●	○

HM | C | TLB E 80 | 20xD | WN | h5 | R | HA

profondeur jusqu'à 20xD • forme périphérique G • pour aciers alliés et hautement alliés



d1 mm	 inch	d2 h6 mm	l1 mm	l2 mm	l3 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

Forets à une lèvre E 80

N° d'article 89509

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | 30xD | WN | h5 | R | HA

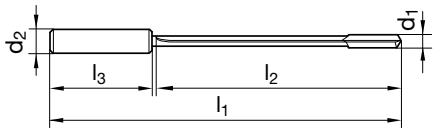
profondeur jusqu'à 30xD • forme périphérique G • avec brise-copeaux latéral

N° d'article 89515

P	M	K	N	S	H
●	●	○	○	●	○

HM | C | TLB E 80 | 30xD | WN | h5 | R | HA

profondeur jusqu'à 30xD • forme périphérique G • pour aciers alliés et hautement alliés



d1 mm	 inch	d2 h6 mm	l1 mm	l2 mm	l3 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

Forets à une lèvre E 80

N° d'article 89506

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | 40xD | WN | h5 | R | HA

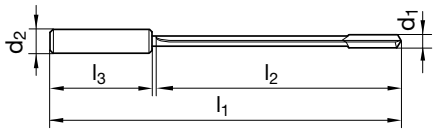
profondeur jusqu'à 40xD • forme périphérique G • avec brise-copeaux latéral

N° d'article 89516

P	M	K	N	S	H
●	●	○	○	●	○

HM | C | TLB E 80 | 40xD | WN | h5 | R | HA

profondeur jusqu'à 40xD • forme périphérique G • pour aciers alliés et hautement alliés



d1 mm	 inch	d2 h6 mm	l1 mm	l2 mm	l3 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

Forets à une lèvre E 80

N° d'article 89507

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | 80xD | WN | h5 | R | HA

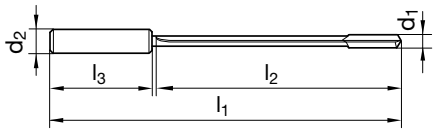
profondeur jusqu'à 80xD • forme périphérique G • avec brise-copeaux latéral • pour les matières à copeaux longs • profondeur maximale de perçage pour chacun des outils 40 x D, lorsqu´il s´agit de perçages plus profonds utiliser, auparavant, le forert n° d´article 89506

N° d'article 89517

P	M	K	N	S	H
●	●	○	○	●	○

HM | C | TLB E 80 | 80xD | WN | h5 | R | HA

profondeur jusqu'à 80xD • forme périphérique G • profondeur maximale de perçage pour chacun des outils 40 x D, lorsqu´il s´agit de plus grandes profondeurs, utiliser auparavant le foret n° d´article 89516



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 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

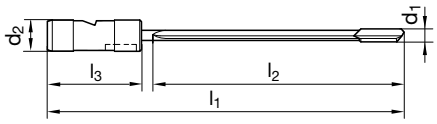
Forets à une lèvre E 80 XXL

N° d'article 89539

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 600 | WN | h5 | R | T 3.1

pour une utilisation sur une foreuse à trous profonds • article en stock avec longueur totale fixe pour foreuse à trous profonds • goujures polies • tête métallique brasée avec géométrie périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		25,000	600,000	500,000	70,000
4,000		25,000	600,000	500,000	70,000
5,000		25,000	600,000	500,000	70,000
6,000		25,000	600,000	500,000	70,000
7,000		25,000	600,000	500,000	70,000
8,000		25,000	600,000	500,000	70,000
9,000		25,000	600,000	500,000	70,000
10,000		25,000	600,000	500,000	70,000
11,000		25,000	600,000	500,000	70,000
11,500		25,000	600,000	500,000	70,000
12,000		25,000	600,000	500,000	70,000
13,000		25,000	600,000	500,000	70,000
14,000		25,000	600,000	500,000	70,000
15,000		25,000	600,000	500,000	70,000
16,000		25,000	600,000	500,000	70,000
17,000		25,000	600,000	500,000	70,000
18,000		25,000	600,000	500,000	70,000
19,000		25,000	600,000	500,000	70,000
20,000		25,000	600,000	500,000	70,000
21,000		25,000	600,000	500,000	70,000
22,000		25,000	600,000	500,000	70,000
23,000		25,000	600,000	500,000	70,000
24,000		25,000	600,000	500,000	70,000
25,000	63/64	25,000	600,000	500,000	70,000

HARTNER

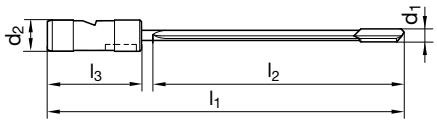
Forets à une lèvre E 80 XXL

N° d'article 89540

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 800 | WN | h5 | R | T 3.1

pour une utilisation sur une foreuse à trous profonds • article en stock avec longueur totale fixe pour foreuse à trous profonds • goujures polies • tête métallique brasée avec géométrie périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		25,000	800,000	700,000	70,000
4,000		25,000	800,000	700,000	70,000
5,000		25,000	800,000	700,000	70,000
6,000		25,000	800,000	700,000	70,000
7,000		25,000	800,000	700,000	70,000
8,000		25,000	800,000	700,000	70,000
9,000		25,000	800,000	700,000	70,000
10,000		25,000	800,000	700,000	70,000
11,000		25,000	800,000	700,000	70,000
11,500		25,000	800,000	700,000	70,000
12,000		25,000	800,000	700,000	70,000
13,000		25,000	800,000	700,000	70,000
14,000		25,000	800,000	700,000	70,000
15,000		25,000	800,000	700,000	70,000
16,000		25,000	800,000	700,000	70,000
17,000		25,000	800,000	700,000	70,000
18,000		25,000	800,000	700,000	70,000
19,000		25,000	800,000	700,000	70,000
20,000		25,000	800,000	700,000	70,000
21,000		25,000	800,000	700,000	70,000
22,000		25,000	800,000	700,000	70,000
23,000		25,000	800,000	700,000	70,000
24,000		25,000	800,000	700,000	70,000
25,000	63/64	25,000	800,000	700,000	70,000

HARTNER

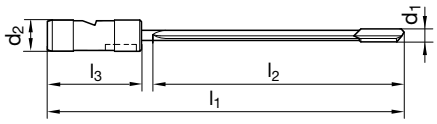
Forets à une lèvre E 80 XXL

N° d'article 89544

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1000 | WN | h5 | R | T 3.1

pour une utilisation sur une foreuse à trous profonds • article en stock avec longueur totale fixe pour foreuse à trous profonds • goujures polies • tête métallique brasée avec géométrie périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		25,000	1000,000	900,000	70,000
4,000		25,000	1000,000	900,000	70,000
5,000		25,000	1000,000	900,000	70,000
6,000		25,000	1000,000	900,000	70,000
7,000		25,000	1000,000	900,000	70,000
8,000		25,000	1000,000	900,000	70,000
9,000		25,000	1000,000	900,000	70,000
10,000		25,000	1000,000	900,000	70,000
11,000		25,000	1000,000	900,000	70,000
11,500		25,000	1000,000	900,000	70,000
12,000		25,000	1000,000	900,000	70,000
13,000		25,000	1000,000	900,000	70,000
14,000		25,000	1000,000	900,000	70,000
15,000		25,000	1000,000	900,000	70,000
16,000		25,000	1000,000	900,000	70,000
17,000		25,000	1000,000	900,000	70,000
18,000		25,000	1000,000	900,000	70,000
19,000		25,000	1000,000	900,000	70,000
20,000		25,000	1000,000	900,000	70,000
21,000		25,000	1000,000	900,000	70,000
22,000		25,000	1000,000	900,000	70,000
23,000		25,000	1000,000	900,000	70,000
24,000		25,000	1000,000	900,000	70,000
25,000	63/64	25,000	1000,000	900,000	70,000

HARTNER

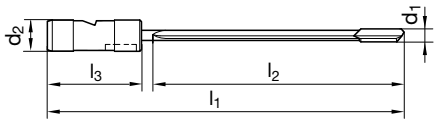
Forets à une lèvre E 80 XXL

N° d'article 89541

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1200 | WN | h5 | R | T 3.1

pour une utilisation sur une foreuse à trous profonds • article en stock avec longueur totale fixe pour foreuse à trous profonds • goujures polies • tête métallique brasée avec géométrie périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		25,000	1200,000	1100,000	70,000
4,000		25,000	1200,000	1100,000	70,000
5,000		25,000	1200,000	1100,000	70,000
6,000		25,000	1200,000	1100,000	70,000
7,000		25,000	1200,000	1100,000	70,000
8,000		25,000	1200,000	1100,000	70,000
9,000		25,000	1200,000	1100,000	70,000
10,000		25,000	1200,000	1100,000	70,000
11,000		25,000	1200,000	1100,000	70,000
11,500		25,000	1200,000	1100,000	70,000
12,000		25,000	1200,000	1100,000	70,000
13,000		25,000	1200,000	1100,000	70,000
14,000		25,000	1200,000	1100,000	70,000
15,000		25,000	1200,000	1100,000	70,000
16,000		25,000	1200,000	1100,000	70,000
17,000		25,000	1200,000	1100,000	70,000
18,000		25,000	1200,000	1100,000	70,000
19,000		25,000	1200,000	1100,000	70,000
20,000		25,000	1200,000	1100,000	70,000
21,000		25,000	1200,000	1100,000	70,000
22,000		25,000	1200,000	1100,000	70,000
23,000		25,000	1200,000	1100,000	70,000
24,000		25,000	1200,000	1100,000	70,000
25,000	63/64	25,000	1200,000	1100,000	70,000

HARTNER

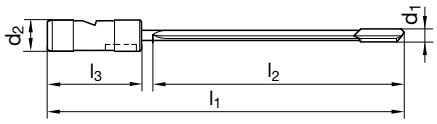
Forets à une lèvre E 80 XXL

N° d'article 89545

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1400 | WN | h5 | R | T 3.1

pour une utilisation sur une foreuse à trous profonds • article en stock avec longueur totale fixe pour foreuse à trous profonds • goujures polies • tête métallique brasée avec géométrie périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
4,000		25,000	1400,000	1300,000	70,000
5,000		25,000	1400,000	1300,000	70,000
6,000		25,000	1400,000	1300,000	70,000
7,000		25,000	1400,000	1300,000	70,000
8,000		25,000	1400,000	1300,000	70,000
9,000		25,000	1400,000	1300,000	70,000
10,000		25,000	1400,000	1300,000	70,000
11,000		25,000	1400,000	1300,000	70,000
11,500		25,000	1400,000	1300,000	70,000
12,000		25,000	1400,000	1300,000	70,000
13,000		25,000	1400,000	1300,000	70,000
14,000		25,000	1400,000	1300,000	70,000
15,000		25,000	1400,000	1300,000	70,000
16,000		25,000	1400,000	1300,000	70,000
17,000		25,000	1400,000	1300,000	70,000
18,000		25,000	1400,000	1300,000	70,000
19,000		25,000	1400,000	1300,000	70,000
20,000		25,000	1400,000	1300,000	70,000
21,000		25,000	1400,000	1300,000	70,000
22,000		25,000	1400,000	1300,000	70,000
23,000		25,000	1400,000	1300,000	70,000
24,000		25,000	1400,000	1300,000	70,000
25,000	63/64	25,000	1400,000	1300,000	70,000

HARTNER

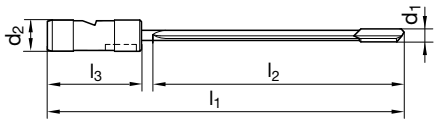
Forets à une lèvre E 80 XXL

N° d'article 89542

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1600 | WN | h5 | R | T 3.1

pour une utilisation sur une foreuse à trous profonds • article en stock avec longueur totale fixe pour foreuse à trous profonds • goujures polies • tête métallique brasée avec géométrie périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
4,000		25,000	1600,000	1500,000	70,000
5,000		25,000	1600,000	1500,000	70,000
5,500		25,000	1600,000	1500,000	70,000
6,000		25,000	1600,000	1500,000	70,000
6,500		25,000	1600,000	1500,000	70,000
7,000		25,000	1600,000	1500,000	70,000
7,500		25,000	1600,000	1500,000	70,000
8,000		25,000	1600,000	1500,000	70,000
9,000		25,000	1600,000	1500,000	70,000
9,500		25,000	1600,000	1500,000	70,000
10,000		25,000	1600,000	1500,000	70,000
11,000		25,000	1600,000	1500,000	70,000
11,500		25,000	1600,000	1500,000	70,000
12,000		25,000	1600,000	1500,000	70,000
13,000		25,000	1600,000	1500,000	70,000
14,000		25,000	1600,000	1500,000	70,000
15,000		25,000	1600,000	1500,000	70,000
16,000		25,000	1600,000	1500,000	70,000
17,000		25,000	1600,000	1500,000	70,000
18,000		25,000	1600,000	1500,000	70,000
19,000		25,000	1600,000	1500,000	70,000
20,000		25,000	1600,000	1500,000	70,000
21,000		25,000	1600,000	1500,000	70,000
22,000		25,000	1600,000	1500,000	70,000
23,000		25,000	1600,000	1500,000	70,000
24,000		25,000	1600,000	1500,000	70,000
25,000	63/64	25,000	1600,000	1500,000	70,000

HARTNER

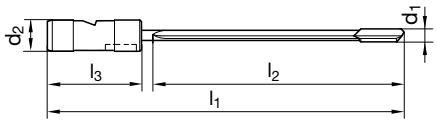
Forets à une lèvre E 80 XXL

N° d'article 89546

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1800 | WN | h5 | R | T 3.1

pour une utilisation sur une foreuse à trous profonds • article en stock avec longueur totale fixe pour foreuse à trous profonds • goujures polies • tête métallique brasée avec géométrie périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
4,000		25,000	1800,000	1700,000	70,000
5,000		25,000	1800,000	1700,000	70,000
6,000		25,000	1800,000	1700,000	70,000
7,000		25,000	1800,000	1700,000	70,000
8,000		25,000	1800,000	1700,000	70,000
9,000		25,000	1800,000	1700,000	70,000
10,000		25,000	1800,000	1700,000	70,000
11,000		25,000	1800,000	1700,000	70,000
11,500		25,000	1800,000	1700,000	70,000
12,000		25,000	1800,000	1700,000	70,000
13,000		25,000	1800,000	1700,000	70,000
14,000		25,000	1800,000	1700,000	70,000
15,000		25,000	1800,000	1700,000	70,000
16,000		25,000	1800,000	1700,000	70,000
17,000		25,000	1800,000	1700,000	70,000
18,000		25,000	1800,000	1700,000	70,000
19,000		25,000	1800,000	1700,000	70,000
20,000		25,000	1800,000	1700,000	70,000
21,000		25,000	1800,000	1700,000	70,000
22,000		25,000	1800,000	1700,000	70,000
23,000		25,000	1800,000	1700,000	70,000
24,000		25,000	1800,000	1700,000	70,000
25,000	63/64	25,000	1800,000	1700,000	70,000
26,000		25,000	1800,000	1695,000	75,000
27,000		25,000	1800,000	1695,000	75,000
28,000		25,000	1800,000	1695,000	75,000
29,000		25,000	1800,000	1695,000	75,000
30,000		25,000	1800,000	1695,000	75,000
31,000		25,000	1800,000	1695,000	75,000
32,000		25,000	1800,000	1695,000	75,000

HARTNER

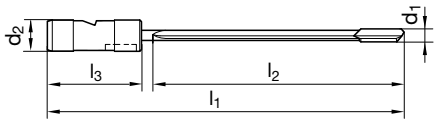
Forets à une lèvre E 80 XXL

N° d'article 89543

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 2000 | WN | h5 | R | T 3.1

pour une utilisation sur une foreuse à trous profonds • article en stock avec longueur totale fixe pour foreuse à trous profonds • goujures polies • tête métallique brasée avec géométrie périphérique G



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
4,000		25,000	2000,000	1900,000	70,000
5,000		25,000	2000,000	1900,000	70,000
6,000		25,000	2000,000	1900,000	70,000
7,000		25,000	2000,000	1900,000	70,000
8,000		25,000	2000,000	1900,000	70,000
9,000		25,000	2000,000	1900,000	70,000
10,000		25,000	2000,000	1900,000	70,000
11,000		25,000	2000,000	1900,000	70,000
11,500		25,000	2000,000	1900,000	70,000
12,000		25,000	2000,000	1900,000	70,000
13,000		25,000	2000,000	1900,000	70,000
14,000		25,000	2000,000	1900,000	70,000
15,000		25,000	2000,000	1900,000	70,000
16,000		25,000	2000,000	1900,000	70,000
17,000		25,000	2000,000	1900,000	70,000
18,000		25,000	2000,000	1900,000	70,000
19,000		25,000	2000,000	1900,000	70,000
20,000		25,000	2000,000	1900,000	70,000
21,000		25,000	2000,000	1900,000	70,000
22,000		25,000	2000,000	1900,000	70,000
23,000		25,000	2000,000	1900,000	70,000
24,000		25,000	2000,000	1900,000	70,000
25,000	63/64	25,000	2000,000	1900,000	70,000
26,000		25,000	2000,000	1895,000	75,000
27,000		25,000	2000,000	1895,000	75,000
28,000		25,000	2000,000	1895,000	75,000
29,000		25,000	2000,000	1895,000	75,000
30,000		25,000	2000,000	1895,000	75,000
31,000		25,000	2000,000	1895,000	75,000
32,000		25,000	2000,000	1895,000	75,000

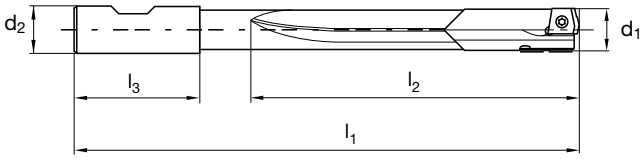
Forets à une lèvre E 800 avec plaquettes interchangeables

N° d'article 89530

P	M	K	N	S	H
●	○	○	●	○	

HM | T | TLB E 800 | 30xD | WN | h8 | R | HB

profondeur jusqu'à 30xD • avec plaquettes interchangeables • avec patins de guidage interchangeables • avec tournevis • avec vis • pour applications universelles



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

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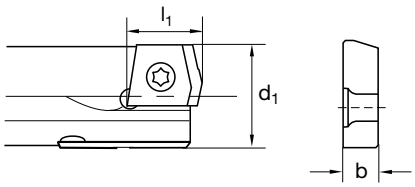
Plaquettes de coupe pour forets à une lèvre E 800

N° d'article 89535

P	M	K	N	S	H
●	○	○	●	○	

VHM T WN R

pour applications universelles



d1 mm	l1 mm	b mm	N° de code
12,000	10,000	2,800	12,000
12,500	10,000	2,800	12,500
12,700	10,000	2,800	12,700
13,000	10,000	2,800	13,000
13,500	10,000	2,800	13,500
14,000	10,000	2,800	14,000
14,500	10,000	2,800	14,500
15,000	10,000	2,800	15,000
16,000	12,000	3,000	16,000
16,100	12,000	3,000	16,100
16,300	12,000	3,000	16,300
16,500	12,000	3,000	16,500
17,000	12,000	3,000	17,000
17,500	12,000	3,000	17,500
18,000	12,000	3,000	18,000
18,400	12,000	3,000	18,400
18,500	12,000	3,000	18,500
19,000	12,000	3,000	19,000
19,300	12,000	3,000	19,300
19,500	12,000	3,000	19,500
19,800	12,000	3,000	19,800
20,000	15,000	4,000	20,000
20,200	15,000	4,000	20,200
20,500	15,000	4,000	20,500
21,000	15,000	4,000	21,000
21,500	15,000	4,000	21,500
22,000	15,000	4,000	22,000
22,200	15,000	4,000	22,200
22,500	15,000	4,000	22,500
23,000	15,000	4,000	23,000
23,500	15,000	4,000	23,500
24,000	15,000	4,000	24,000
24,500	15,000	4,000	24,500
25,000	15,000	4,000	25,000
25,100	15,000	4,000	25,100
25,400	15,000	4,000	25,400

d1 mm	l1 mm	b mm	N° de code
25,500	15,000	4,000	25,500
25,800	15,000	4,000	25,800
26,000	16,000	5,000	26,000
26,500	16,000	5,000	26,500
27,000	16,000	5,000	27,000
27,500	16,000	5,000	27,500
28,000	16,000	5,000	28,000
28,100	16,000	5,000	28,100
28,500	16,000	5,000	28,500
29,000	16,000	5,000	29,000
29,500	16,000	5,000	29,500
29,700	16,000	5,000	29,700
30,000	18,000	6,000	30,000
30,100	18,000	6,000	30,100
30,500	18,000	6,000	30,500
31,000	18,000	6,000	31,000
31,500	18,000	6,000	31,500
32,000	18,000	6,000	32,000
32,500	18,000	6,000	32,500
33,000	18,000	6,000	33,000
33,500	18,000	6,000	33,500
34,000	19,000	6,500	34,000
34,500	19,000	6,500	34,500
35,000	19,000	6,500	35,000
35,500	19,000	6,500	35,500
36,000	19,000	6,500	36,000
36,500	19,000	6,500	36,500
37,000	19,000	6,500	37,000
37,500	19,000	6,500	37,500
37,700	19,000	6,500	37,700
38,000	20,000	7,000	38,000
38,100	20,000	7,000	38,100
38,500	20,000	7,000	38,500
39,000	20,000	7,000	39,000
39,500	20,000	7,000	39,500
40,000	20,000	7,000	40,000

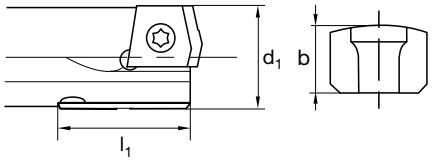
Patins de guidage pour les forets à une lèvre E 800

N° d'article 89536

P	M	K	N	S	H
●	○	○	●	○	

VHM T WN

pour applications universelles



d1 mm	l1 mm	b mm	N° de code
12,000	19,950	2,150	12,000
12,500	19,950	2,150	12,500
12,700	19,950	2,250	12,700
13,000	19,950	2,150	13,000
13,500	19,950	2,150	13,500
14,000	19,950	2,150	14,000
14,500	19,950	2,150	14,500
15,000	19,950	2,150	15,000
16,000	20,000	2,850	16,000
16,100	20,000	2,900	16,100
16,300	20,000	3,000	16,300
16,500	20,000	2,850	16,500
17,000	20,000	2,850	17,000
17,500	20,000	2,850	17,500
18,000	20,000	2,850	18,000
18,400	20,000	3,050	18,400
18,500	20,000	2,850	18,500
19,000	20,000	2,850	19,000
19,300	20,000	3,000	19,300
19,500	20,000	2,850	19,500
19,800	20,000	3,000	19,800
20,000	25,000	3,350	20,000
20,200	25,000	3,450	20,200
20,500	25,000	3,350	20,500
21,000	25,000	3,350	21,000
21,500	25,000	3,350	21,500
22,000	25,000	3,350	22,000
22,200	25,000	3,450	22,200
22,500	25,000	3,350	22,500
23,000	25,000	3,350	23,000
23,500	25,000	3,350	23,500
24,000	25,000	3,350	24,000
24,500	25,000	3,350	24,500
25,000	25,000	3,350	25,000
25,100	25,000	3,400	25,100
25,400	25,000	3,550	25,400

d1 mm	l1 mm	b mm	N° de code
25,500	25,000	3,350	25,500
25,800	25,000	3,500	25,800
26,000	25,000	3,850	26,000
26,500	25,000	3,850	26,500
27,000	25,000	3,850	27,000
27,500	25,000	3,850	27,500
28,000	25,000	3,850	28,000
28,100	25,000	3,900	28,100
28,500	25,000	3,850	28,500
29,000	25,000	3,850	29,000
29,500	25,000	3,850	29,500
29,700	25,000	3,950	29,700
30,000	30,000	4,350	30,000
30,100	30,000	4,400	30,100
30,500	30,000	4,350	30,500
31,000	30,000	4,350	31,000
31,500	30,000	4,350	31,500
32,000	30,000	4,350	32,000
32,500	30,000	4,350	32,500
33,000	30,000	4,350	33,000
33,500	30,000	4,350	33,500
34,000	30,000	4,850	34,000
34,500	30,000	4,850	34,500
35,000	30,000	4,850	35,000
35,500	30,000	4,850	35,500
36,000	30,000	4,850	36,000
36,500	30,000	4,850	36,500
37,000	30,000	4,850	37,000
37,500	30,000	4,850	37,500
37,700	30,000	4,950	37,700
38,000	30,000	5,350	38,000
38,100	30,000	5,400	38,100
38,500	30,000	5,350	38,500
39,000	30,000	5,350	39,000
39,500	30,000	5,350	39,500
40,000	30,000	5,600	40,000

Outils de forage à deux lèvres Z 80

N° d'article 89508

P	M	K	N	S	H
			•		

HM | TLB Z 80 | 30xD | WN | h5 | R | HA

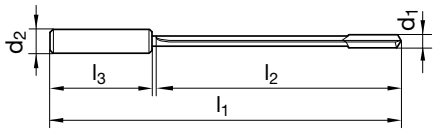
profondeur jusqu'à 30xD • Foret TLB à 4 listels • pour aluminium

N° d'article 89518

P	M	K	N	S	H
		•			

HM | TLB Z 80 | 30xD | WN | h5 | R | HA

profondeur jusqu'à 30xD • Foret TLB à 4 listels • pour les fontes



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 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

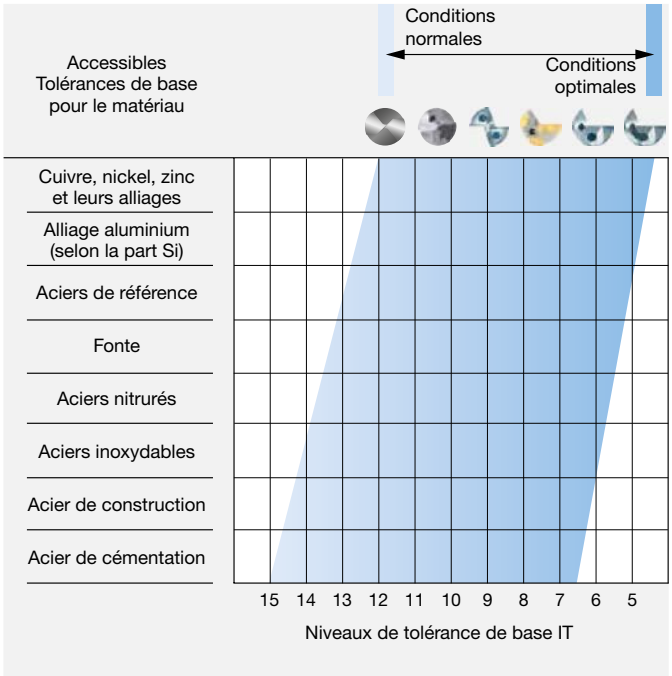
Caractéristiques qualité

Les techniques d'usinage par enlèvement de copeaux définissent le perçage profond à partir d'une profondeur égale ou supérieure à 15xD :
- Foret classique une lèvre pour trous profonds en carbure monobloc ou avec tête carbure brasée
- Foret classique deux lèvres pour trous profonds avec tête carbure brasée
- Système interchangeable avec arêtes de coupe en carbure monobloc et barrettes changeables
- Foret hélicoïdal pour trous profonds en carbure monobloc ou HSS/HSCO

L'outil adéquat est choisi en fonction de l'application et des exigences de qualité de l'alésage.
Les diagrammes suivants vous aideront à choisir l'outil :

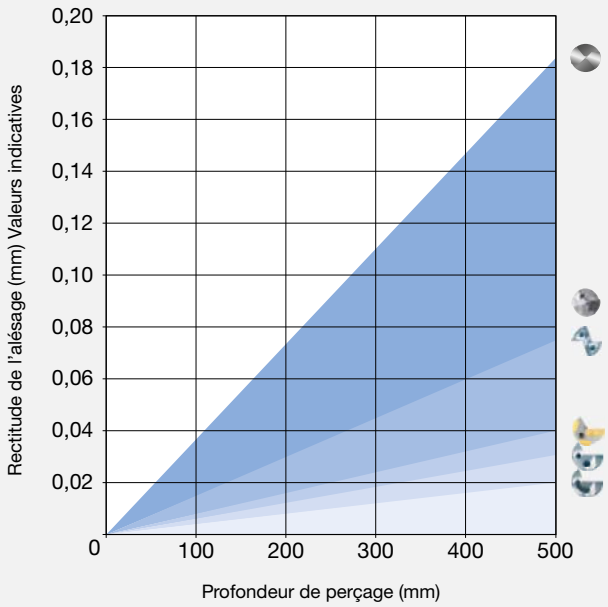
Tolérances de base

Les tolérances de bases varient selon la forme et la conception des différents outils. Le foret une lèvre réalise des trous d'une extrême précision. Dans les meilleurs conditions d'usinage, le foret une lèvre gun drill peut atteindre des degrés de tolérance jusqu'à IT5.



Précision de l'alignement

La rectitude d'un trou décrit une déviation de la direction. Celle-ci se produit lors du centrage de l'outil à l'avant-trou en fonction de la forme et de la position du pilote ou du canon de perçage. Les propriétés du matériau ou de la pièce ainsi que la stabilité de l'outil et de la machine influencent également le résultat de la rectitude.



Classes de rugosité		N12	N11	N10	N9	N8	N7	N6	N5	N4	N3
E 100/E 80 Perçage profond											
E 800 Perçage profond											
Z 80/TS 100 T Perçage profond											
HSS/HSS-E Perçage profond											
E 100/80/800 Trou pilote											
Valeurs de surface	Rz (µm)	160	100	63	40	15,6	7,87	4,65	2,60	1,74	0,81
Valeurs de rugosité	Ra (µm)	50	25	12,5	6,3	3,2	1,6	0,8	0,4	0,2	0,1

Conditions normales (Valeurs indicatives)
Conditions idéales

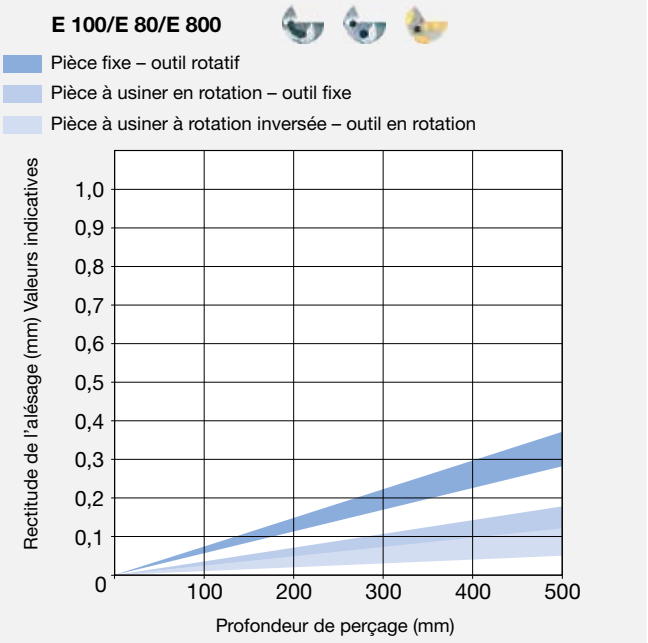
Qualité de surface

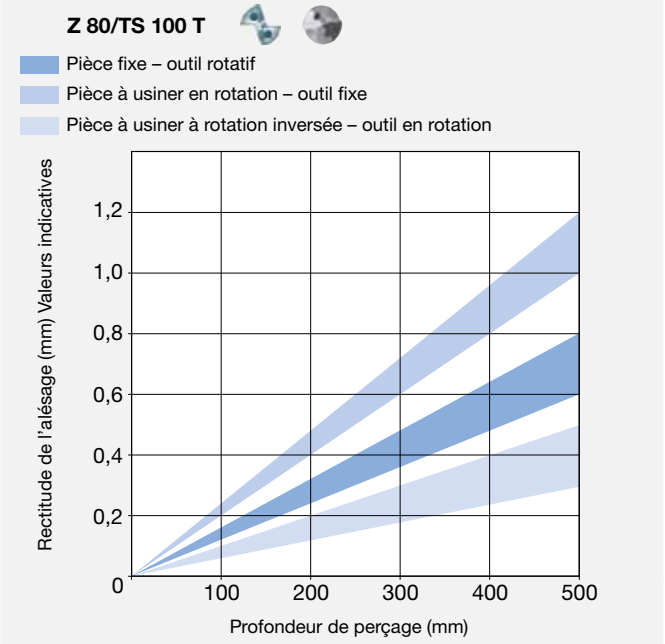
La rugosité d'un trou est influencée par de nombreux facteurs. Le type d'outil, la géométrie, le matériau et le liquide de refroidissement sont déterminants. Contrairement aux outils multi-dents, lors d'un perçage une-lèvre, la paroi du trou sera encore plus lissé grâce à la barre de guidage. La qualité de l'état de surface dépend de l'état de l'outil selon sa surface (p. ex. revêtement) et l'états des dents (usure) des arêtes de coupe principales et secondaires.

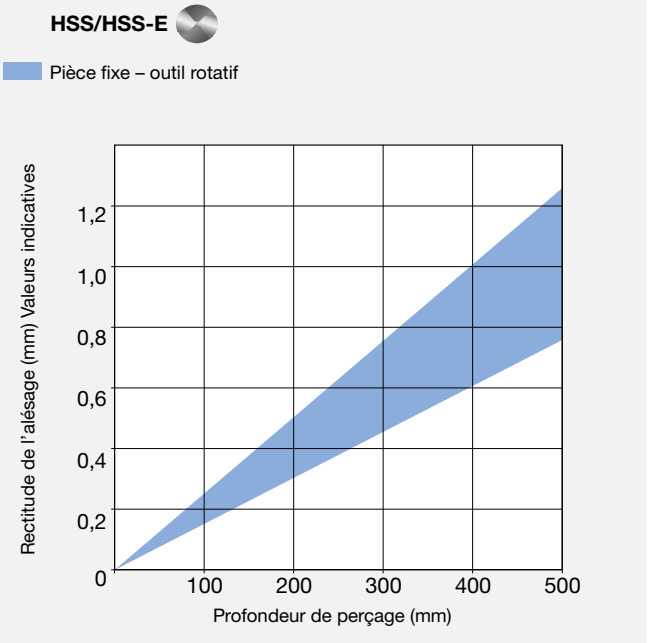
Caractéristiques qualité

Déviation du point central

Le déplacement continu de l'outil à mesure que la profondeur de perçage augmente décrit la concentricité. Outre les propriétés géométriques du foret, les conditions de coupe, la structure du matériau et les températures influencent le résultat de l'évolution. Un usinage avec des vitesses de rotation opposées de la pièce à usiner et de l'outil permet d'obtenir des résultats optimaux. Le foret à une lèvre génère une déviation du point central plus faible qu'un outil multi-dents.







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Application des revêtements Hartner

Matériau	Groupes ISO	E/Z	TS 100 T	HSS
Aciers C, Aciers de décolletage, Aciers Mn	P	TiN TiSiN TiAlSiN	TiSiN TiAlZrN FIRE	FIRE – –
Acier, faiblement allié	P	poli TiN FIRE	FIRE TiSiN TiAlZrN	FIRE TiN –
Acier, allié	P	FIRE TiAlSiN	FIRE TiAlSiN AlTiN nano	FIRE TiN –
Acier, trempé, <55 HRC	P	TiAlSiN FIRE TiAlN	TiAlSiN FIRE TiAlN	– – –
Acier, trempé, 55 – 65 HRC	P	TiAlSiN FIRE TiAlN	TiAlSiN FIRE TiAlN	– – –
Acier, inoxydable et résistant aux acides	M	SuperA AlTiZrN TiAlSiN	AlTiN nano AlTiZrN TiSiN	AlTiZrN FIRE TiN
Fonte	K	TiAlSiN TiSiN FIRE	TiAlSiN FIRE AlTiN nano	FIRE – –
Alliages à base de nickel (p. ex. Inconel)	S	AlTiN nano AlTiZrN TiSiN	AlTiN nano TiAlSiN FIRE	FIRE – –
Titane/alliages de titane	S	poli ZrN AlTiN nano	ZrN AlTiN nano	FIRE –
Alliages de chrome cobalt	S	AlTiN nano FIRE TiAlSiN	AlTiN nano TiAlSiN FIRE	– – –
Métaux précieux	S	AlTiN nano DLC	AlTiN nano	–
Alliages d'aluminium corroyés	N	poli DLC –	poli DLC Diamant	poli DLC –
Alliages de fonderie d'aluminium (<12% silicium)	N	poli ZrN DLC	poli ZrN DLC	poli ZrN DLC
Alliages de fonderie d'aluminium (≥12% silicium)	N	Diamant TiAlSiN –	Diamant – –	– – –
Cuivre/bronze/laiton	N	poli DLC CrN	CrN DLC	TiN –
Céramique	N	Diamant TiAlSiN	Diamant	–
Plastiques, non renforcés	N	poli	DLC	–
Plastiques, renforcés de fibres	N	Diamant TiAlSiN	Diamant TiAlSiN	– –
Graphite	N	poli	–	–

Remarque : *l'aperçu montre les recommandations d'utilisation générales des revêtements Hartner. La priorisation s'effectue de haut en bas.*

Introduction au perçage profond

Dans le domaine de la technique d'enlèvement de copeaux, on parle de perçage profond à partir d'une profondeur de perçage de 15xD et plus encore, bien entendu, il est également possible de réaliser des perçages plus courts avec des forets profonds. On profite ainsi des effets positifs de ce type de perçage, comme une bonne qualité de surface, une faible déviation du point central et une rectitude optimisée.

Le refroidissement haute pression est une évidence désormais.

Le refroidissement interne s'étant imposé ces dernières années pour tous les outils de perçage, le liquide de refroidissement porte bien son nom et est amené par des canaux de refroidissement là où il est absolument nécessaire. Cette mesure a également permis d'améliorer considérablement la durée de vie des outils en perçage hélicoïdal, en taraudage ou autres procédés d'usinage par enlèvement de copeaux et de réduire leur rupture. Toutes les machines-outils conventionnelles sont aujourd'hui proposées avec un refroidissement interne haute pression et conviennent donc également au perçage profond. La part des forets profonds dans les centres d'usinage, les tours et les fraiseuses gagne de plus en plus en importance. Le procédé devient ainsi de plus en plus populaire dans le domaine de la technique d'enlèvement de copeaux.

Tous les forets pour trous profonds doivent être guidés lors du forage. Les forets pour trous profonds ne doivent jamais se déplacer librement dans le compartiment machine à pleine vitesse.

Le perçage profond n'est pas un jeu d'enfant, mais peut être maîtrisé par tout un chacun en respectant certaines conditions. Vous trouverez des valeurs indicatives pour l'utilisation des forets pour trous profonds Hartner au chapitre HartnerNAVIGATOR.

Astuces

- Pour les profondeurs de perçage supérieures à 40xD, nous recommandons l'utilisation de deux ou plusieurs forets pour trous profonds, p. ex., pour l'utilisation des forets classiques à tige en acier E 80, E 800 et Z 80. ex. Ø 10x400 mm et Ø 9,95x800 mm.
- Les forets pour trous profonds VHM E 100 M et les forets brasés E 100 peuvent atteindre une profondeur de perçage maximale de 80xD avec un seul outil.
- Les forets pour trous profonds pour des profondeurs de perçage supérieures à 40xD doivent être insérés dans le perçage pilote en rotation à gauche.
- En cas de changement d'outils à partir de 40xD, l'outil peut être immobilisé en activant le refroidissement interne à haute pression pendant env. 1 seconde.
- Pour l'usinage de matériaux générant de longs copeaux, nous recommandons de commander des forets pour trous profonds avec goujures polies.
- Nous recommandons généralement de régler la teneur en huile de l'émulsion sur au moins 8 %.
- Les forets pour trous profonds à une lèvre pour l'aluminium générant de longs copeaux doivent être commandés avec un affûtage à 180° et un palier de carter d'huile.
- Une fixation solide des douilles de lunette permet de stabiliser le processus de perçage et d'augmenter la qualité du perçage.
- Pour éviter un décalage entre le perçage pilote et le perçage profond, il est possible d'obtenir une transition lisse avec la forme circonférentielle G et un pilotage avec une légère sous-cote.
- En cas de longue formation de copeaux, une interruption périodique de l'avance (sans retrait) peut permettre un processus d'usinage.

Le processus de perçage sur des machines conventionnelles (BAZ)

Étapes de travail pour le perçage profond

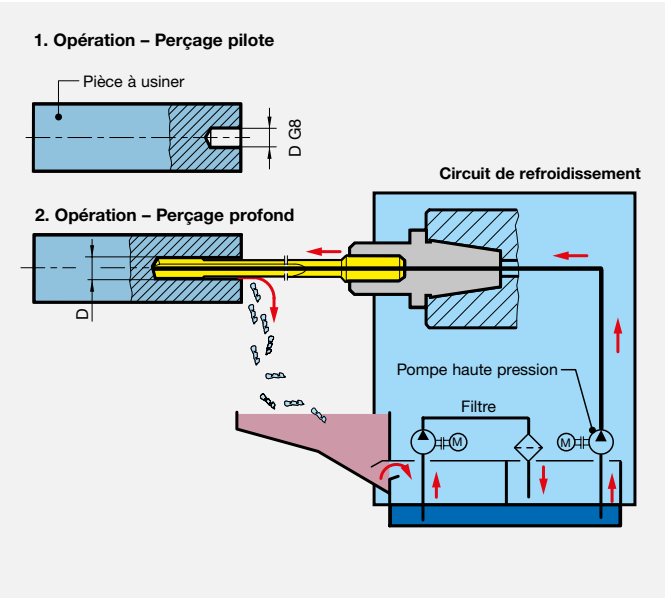
- Fabrication d'un perçage pilote
- Perçage à faible régime
- Réglage de la pression du lubrifiant réfrigérant et de la vitesse
- Perçage continu à la profondeur de perçage sans enlèvement de copeaux
- Arrêt de l'alimentation en liquide de refroidissement une fois la profondeur de perçage atteinte
- Retrait de l'outil de l'alésage

En cas de données de lubrifiant insuffisantes, il est possible de travailler avec des paramètres de coupe réduits.
Des systèmes d'augmentation de la pression sont également possibles.

Procédure

Pour obtenir des résultats d'usinage optimaux lors de la réalisation de perçages profonds, en particulier lors du perçage sur des rayons et/ou une structure de surface irrégulière, nous recommandons les étapes d'usinage suivantes :

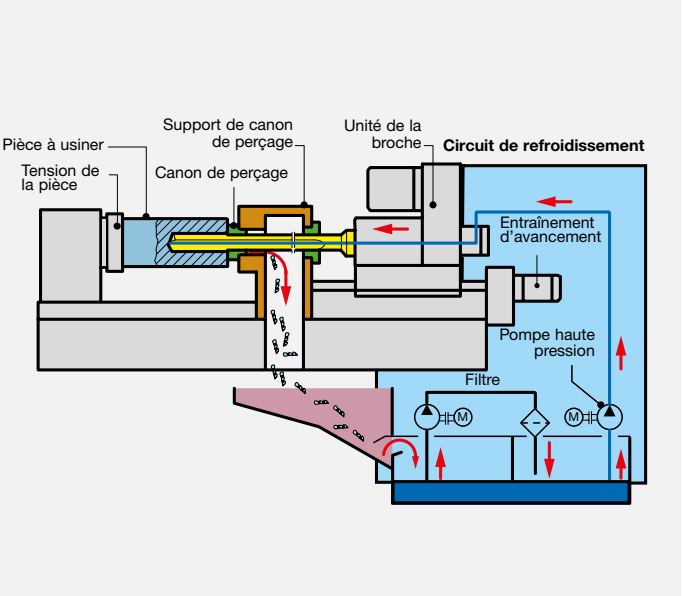
1. Fraisage d'une surface, par exemple avec le TF 100 MULTI-MILL avec coupe centrale. La surface doit être perpendiculaire à l'angle d'entrée du perçage.
2. Fabrication d'un perçage pilote cylindrique, p. ex. avec les TS 100 U. Grâce à leur angle de pointe de 140° et à leur tolérance de Ø m7, ces forets sont parfaitement adaptés à cette étape d'usinage.
3. Introduction dans l'alésage pilote avec un régime d'env. 200 tr/min avec une avance d'env. 500 mm/min en rotation à gauche.
4. Réglage de la pression du lubrifiant réfrigérant et de la vitesse.
5. Perçage continu à la profondeur de perçage sans enlèvement de copeaux. Pour l'utilisation de forets pour trous profonds avec un très grand rapport longueur/diamètre (p. ex. forets à une lèvre en carbure monobloc à partir d'une longueur de rainure de serrage de 160 mm), nous recommandons d'atteindre une profondeur de perçage d'env. 25 mm avec paramètres de coupe réduits (env. 75 % de la vitesse de coupe optimale).
6. Pour les perçages traversants avec sortie droite, c.à.d. à 90°, réduisez à 50 % la vitesse d'avancement vf à environ 1 mm avant de traverser le matériau.
7. Pour les perçages traversants avec sortie inclinée, réduisez à 40 % la vitesse d'avancement vf à environ 1 mm avant de traverser le matériau.
8. Une fois la profondeur de perçage atteinte, couper le régime et le liquide de refroidissement, retrait avec max. 5 000 mm/min.



Le procédé de perçage sur les machine à percer des trous profonds

Pour les perçages très profonds, la fabrication en grande série ou pour les exigences très élevées en matière de surface, de précision dimensionnelle et de rectitude, on utilise généralement une machine à percer des trous profonds. La profondeur de forage est quasiment illimitée, l'outil de forage est guidé par ce que l'on appelle des lunettes, qui sont rapprochées comme un accordéon pendant le processus de forage. Les perçages pilotes ne sont pas nécessaires, car le canon de perçage guide l'outil lors du perçage. Sans enlèvement de copeaux, il est possible de percer à la profondeur souhaitée.

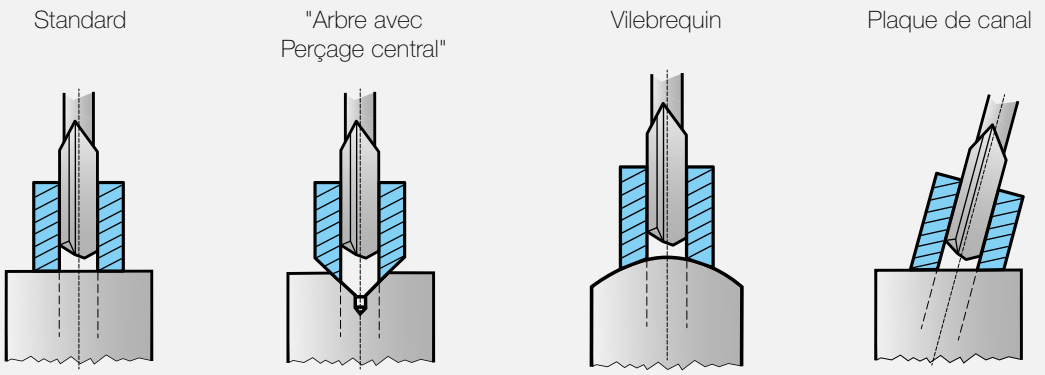
La machine à percer des trous profonds présente plusieurs avantages par rapport à la machine-outil conventionnelle : un perçage pilote est inutile, ce qui permet d'économiser du temps d'usinage et des changements d'outils. La profondeur de perçage peut atteindre plusieurs mètres, et ce, avec une qualité de perçage exceptionnelle. Des pompes haute pression et des filtres de liquide de refroidissement adaptés à de grandes profondeurs de forage contribuent également à la sécurité du processus. La longueur totale des lunettes et du support de douilles de forage donne la « longueur de perte » qui est déterminante dans le calcul de la longueur de l'outil.



Pilotage et canon de perçage

Comme il s'agit d'un foret profond une lèvre, il n'y a qu'une arête de coupe et ne peut pas de manière autonome, l'outil doit être guidé par un canon de perçage ou un trou pilote.
Les forets à deux lèvres à centrage automatique doivent également être guidés par des canons de perçage ou des perçages pilotes, sinon ils pourraient se mettre à vibrer.

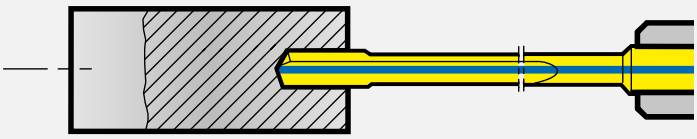
Exemple de canon de perçage avec réf. 5747 (HSS)/5748 (VHM)



À respecter lors de la manipulation de canons de perçage

- Le canon de perçage doit reposer de manière solidaire sur le contour de perçage.
- Le jeu entre le canon de perçage et l'outil doit être aussi réduit que possible.
- Si le foret pour trous profonds a un diamètre de guidage, le canon de perçage doit être au moins assez long pour permettre aux deux circonférences de se croiser.
- Examen régulier de l'état du canon de perçage afin d'éviter des influences négatives sur l'outil.
- Nous recommandons pour les canons de perçage de petites séries HSS et pour les canons de perçage de grandes séries en carbure monobloc.

Exemple de trous pilotes



Valeurs indicatives de profondeur pour trous pilotes

Foret long classique	Ø nominal de l'outil suivant				
Profondeur de perçage	Ø 0,900-1,799	Ø 1,800-3,999	Ø 4,000-7,999	Ø 8,000-11,999	Ø 12,000-52,000
jusqu'à 20xD	3,0xD	2,5xD	2,0xD	1,5xD	1,5xD
jusqu'à 30xD		3,0xD	2,5xD	2,0xD	
jusqu'à 40xD		4,0xD	3,0xD	2,5xD	

Pilotage et canon de perçage

Domaine d'application des outils pilotes

	Plage de diamètre [mm]																		
	0,9	1,0	1,4	2,0	3,0	6,0	8,0	11,0	12,0	15,5	16,0	19,5	20,0	25,0	30,0	35,0	40,0	45,0	50,0	52,0
Micro-forets	N° d'art.86400 sans LI																			
	86405 avec LI																			
TS 100 U					N° d'art.89413 sans LI															
					N° d'art.89410 avec LI															
Multiplex HPC								N° d'art.86721 Plaquette pour trou pilote												
TF 100 Pilot			N° d'art.85000 4 dents sans LI																	
TF 100 MULTI-MILL						N° d'art.84951 4 dents sans LI														
Type V		N° d'art.84803 HSS-E sans LI																		

Micro-forets
- pour perçages pilotes < Ø 3 000/E 100, E 80
- pour situations standard/surface de perçage plane

TS 100 U
- Outil universel pilote Ø3,000-19,500/E 100, E 80, Z 80, E 800, TS 100 T
- pour situations standard/surface de perçage plane

Multiplex HPC
- Outil pilote WP Ø11,000-40,000/E 100, E 80, Z 80, E 800, TS 100 T
- pour situations standard/surface de perçage plane

TF 100 Pilot
- Fraises pour trous pilotes Ø haute précision Ø1,400-12,000/E 100, E 80, Z 80, E 800, TS 100 T
- pour situations standard et spéciales/surfaces de perçage planes, angulaires, cubiques ou autres

TF 100 MULTI-MILL
- Fraises pour trous pilotes Ø haute précision Ø4,000-52,000/E 100, E 80, Z 80, E 800, TS 100 T
- pour situations standard et spéciales/surfaces de perçage planes, angulaires, cubiques ou autres

Type V
- Foret pilote HSS Ø 0,900-15,500/Foret long HSS
- pour situations standard/surface de perçage plane

À respecter lors de la manipulation de perçages pilotes

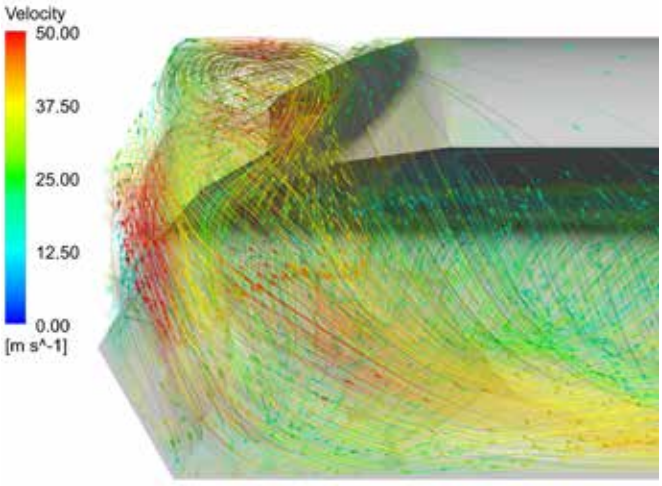
- Le diamètre de pilotage doit être toléré par G8 et les outils doivent en principe être tolérés par Ø nominal **m7**.
- Si le foret à une lèvre a un diamètre de guidage, le perçage pilote doit être au moins aussi profond, pour permettre aux deux circonférences de se croiser.
- En fonction de l'application, il est en partie avantageux d'avoir un chanfrein d'insertion dans le perçage pilote.
- Si la position et le tracé du trou profond sont soumis à des exigences élevées, il faut, si possible, fraiser ou usiner le perçage pilote sur un tour.

Important :
La qualité du canon de perçage et de l'alésage pilote a une grande influence sur la trajectoire du centre de l'alésage et sur la durée de vie de l'outil suivant.

Liquide de refroidissement

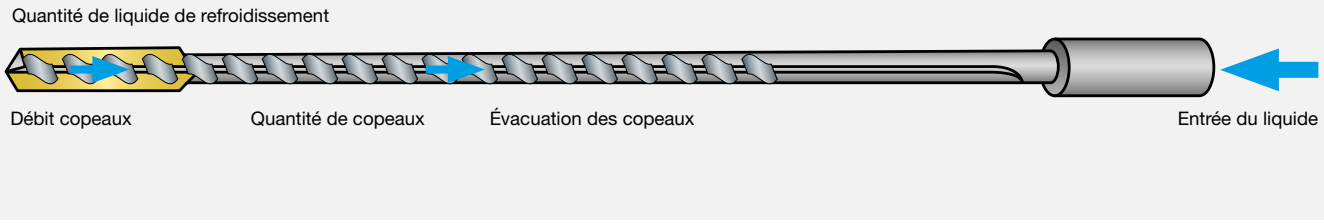
Introduction

Le liquide de refroidissement est l'un des composants les plus importants pour le perçage de rapports LxD supérieurs à 15xD ou en particulier pour le perçage profond. Le choix de l'alimentation en liquide de refroidissement, ses caractéristiques ainsi que les performances telles que la pression et le débit volumétrique sont décisifs pour la performance du processus et donc aussi pour la qualité de l'alésage. Une pression de liquide de refroidissement trop élevée peut générer des ondulations et un alésage plus important.



Fonction

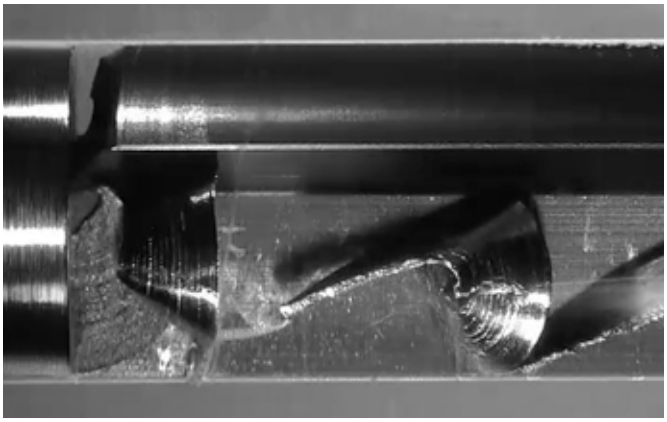
Le liquide de refroidissement (huile, émulsion, MQL, air) rince en premier lieu les copeaux de l'alésage et lubrifie tous les segments de l'outil en contact avec la pièce (circonférence et coupe). Le perçage s'effectue à haute pression. La pression est « seulement » la somme de la quantité de liquide de refroidissement produite et des résistances existantes telles que la longueur de la section du canal de refroidissement ou de l'outil et la masse de copeaux. Du point de vue hydraulique, la quantité de liquide de refroidissement et les résistances mentionnées permettent d'obtenir une vitesse d'écoulement qui, lorsqu'elle est utilisée correctement, minimise le temps de contact des copeaux avec la lame, empêche l'obturation des forets et a donc une influence directe sur le processus d'usinage. Les propriétés de lubrification du liquide de refroidissement déterminent la formation de copeaux et le produit de surface. Des additifs appropriés, tels que des additifs EP (Extreme Pressure), garantissent le glissement des rails de guidage, qui peuvent être soumis à une pression de surface et à une force de roulement considérables.



Filtration

Pour pouvoir garantir des processus de perçage sûrs, il est impératif de mettre à disposition une propreté du liquide de refroidissement en fonction du diamètre de l'outil :

- < Ø 2,000 maximum 15 µm
- Ø 2,000 à ≤ Ø 6,000 maximum 40 µm
- > Ø 6,000 jusqu'à 100 µm



HARTNER

Types de liquide de refroidissement

Émulsion

Outre la teneur en graisse choisie, différents types de liquides de refroidissements miscible à l'eau, tels que les composés minéraux, synthétiques ou naturels, influencent considérablement le processus de forage. Dans l'idéal, la teneur en graisse pour le perçage profond se situe entre 8 et 12 %. Des valeurs inférieures entraînent des pertes de performance et des dysfonctionnements.

Propriétés d'émulsion*

- À des pressions élevées, des additifs EP (Extreme Pressure) doivent être utilisés dans l'émulsion, sinon la mousse risque de se former et les propriétés de lubrification peuvent être perdues.
- En cas d'émulsion, les pressions peuvent être réduites d'env. 15 % afin d'obtenir un comportement de rinçage comparable.
- Pour les types de matériaux contenant plus de 12 % de chrome, il faut s'attendre à une longueur de coupe inférieure à 1,5 m.

Huile

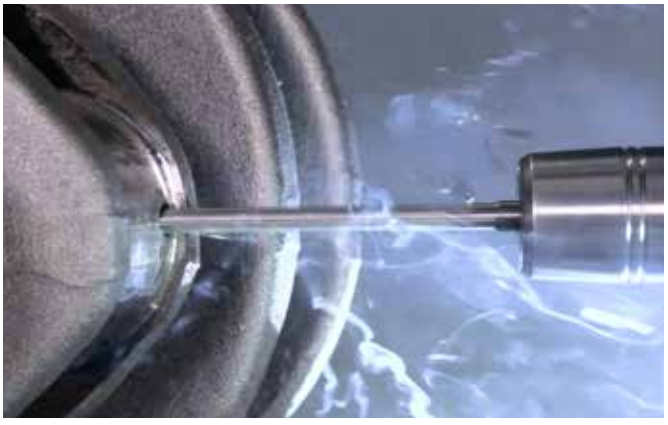
L'huile de forage profond se distingue, tout comme l'émulsion, par sa composition minérale, synthétique et naturelle. La viscosité plus élevée des huiles de forage profond par rapport à l'émulsion détermine en partie la résistance accrue du liquide de refroidissement qui entraîne des vitesses d'écoulement élevées (petits diamètres) pour les huiles à faible viscosité ou des forces hydrauliques plus élevées pour les huiles à haute viscosité (principalement pour les diamètres plus grands). Les huiles réagissent fortement à la température en raison de leur viscosité et de leur pouvoir lubrifiant. Une surchauffe > 50 °C doit être évitée afin de pouvoir percer en toute sécurité.

Propriétés des huiles*

- < Ø 2 mm 7-10 mm^2/s
- > Ø 2 mm 10-20 mm^2/s

MQL/Sec

Le perçage profond est possible à sec ou avec MQL. En fonction du matériau, du diamètre et de la profondeur de perçage, il est possible d'exécuter les processus correspondants. La forme, la taille et la masse des copeaux sont déterminantes. L'usinage à sec n'est possible qu'en cas de formation de copeaux de type poussière (par le graphite ou les corps verts).



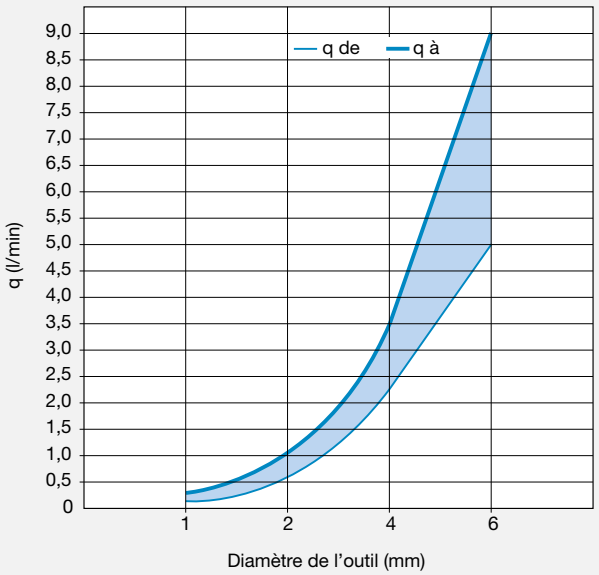
*Aucune responsabilité en cas d'écart par rapport aux prescriptions du fabricant

Indications sur le liquide de refroidissement

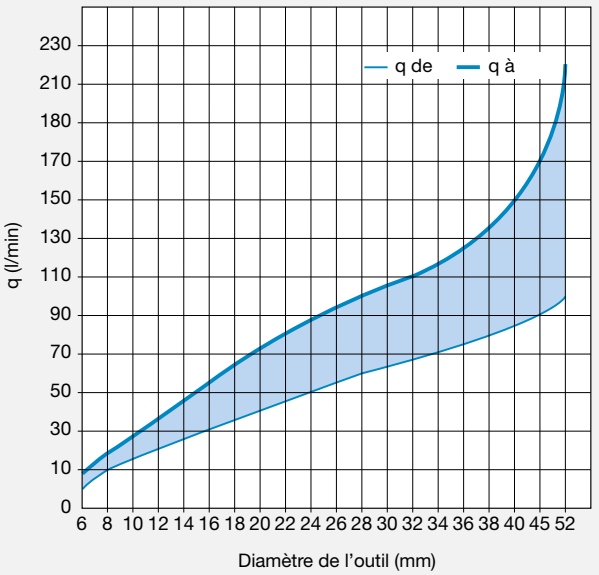
Attention !

- Tous les forets pour trous profonds ne peuvent être utilisés qu'avec un refroidissement interne, qu'il s'agisse d'air, d'émulsion ou d'huile. Le refroidissement interne permet une meilleure évacuation des copeaux.
- Tous les forets pour trous profonds peuvent également être utilisés avec de l'huile comme fluide de refroidissement interne. Cependant, une pression supérieure à l'émulsion est nécessaire pour obtenir la même quantité de liquide de refroidissement.
- Si des forets pour trous profonds sont utilisés avec MQL, une augmentation de la pression peut s'avérer nécessaire pour les petits diamètres nominaux, en fonction de la pression système de l'installation MQL.
- En cas de données de lubrifiant insuffisantes, il est possible de travailler avec des paramètres de coupe réduits. Des systèmes d'augmentation de la pression sont également possibles.
- Plus un foret pour trous profonds est long, plus il faut s'attendre à des augmentations de pression afin de transporter la quantité de liquide de refroidissement nécessaire à travers les canaux de refroidissement."

Indications générales de débit
E 100/E 80/E 800/Z 80

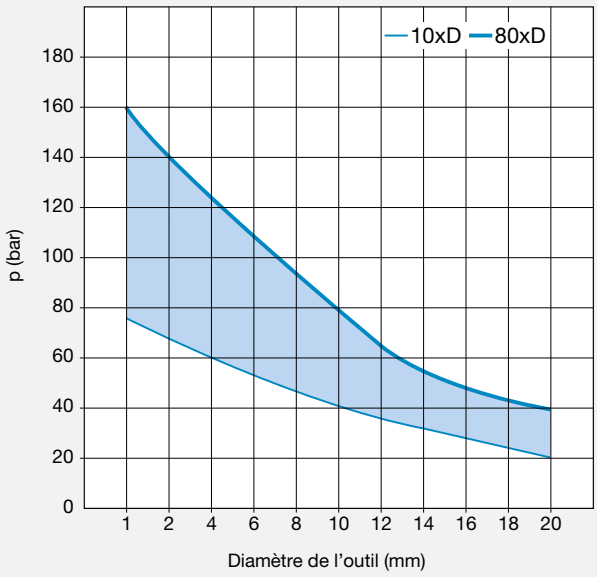


Indications générales de débit
E 100/E 80/E 800/Z 80

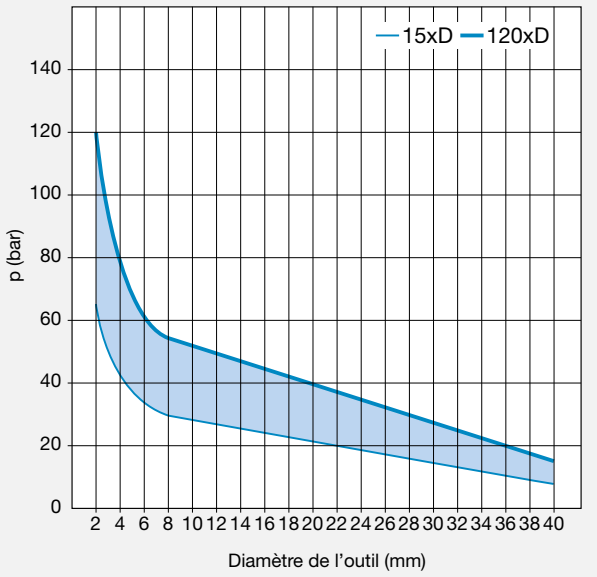


Indications sur le liquide de refroidissement

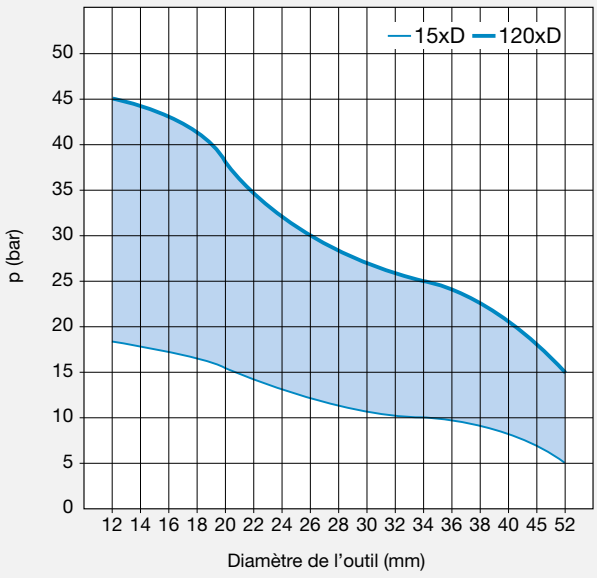
E 100 Spécifications de pression
en fonction de la longueur de l'outil



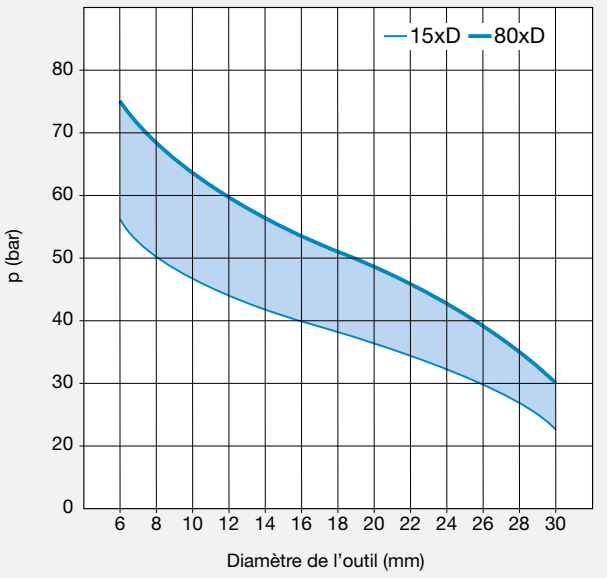
E 80 Spécifications de pression
en fonction de la longueur de l'outil



E 800 Spécifications de pression
en fonction de la longueur de l'outil



Z 80 Spécifications de pression
en fonction de la longueur de l'outil



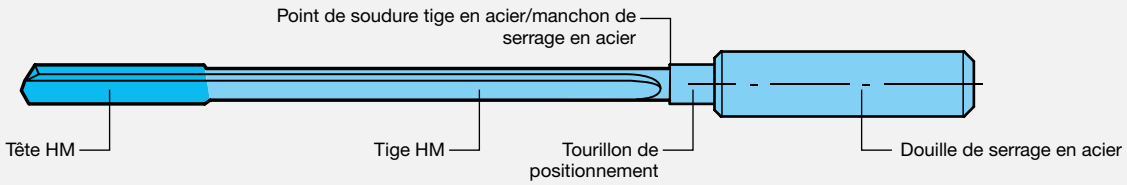
Propriétés

Spectre d'application

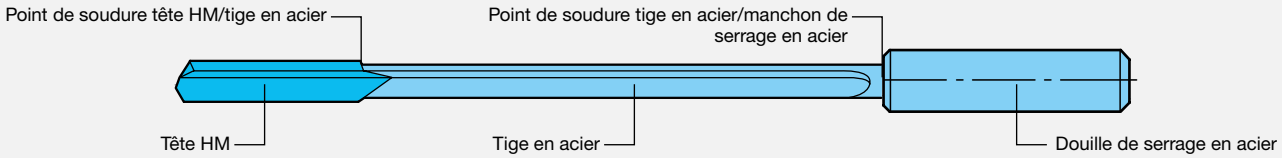
	Plage de diamètre																		
	0,9	1,0	2,0	4,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0	30,0	35,0	40,0	45,0	50,0	52,0
E 100 M		Longueur max. hors tout 615 mm																	
E 100		Longueur max. hors tout 615 mm																	
E 80				Longueur max. hors tout 3.600 mm															
Z 80						Longueur max. hors tout 1.000 mm													
E 800								Longueur max. hors tout 3.600 mm											

E 100 M

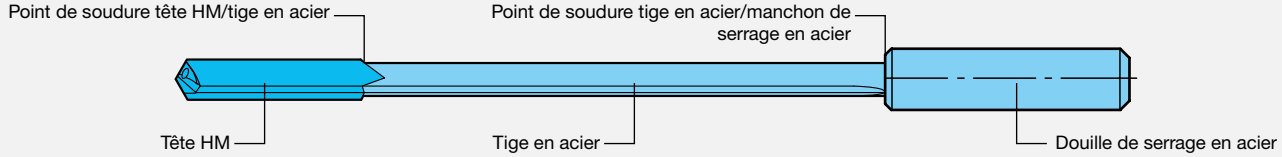
E 100



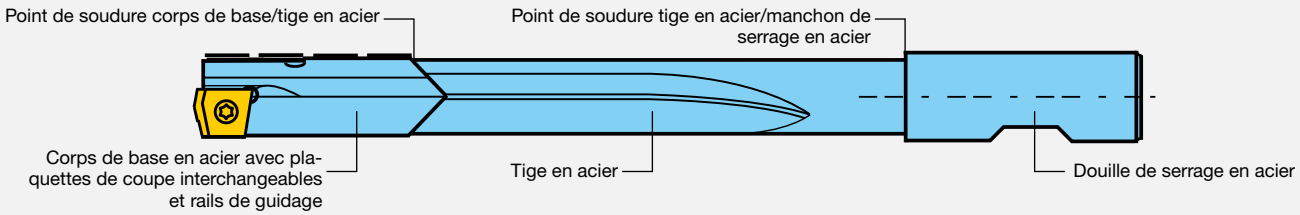
E 80



Z 80

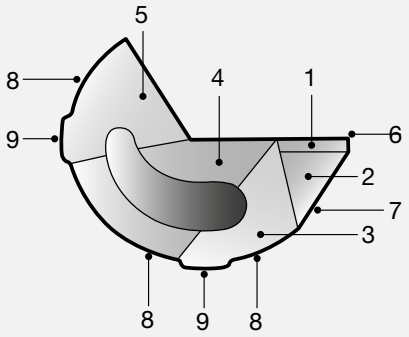


E 800

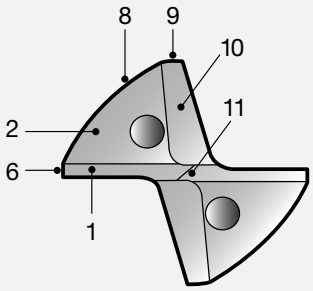


Propriétés

Caractéristiques – Ponçage E



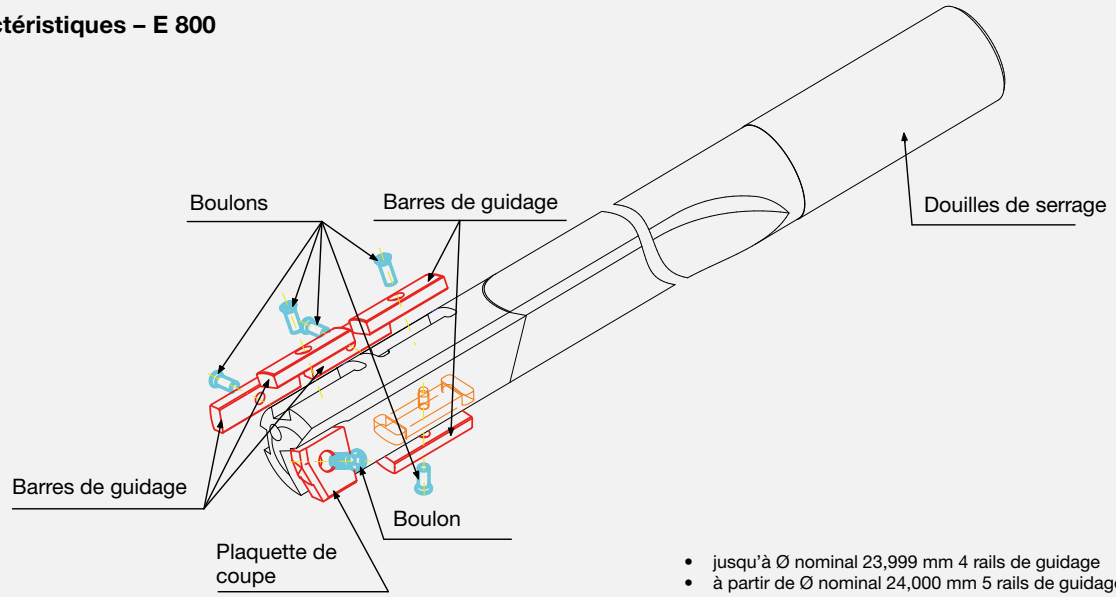
Caractéristiques – Ponçage Z



Explications :

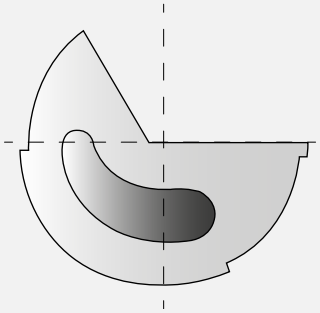
1 – Tranchant extérieur 1. Surface dégagée
2 – Tranchant extérieur 2. Surface dégagée
3 – Pointe surface dégagée
4 – Arête interne
5 – Pièce huile
6 – Tranchant secondaire (chanfrein)
7 – Détalonnage (poche d'huile)
8 – Diamètre arrière
9 – Bord de soutien (forme circonférentielle)
10 – Pointe
11 – Coupe transversale

Caractéristiques – E 800



- jusqu'à Ø nominal 23,999 mm 4 rails de guidage
- à partir de Ø nominal 24,000 mm 5 rails de guidage

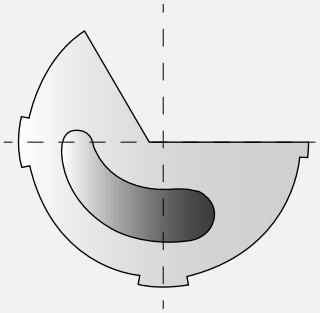
Formes périphériques standards



Forme périphérique G

Forme périphérique standard. Convient à la plupart des matériaux et travaux de perçage. Avec cette forme, le diamètre de l'outil n'est plus mesurable après la fabrication.

- Adapté à presque toutes les applications de perçage
- Pour tous les matériaux
- Déviation du point central faible
- Faible tendance au bourrage
- Tolérance d'alésage réduite

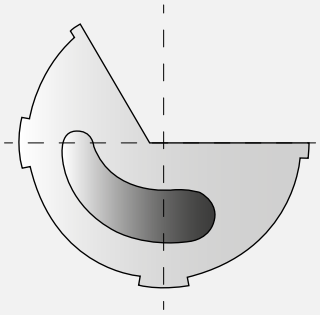


Forme périphérique C

Cette forme périphérique est privilégiée pour les tolérances réduites de diamètres et de surface du perçage.

- Pour tous les matériaux
- Acier, acier inoxydable, aluminium
- Déviation du point central faible
- Faible tendance au bourrage

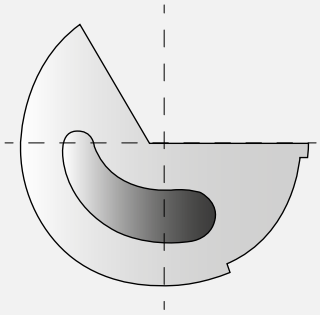
Formes périphériques spéciales



Forme périphérique A

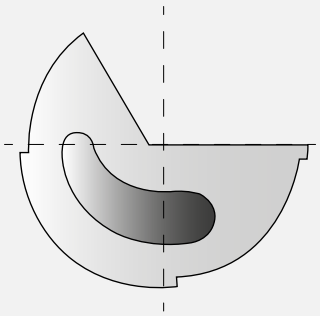
Forme périphérique adaptée aux conditions de perçage difficiles lors du perçage ou du perçage croisé. Pour matériaux faciles à usiner et/ou avec mauvaises performances de lubrification.
Utilisé pour les tolérances de perçage étroites, ainsi que comme pièce de guidage pour les têtes de coupe très longues.

- Aluminium
- Cuivre



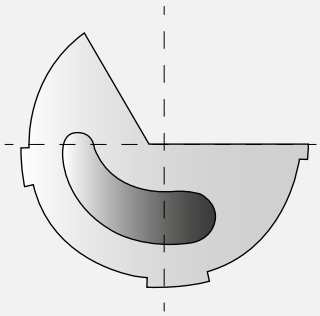
Forme périphérique D

Cette forme périphérique est utilisée presque exclusivement pour les matériaux faciles à usiner comme le GG, le graphite, etc., en particulier en combinaison avec des tolérances d'alésage étroites.



Forme périphérique E

Convient à toutes les substances, mais avec des tolérances d'alésage plus élevées.



Forme périphérique F

Forme périphérique pour matériaux facile à usiner, faible friction, et usinage stable, tel que l'aluminium,

Ce n'est qu'un petit aperçu des formes périphériques spéciales.
Autres formes périphériques spécialement adaptées à votre application sur demande.

HARTNER

Foret long classique

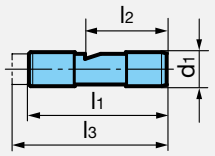
Nous conservons en stock la gamme de douilles présentée ici, mais il ne s'agit que d'une sélection de douilles de serrage. Nous fabriquons bien sûr aussi des douilles sur mesure, en fonction du dessin du client, avec la plus grande précision.

Attention ! Pour E100, des douilles de serrage avec collerette de redressage sont nécessaires. InFormeations sur demande.

Douilles de serrage pour E 80

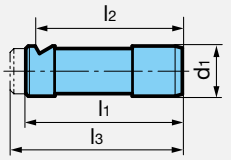
Douilles de serrage pour machine à percer des trous profonds

1



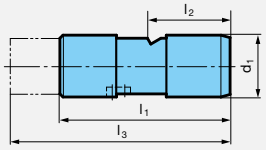
N° de code	d_1	l_1	l_2	l_3
1.1	10	40	24	-
1.2	10	40	24	45
1.3	10	40	24	55
1.4	16	45	31,2	-
1.5	25	70	34	-
1.6	25	70	34	78

2



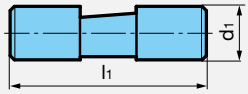
N° de code	d_1	l_1	l_2	l_3
2.1	16	50	47	-
2.2	16	50	47	55
2.3	16	50	47	70

3



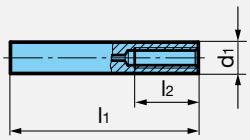
N° de code	d_1	l_1	l_2	l_3
3.1	25	70	34	-
3.2	25	70	34	100
3.3	25	70	34	105

4



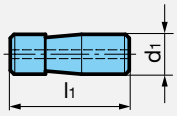
N° de code	d_1	l_1
4.1	19,05	70
4.2	12,7	70
4.3	25,4	70
4.4	31,75	70
4.5	38,1	70

5



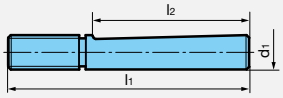
N° de code	d_1	l_1	l_2
5.1	10	60	20
5.2	16	80	28
5.3	25	100	50
5.4	10	100	20
5.5	10	110	24

6



N° de code	d_1	l_1
6.1	12,7	38
6.2	19,05	70
6.3	38,1	70

7

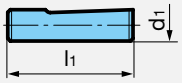


N° de code	d_1	l_1	l_2
7.1	16	112	73
7.2	20	126	82

Douilles de serrage selon DIN 1835

9

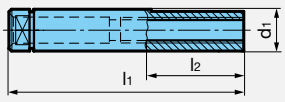
Forme HE



N° de code	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

Douilles de serrage après conception VDI

12

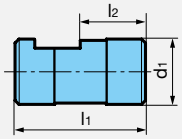


N° de code	d_1	l_1	l_2
12.1	10	68	40
12.2	16	90	40
12.3	25	112	50

Utilisable également sur les machines à percer des trous profonds

Douilles de serrage selon le système Speed-Bit

13



N° de code	d_1	l_1	l_2
13.1	16	40	14
13.2	25	50	25
13.3	35	60	20

Utilisable également sur les machines à percer des trous profonds

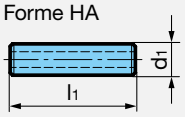
Foret long classique

Douilles de serrage pour E 80

Douilles de serrage selon DIN 6535

10

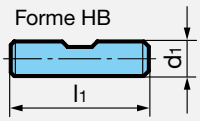
Forme HA



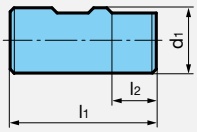
N° de code	d_1	l_1
10.1	8	36
10.2	10	40
10.3	12	45
10.4	16	48
10.5	20	50
10.6	25	56
10.7	32	60
10.8	25	70
10.9	40	70

8

Forme HB



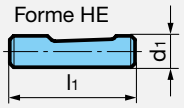
de N° de code 8.6



N° de code	d_1	l_1	l_2
8.1	8	36	-
8.2	10	40	-
8.3	12	45	-
8.4	16	48	-
8.5	20	50	-
8.6	25	56	17
8.7	32	60	19
8.8	40	70	19
8.9	50	80	23
8.10	63	90	23

11

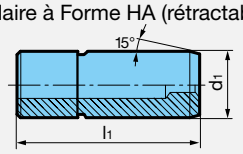
Forme HE



N° de code	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

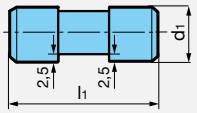
similaire à Forme HA (rétractable)



N° de code	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

similaire à Forme HE



N° de code	d_1	l_1
17.1	19,05	70
17.2	25,4	70
17.3	31,75	70
17.4	38,1	70

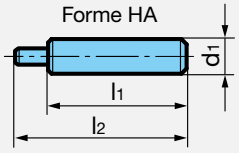
Utilisable également sur les machines à percer des trous profonds

Douilles de serrage pour E 100

Douilles de serrage avec tourillon à dresser selon DIN 6535

18

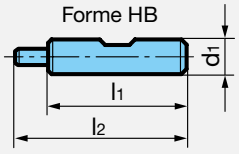
Forme HA



N° de code	d_1	l_1	l_2
4	4	28	40
6	6	36	51
10	10	40	55
12	12	45	60
16	16	48	63

19

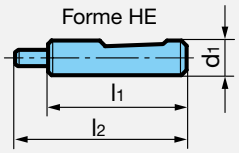
Forme HB



N° de code	d_1	l_1	l_2
4	4	28	40
6	6	36	51
10	10	40	55
12	12	45	60
16	16	48	63

20

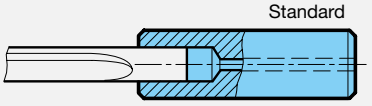
Forme HE



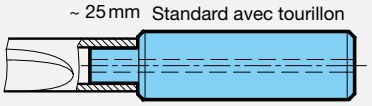
N° de code	d_1	l_1	l_2
4	4	28	40
6	6	36	51
10	10	40	55
12	12	45	60
16	16	48	63

Variantes de fabrication des douilles de serrage sur les forets pour trous profonds avec tige tubulaire

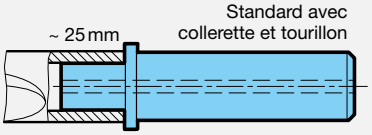
Procédure pour Ø nominal < Ø de douille
(la différence doit être d'environ 6 mm) :
La tige tubulaire se trouve dans la douille de serrage



Procédure pour Ø nominal ≠ Ø de douille
(max. à égalité) :
La tige du canon se trouve au-dessus du tourillon



Procédure pour Ø nominal > Ø de douille :
La tige du canon se trouve au-dessus du tourillon,
dont le Ø intérieur est > Ø de douille,
et se termine au ras de la collerette.



Réaffûtage et Réapprovisionnement

Même les outils haute performance modernes s'usent en raison de l'énorme charge qu'ils doivent supporter à un moment donné. Hartner rétablit la performance des outils en les réaffutant de manière appropriée.

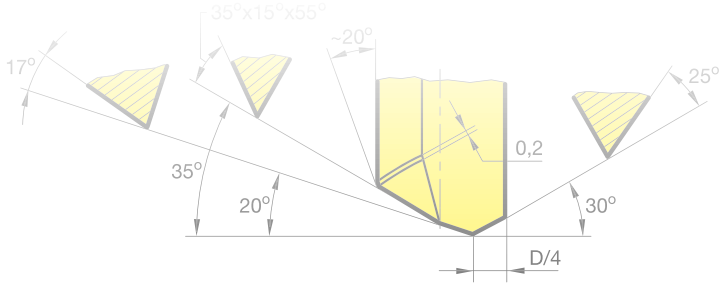
L'utilisation du même parc de machines dans tous les centres de réaffûtage garantit un standard de qualité uniforme.

Les forets pour trous profonds VHM ou les forets pour trous profonds à tête brasée peuvent être rectifiés jusqu'à 10 fois selon la longueur de la tête et la largeur de la marque d'usure.

Les points suivants doivent être respectés :

- Lors du réaffûtage, l'outil doit être rectifié proprement, c'est-à-dire sans aucune trace d'usure.
- Après le réaffûtage, l'outil est nu sur la face frontale. Il est possible d'appliquer un revêtement supplémentaire sur les outils moyennant un surcoût.
- Les forets pour trous profonds à tête brasée peuvent être réequipés s'ils sont très usés ou endommagés.
- Après le réaffûtage, la concentricité des forets pour trous profonds avec tourillon de positionnement est contrôlée et, le cas échéant, rectifié.
- Valeurs de référence pour les valeurs min. de longueur de tête lors du réaffûtage afin de garantir les exigences de qualité de l'alésage :

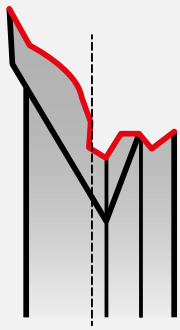
Plage de diamètre	Long.de la tête min.
Ø0,900 - Ø1,999	5 - 7 mm
Ø2,000 - Ø3,999	8 - 10 mm
Ø4,000 - Ø16,999	10 - 14 mm
Ø17,000 - Ø25,999	14 - 16 mm
Ø26,000 - Ø40,000	16 - 18 mm



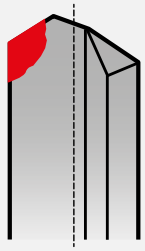
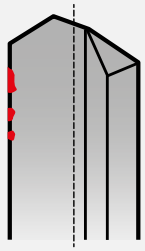
1	- 25°	+ 30°	0°	
2	+ 20°	+ 17°	0°	D/4
3	+ 35°	+ 15°	+ 55°	

HARTNER

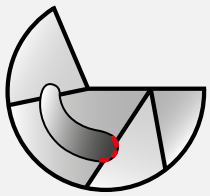
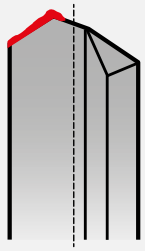
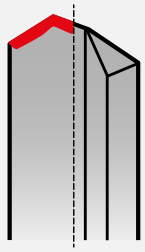
Conseils d'utilisation / résolutions des problèmes

Erreur	Causes		Solutions
1. Casse de l'outil lors du perçage	Outil	- Arête de coupe émoussée - Mauvais affûtage - Avance trop rapide - Perçage à vitesse rapide - Outil préalablement endommagé (éclats…) - Rapport longueur/diamètre (LxD) trop élevé	- Réaffûter - Corriger la géométrie de pointe - Réduire l'avance - Sélectionner l'avance de perçage - Réaffûter si nécessaire le nouvel outil - Utiliser plusieurs outils/douilles de serrage
	Perçage pilote	- Diamètre trop petit - Diamètre trop grand - Trop mauvaise qualité du trou percé (outil usé) - Méthode de perçage incorrecte	- Autre outil (Ø supérieur) - Autre outil (Ø inférieur) - Utiliser un nouvel outil - Corriger le programme
	Canon de perçage	- Usé - Cassé - Pression de serrage trop faible/se soulève lors du perçage et les copeaux se coincent - L'espace entre la douille et la pièce à usiner/les copeaux se coince, accumulation de copeaux	- Nouveau canon de perçage - Nouveau canon de perçage - Augmenter la pression d'appui - Corriger la position du canon de perçage
	Pièce à usiner	- Serrage incorrect	- Serrer la pièce à usiner correctement
	Liquide de refroidissement	- Pression de liquide de refroidissement trop basse, accumulation de copeaux - Milieu trop sale --> obstruction	- Augmenter la pression du liquide de refroidissement - Contrôler les filtres
2. La queue de l'outil casse (douille de serrage)	Outil	- Rapport longueur/diamètre (LxD) trop élevé	- Utiliser plusieurs outils / douilles de serrage
	Pièce à usiner	- Position de l'axe du perçage incorrecte	- Contrôler le serrage de la pièce à usiner
	Machine	- Décalage machine/pièce - Profondeur de perçage trop faible (erreur de programmation)	- Vérifier le décalage et le cas échéant, corriger - Contrôler la programmation

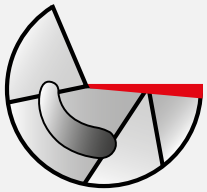
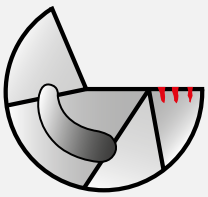
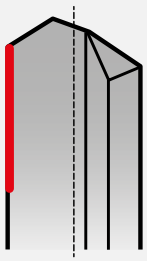
Conseils d'utilisation / résolutions des problèmes

Erreur	Causes		Solutions
3. Tube déformé / tordu 	Outil	- Rapport longueur/diamètre (LxD) trop élevé - Forces d'usinage trop élevées (couple)	- Utiliser plusieurs outils/douilles de serrage - Réduire les conditions de coupe
	Liquide de refroidissement	- Pression du liquide de refroidissement trop faible, bourrage de copeaux	- Augmenter la pression du liquide de refroidissement
4. L'outil se brise/s'écaille 	Outil	- Surchauffe lors de l'usinage - Arête de coupe du tranchant secondaire (chanfrein arrondi) trop émoussée - Outil mal fixé, oscillations axiales - L'outil se coince, se décale lors du retrait - Durée de vie maximale dépassée - Performance d'enlèvement de copeaux trop élevée - Coupe interrompue - Ecart de concentricité trop important	- Corriger les paramètres lors de l'usinage - Vérifier l'arrondi des arêtes sur les arêtes latérales - Optimiser le serrage de l'outil - Corriger la géométrie de coupe ou la forme périphérique - Réduire l'intervalle entre les changements d'outil - Réduire la vitesse de coupe - Réduire les valeurs d'avance - Vérifier la concentricité, la corriger éventuellement
	Perçage pilote	- Diamètre trop grand (trop de jeu)	- autre outil (Ø inférieur)
	Canon de perçage	- Diamètre trop grand (trop de jeu)	- Autre canon de perçage (Ø inférieur)
	Pièce à usiner	- Serrage insuffisant	- Serrer la pièce à usiner correctement
5. Ebréchure sur le chanfrein de l'outil 	Outil	- Coupe interrompue	- Réduire les valeurs d'avance
	Perçage pilote	- Diamètre trop grand (trop de jeu)	- autre outil (Ø inférieur)
	Canon de perçage	- Diamètre trop grand (trop de jeu) - Espace trop grand entre le canon de perçage et la pièce à usiner	- Autre canon de perçage (Ø inférieur) - Réduire l'interstice (dans l'idéal, le canon de perçage doit être positionné)
	Pièce à usiner	- conditions instables / serrage de la pièce insuffisant - Perçages transversaux non bouchés (perte de liquide de refroidissement)	- Serrer la pièce à usiner correctement - Sceller les trous transversaux (bouchons d'étanchéité Hartner)
	Liquide de refroidissement	- Liquide de refroidissement inapproprié pour les matériaux abrasifs	- Choisir le liquide de refroidissement adapté, augmenter la teneur en huile de l'émulsion/utiliser de l'huile

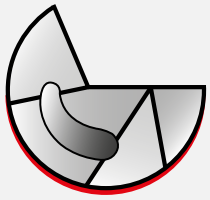
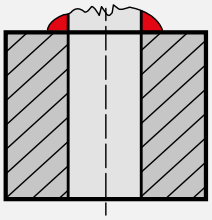
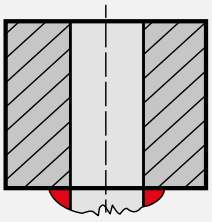
Conseils d'utilisation / résolutions des problèmes

Erreur	Causes		Solutions
6. Ruptures dans le canal de refroidissement 	Outil	- Angle de dépouille trop faible - Angle de lubrification trop petit (débit d'huile insuffisant) - Adhérences du matériau au front	- Augmenter l'angle de dépouille - Augmenter / ajuster l'angle de lubrification - Outil revêtu, si nécessaire
	Liquide de refroidissement	- Liquide de refroidissement inapproprié, mauvaise huile (viscosité) ou émulsion trop fine (dépôts de matière) - Liquide de refroidissement sale en raison de petits copeaux ou d'autres salissures	- Choisir le liquide de refroidissement adapté, augmenter la teneur en huile de l'émulsion/utiliser de l'huile - Vérifier le filtrage du liquide de refroidissement, le cas échéant améliorer/affiner
7. Arête rapportée 	Outil	- Vitesse de coupe trop faible - Retrait/ arrondi de l'arête de coupe trop important - Arêtes de coupe simple - Matériau de coupe inapproprié - Revêtement inadapté	- Augmenter la vitesse de coupe - Réduire l'arrondi de l'arête de coupe - Revêtir l'outil si nécessaire - Matériau de coupe adapté - Choisir un autre revêtement
	Liquide de refroidissement	- Liquide de refroidissement inapproprié, mauvaise huile (viscosité) ou émulsion trop fine	- Choisir le liquide de refroidissement adapté, augmenter la teneur en huile de l'émulsion/utiliser de l'huile
8. Forte usure des colonnes 	Outil	- Vitesse de coupe trop élevée - Mauvaise forme de copeaux - Matériau de coupe inapproprié	- Réduire la vitesse de coupe - Adapter l'affûtage - Matériau de coupe adapté, le cas échéant Revêtir l'outil si nécessaire
	Liquide de refroidissement	- Liquide de refroidissement inapproprié, mauvaise huile (viscosité) ou émulsion trop fine - Basse pression/débit du liquide de refroidissement trop lent	- Choisir le liquide de refroidissement adapté, augmenter la teneur en huile de l'émulsion/utiliser de l'huile - Augmenter la pression/le débit du liquide de refroidissement

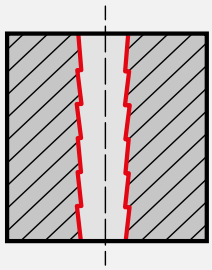
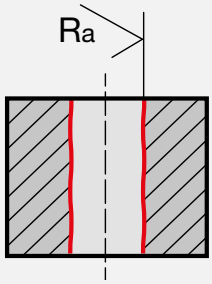
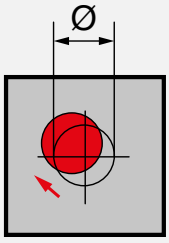
Conseils d'utilisation / résolutions des problèmes

Erreur	Causes		Solutions
9. Usure de la surface libre 	Outil	- Vitesse de coupe trop élevée - Les copeaux freinent trop fortement sur la face de coupe - Avance trop faible - Angle de dépouille trop faible	- Réduire la vitesse de coupe - Enlever le revêtement de la surface de copeaux - Augmenter l'avance - Augmenter l'angle de dépouille
	Liquide de refroidissement	- Liquide de refroidissement inapproprié, mauvaise huile (viscosité) ou émulsion trop fine	- Choisir le liquide de refroidissement adapté, augmenter la teneur en huile de l'émulsion/utiliser de l'huile
10. Usure du peigne/ébrèchement 	Outil	- Forces de coupe trop élevées - Coupe interrompue - Mauvais carbure sélectionné - Températures d'enlèvement de copeaux trop élevées	- Réduire les conditions de coupe - Réduire l'avance - Choisir un autre carbure - Réduire les conditions de coupe/modifier la géométrie de rectification (angle du compartiment à huile)
	Liquide de refroidissement	- Liquide de refroidissement inapproprié, mauvaise huile (viscosité) ou émulsion trop fine (températures trop élevées en raison d'une lubrification insuffisante)	- Choisir le liquide de refroidissement adapté, augmenter la teneur en huile de l'émulsion/utiliser de l'huile
11. Usure des listels périphériques 	Outil	- Défaut de concentricité trop importante - Conicité arrière insuffisante - Arrondi des arêtes de coupe trop grand - Géométrie de la pointe inadaptée à l'espace de lubrification (débit insuffisant)	- Vérifier la concentricité, la corriger éventuellement - Augmenter la conicité arrière - Réduire l'arrondi de l'arête de coupe - Adapter l'espace de lubrification (angle/dépose/rainure/2e surface)
	Pièce à usiner	- Conditions instables, serrage de l'outil insuffisant	- Serrer la pièce à usiner correctement
	Liquide de refroidissement	- Liquide de refroidissement inapproprié, mauvaise huile (viscosité) ou émulsion trop fine	- Choisir le liquide de refroidissement adapté, augmenter la teneur en huile de l'émulsion/utiliser de l'huile

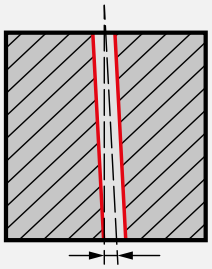
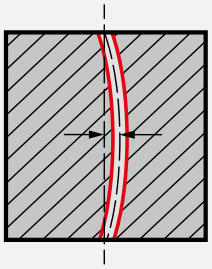
Conseils d'utilisation / résolutions des problèmes

Erreur	Causes		Solutions
12. Usure de la forme périphérique 	Outil	- Défaut de concentricité trop importante - Coupe interrompue - Mauvais carbure sélectionné - Conicité arrière insuffisante - Mauvais revêtement sélectionné	- Vérifier la concentricité, la corriger éventuellement - Réduire les valeurs d'avance - Corriger la sélection du carbure - Augmenter la conicité arrière - Corriger la sélection du revêtement
	Pièce à usiner	- Conditions instables, serrage de l'outil insuffisant	- Serrer la pièce à usiner correctement
	Liquide de refroidissement	- Liquide de refroidissement inapproprié pour les matériaux abrasifs	- Choisir le liquide de refroidissement adapté, augmenter la teneur en huile de l'émulsion/utiliser de l'huile
13. Forte bavure de perçage à l'entrée 	Outil	- Avance trop élevée lors du perçage - Durée de vie de l'outil maximale atteinte (outil émoussé) - Arrondi des arêtes de coupe trop grand - Angle de dépouille trop petit	- Réduire l'avance lors du perçage - Réduire l'intervalle entre les changements d'outil - Réduire l'arrondi de l'arête de coupe - Augmenter l'angle de dépouille
	Perçage pilote	- Diamètre trop grand (trop de jeu)	- autre outil (Ø inférieur)
	Canon de perçage	- Diamètre trop grand (trop de jeu)	- Autre canon de perçage (diamètre plus petit)
14. Forte bavure de perçage à la sortie 	Outil	- Avance trop élevée lors du perçage - Durée de vie de l'outil maximale atteinte (outil émoussé) - Arrondi des arêtes de coupe trop grand	- Réduire l'avance lors du perçage - Réduire l'intervalle entre les changements d'outil - Réduire l'arrondi de l'arête de coupe

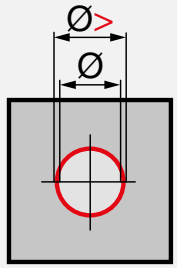
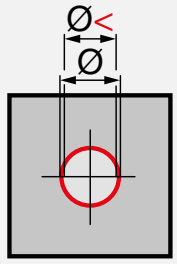
Conseils d'utilisation / résolutions des problèmes

Erreur	Causes		Solutions
15. L'outil perce 	Outil	- La tête de forage n'est pas positionnée en ligne droite sur le tube de forage (E 80/E 800) - Coaxialité de la tête à la tige trop grande	- Rebraser la tête/nouvel outil - Vérifier la coaxialité/utiliser un nouvel outil
	Machine	- Décalage de l'axe trop important entre le logement de la broche et les canons de perçage ou le perçage pilote	- Corriger le décalage de l'axe. Décalage de 0,02 mm optimal
	Liquide de refroidissement	- Pression du liquide de refroidissement trop élevée	- Réduire la pression du liquide de refroidissement
16. Mauvais état de surface 	Outil	- Arête de coupe cassée - Chanfrein du tranchant secondaire (chanfrein arrondi) trop large - Chanfrein de tirage trop faible - Pression trop faible sur la barre de guidage arrière - Défaut de concentricité trop importante - Mauvais revêtement sélectionné	- Affûter de l'outil - Corriger la conception de la pièce - Améliorer le chanfrein - Augmenter la pression par la géométrie de contact ou par le chanfrein/rayon d'angle - Vérifier la concentricité, la corriger - Corriger la sélection du revêtement
	Pièce à usiner	- Conditions instables, serrage de l'outil insuffisant	- Serrer la pièce à usiner correctement
	Liquide de refroidissement	- Type de liquide de refroidissement/ émulsion insuffisante - Quantité de liquide de refroidissement insuffisante	- Si possible, utiliser de l'huile - Augmenter la quantité de liquide de refroidissement (volume/pression)
17. Écart d'alignement 	Outil	- Défaut de concentricité trop importante	- Vérifier la concentricité, la corriger éventuellement
	Perçage pilote	- Amorce de perçage sur plan incliné - Mauvaise exécution de l'outil	- Perçage du trou pilote à l'aide d'une fraise - Optimiser LxD/vérifier Ø outil
	Canon de perçage	- Amorce de perçage sur plan incliné - Canon de perçage usé (Ø intérieur trop grand)	- utiliser un canon de perçage adapté - utiliser un nouveau canon de perçage
	Pièce à usiner	- Conditions instables, serrage de l'outil insuffisant	- Serrer la pièce à usiner correctement
	Machine	- Trop grand décalage de l'axe entre le logement de la broche et le canon de perçage/le perçage pilote	- Corriger le décalage de l'axe. Décalage de 0,02 mm optimal

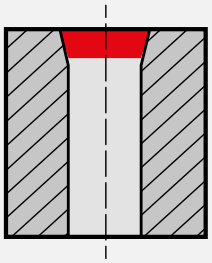
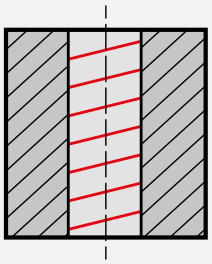
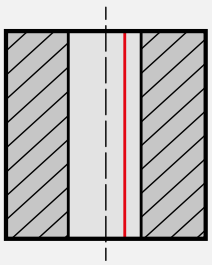
Conseils d'utilisation / résolutions des problèmes

Erreur	Causes		Solutions
18. Tracé de perçage trop grand 	Outil	- Arête de coupe émoussée - Mauvaise coupe - Mauvaise forme périphérique - Avance trop rapide - Guidage trop faible - Défaut de concentricité trop importante	- Réaffûter - Corriger l'affûtage - Corriger la forme périphérique - Réduire l'avance - Utiliser une tête plus longue - Vérifier la concentricité, la corriger éventuellement
	Perçage pilote	- Perçage pilote en cours - Perçage pilote non rond	- Vérifier le perçage pilote, le cas échéant autre outil - Installer l'outil pilote
	Canon de perçage	- Mauvais canon de perçage/canon de perçage inadapté au logement pour canon de perçage	- Remplacer le canon de perçage si nécessaire également le logement pour canon de perçage
	Pièce à usiner	- Conditions instables, serrage de l'outil insuffisant - Position de perçage défavorable/très faibles parois - Surchauffe de la pièce à usiner (augmentation importante de la température)	- Serrer la pièce à usiner correctement - Tenir compte de la position de l'alésage/ le cas échéant, modifier - Réduire les conditions de coupe
	Machine	- Trop grand décalage de l'axe entre le logement de la broche et le canon de perçage/le perçage pilote	- Corriger le décalage de l'axe. Décalage de 0,02 mm optimal
19. Mauvaise rectitude de l'alésage 	Outil	- Arête de coupe émoussée - Mauvaise coupe - Mauvaise forme périphérique - Avance trop rapide - Guidage trop faible - Défaut de concentricité trop importante - Mauvais revêtement sélectionné - Rapport longueur/diamètre (LxD) trop élevé	- Réaffûter - Corriger l'affûtage - Corriger la forme périphérique - Réduire l'avance - Utiliser une tête plus longue - Vérifier la concentricité, la corriger éventuellement - Corriger la sélection du revêtement - Utiliser plusieurs outils/douilles de serrage
	Pièce à usiner	- Conditions instables, serrage de l'outil insuffisant - Position de perçage défavorable/très faibles parois - Surchauffe de la pièce à usiner (augmentation importante de la température)	- Serrer la pièce à usiner correctement - Tenir compte de la position de l'alésage/ le cas échéant, modifier - Réduire les conditions de coupe
	Machine	- Pièce à usiner sans contre-sens - Trop grand décalage de l'axe entre le logement de la broche et le canon de perçage/le perçage pilote	- Si possible mécaniquement, percer en sens inverse - Corriger le décalage de l'axe. Décalage de 0,02 mm optimal

Conseils d'utilisation / résolutions des problèmes

Erreur	Causes		Solutions
20. Trou trop grand 	Outil	- Pression trop importante sur le tranchant secondaire - Défaut de concentricité trop importante	- Modifier la géométrie d'affûtage/retirer la pression de l'arête de coupe secondaire (modifier D/4 sur D/3) - Vérifier la concentricité, la corriger éventuellement
	Liquide de refroidissement	- Pression du liquide de refroidissement trop élevée	- Réduire la pression du liquide de refroidissement
21. Trou trop étroit 	Outil	- Pression trop faible sur le tranchant secondaire - Mauvaise forme périphérique - Outil rectifié trop fortement (souvent) (rétrécissement)	- Modifier la géométrie d'affûtage/ Augmenter la pression sur le couteau secondaire (modifier D/3 sur D/4) - Corriger la forme périphérique (forme «C») - Utiliser un nouvel outil
22. Accumulation de copeaux/ outil coincé 	Outil	- Le rapport de la vitesse de coupe par rapport à l'avance ne correspond pas - Géométrie de rectification défavorable - Projection fluide - Usinage par enlèvement de copeaux avec l'outil revêtu - Géométrie de la pointe inadaptée à l'espace de lubrification (débit insuffisant) - Serrage de l'outil non étanche (fuite du liquide de refroidissement)	- Corriger/ajuster le rapport vitesse de coupe/avance - Adapter la géométrie de rectification pour favoriser la rupture de copeaux - Programmer l'avance par pas, si nécessaire - Enlever le revêtement de la surface de copeaux - Adapter l'espace de lubrification (angle/ dépose/rainure/2e surface) - Optimiser le serrage de l'outil
	Liquide de refroidissement	- Quantité de liquide de refroidissement insuffisante	- Augmenter la quantité de liquide de refroidissement (volume/pression)

Conseils d'utilisation / résolutions des problèmes

Erreur	Causes		Solutions
23. Grande largeur de perçage 	Outil	- Avance trop élevée lors du perçage	- Réduire l'avance lors du perçage
	Perçage pilote	- Le perçage pilote se déplace/n'est pas rond	- Vérifier le perçage pilote, le cas échéant utiliser un autre outil
	Canon de perçage	- Mauvais canon de perçage/canon de perçage inadapté au logement pour canon de perçage	- Remplacer le canon de perçage si nécessaire également le logement pour canon de perçage
	Pièce à usiner	- Conditions instables / serrage de la pièce insuffisant, vibrations lors du perçage	- Serrer la pièce à usiner correctement
24. Perçage hélicoïdal 	Outil	- Performance d'enlèvement de copeaux trop élevée - Arête de coupe émoussée - La tête de forage n'est pas positionnée en ligne droite sur le tube de forage (E80/E800) - Coaxialité de la tête à la tige trop grande - Mauvaise forme périphérique	- Réduire la vitesse de coupe - Réaffûter l'outil/le cas échéant changer - Rebraser la tête/nouvel outil - Vérifier la coaxialité/utiliser un nouvel outil - Corriger la forme circonférentielle
	Pièce à usiner	- Conditions instables / serrage de la pièce insuffisant, vibrations lors du perçage	- Fixer correctement la pièce à usiner/ placer les amortisseurs de vibrations
25. L'outil laisse des traces de retrait 	Outil	- Avance trop élevée lors de l'extraction - Arêtes de coupe trop tranchantes - Défaut de concentricité trop importante - Forme circonférentielle incorrecte	- Réduire l'avance - Arrondir les arêtes de coupe - Vérifier la concentricité, la corriger éventuellement - Corriger la forme périphérique
	Pièce à usiner	- Mauvaise forme périphérique	- Serrer la pièce à usiner correctement
	Machine	- Conditions instables, serrage de l'outil insuffisant	- Corriger le décalage de l'axe. Décalage de 0,02 mm optimal

HARTNER

Precision Cutting Tools

MICROFORETS

CW et HSS-E-PM
polis et revêtus

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Profon-deur	d1/mm	N° d'article	Progr. page
Microforets sans trou d'huile															
●	●	●	●	○		DIN 1899	N	**HSS-E-PM**	◯	à droite	cyl.	~5xD	0,050 - 1,900	**87011**	329
●	●	●	●	○		DIN 1899	N	**HSS-E-PM**	◯	à gauche	cyl.	~5xD	0,160 - 1,450	**87016**	331
●	●	●	●	○		DIN 1899	N	**HSS-E-PM**	T	à droite	cyl.	~5xD	0,200 - 1,500	**84810**	332
															
●		●				Norme usine	N	**CW monobloc**	A	à droite	cyl.		0,100 - 3,000	**86402**	333
															
●	●	●	○	○		Norme usine	N	**CW monobloc**	A	à droite	cyl.	4xD	0,500 - 3,000	**86400**	334
●	○	●	○	○	○	Norme usine	N	**CW monobloc**	◯	à droite	cyl.	~5xD	0,200 - 1,300	**89281**	335
															
●	●	●	○	○		Norme usine	N	**CW monobloc**	A	à droite	cyl.	7xD	0,500 - 3,000	**86401**	336
Microforets à trous d'huile															
															
●	●	●	○	○		Norme usine	N	**CW monobloc**	A	à droite	cyl.	5xD	1,400 - 3,000	**86405**	337
															
●	●	●	○	○		Norme usine	N	**CW monobloc**	A	à droite	cyl.	8xD	1,400 - 3,000	**86408**	338
															
●	●	●	○	○		Norme usine	N	**CW monobloc**	A	à droite	cyl.	15xD	1,400 - 3,000	**86412**	339

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Microforets sans trou d'huile

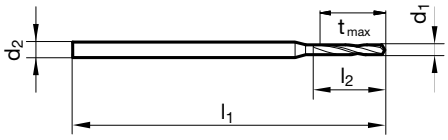
N° d'article 87011

P	M	K	N	S	H
●	●	●	●	○	

HSS-E-PM | N | ~5xD | DIN 1899 | 118° | 0/-0,004 | R | Cyl

affûtage en pente • < Ø 0,15 mm acier rapide au Co • avec attachement renforcé
aciers hautement alliés

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



d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,050	1,000	25,000	0,400	0,355	1,000	25,000	2,400
0,060	1,000	25,000	0,400	0,360	1,000	25,000	2,400
0,080	1,000	25,000	0,500	0,365	1,000	25,000	2,400
0,090	1,000	25,000	0,500	0,370	1,000	25,000	2,400
0,100	1,000	25,000	0,500	0,375	1,000	25,000	2,400
0,110	1,000	25,000	0,500	0,380	1,000	25,000	2,400
0,120	1,000	25,000	0,500	0,390	1,000	25,000	3,000
0,130	1,000	25,000	0,800	0,400	1,000	25,000	3,000
0,140	1,000	25,000	0,800	0,405	1,000	25,000	3,000
0,150	1,000	25,000	0,800	0,410	1,000	25,000	3,000
0,160	1,000	25,000	1,100	0,415	1,000	25,000	3,000
0,170	1,000	25,000	1,100	0,420	1,000	25,000	3,000
0,180	1,000	25,000	1,100	0,425	1,000	25,000	3,000
0,190	1,000	25,000	1,100	0,430	1,000	25,000	3,000
0,200	1,000	25,000	1,500	0,440	1,000	25,000	3,000
0,205	1,000	25,000	1,500	0,450	1,000	25,000	3,000
0,210	1,000	25,000	1,500	0,455	1,000	25,000	3,000
0,215	1,000	25,000	1,500	0,460	1,000	25,000	3,000
0,220	1,000	25,000	1,500	0,470	1,000	25,000	3,000
0,225	1,000	25,000	1,500	0,480	1,000	25,000	3,000
0,230	1,000	25,000	1,500	0,485	1,000	25,000	3,400
0,235	1,000	25,000	1,500	0,490	1,000	25,000	3,400
0,240	1,000	25,000	1,500	0,495	1,000	25,000	3,400
0,245	1,000	25,000	1,900	0,500	1,000	25,000	3,400
0,250	1,000	25,000	1,900	0,510	1,000	25,000	3,400
0,255	1,000	25,000	1,900	0,520	1,000	25,000	3,400
0,260	1,000	25,000	1,900	0,530	1,000	25,000	3,400
0,265	1,000	25,000	1,900	0,540	1,000	25,000	3,900
0,270	1,000	25,000	1,900	0,550	1,000	25,000	3,900
0,275	1,000	25,000	1,900	0,555	1,000	25,000	3,900
0,280	1,000	25,000	1,900	0,560	1,000	25,000	3,900
0,285	1,000	25,000	1,900	0,570	1,000	25,000	3,900
0,290	1,000	25,000	1,900	0,580	1,000	25,000	3,900
0,300	1,000	25,000	1,900	0,585	1,000	25,000	3,900
0,310	1,000	25,000	2,400	0,590	1,000	25,000	3,900
0,315	1,000	25,000	2,400	0,600	1,000	25,000	3,900
0,320	1,000	25,000	2,400	0,610	1,000	25,000	4,200
0,325	1,000	25,000	2,400	0,620	1,000	25,000	4,200
0,330	1,000	25,000	2,400	0,630	1,000	25,000	4,200
0,335	1,000	25,000	2,400	0,640	1,000	25,000	4,200
0,340	1,000	25,000	2,400	0,650	1,000	25,000	4,200
0,350	1,000	25,000	2,400	0,660	1,000	25,000	4,200

Microforets sans trou d’huile

d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,665	1,000	25,000	4,200	1,040	1,500	25,000	6,800
0,670	1,000	25,000	4,200	1,050	1,500	25,000	6,800
0,680	1,000	25,000	4,800	1,060	1,500	25,000	6,800
0,690	1,000	25,000	4,800	1,070	1,500	25,000	7,600
0,700	1,000	25,000	4,800	1,080	1,500	25,000	7,600
0,710	1,000	25,000	4,800	1,100	1,500	25,000	7,600
0,720	1,000	25,000	4,800	1,110	1,500	25,000	7,600
0,730	1,000	25,000	4,800	1,120	1,500	25,000	7,600
0,740	1,000	25,000	4,800	1,140	1,500	25,000	7,600
0,750	1,000	25,000	4,800	1,150	1,500	25,000	7,600
0,760	1,000	25,000	5,300	1,180	1,500	25,000	7,600
0,770	1,000	25,000	5,300	1,190	1,500	25,000	8,500
0,790	1,000	25,000	5,300	1,200	1,500	25,000	8,500
0,800	1,500	25,000	5,300	1,210	1,500	25,000	8,500
0,810	1,500	25,000	5,300	1,240	1,500	25,000	8,500
0,820	1,500	25,000	5,300	1,250	1,500	25,000	8,500
0,830	1,500	25,000	5,300	1,270	1,500	25,000	8,500
0,840	1,500	25,000	5,300	1,300	1,500	25,000	8,500
0,850	1,500	25,000	5,300	1,310	1,500	25,000	8,500
0,860	1,500	25,000	6,000	1,320	1,500	25,000	8,500
0,870	1,500	25,000	6,000	1,340	1,500	25,000	9,500
0,880	1,500	25,000	6,000	1,350	1,500	25,000	9,500
0,890	1,500	25,000	6,000	1,380	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
0,930	1,500	25,000	6,000	1,420	1,500	25,000	9,500
0,940	1,500	25,000	6,000	1,450	1,500	25,000	9,500
0,950	1,500	25,000	6,000	1,500	2,000	30,000	9,500
0,960	1,500	25,000	6,800	1,600	2,000	30,000	10,600
0,970	1,500	25,000	6,800	1,630	2,000	30,000	10,600
0,980	1,500	25,000	6,800	1,700	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				

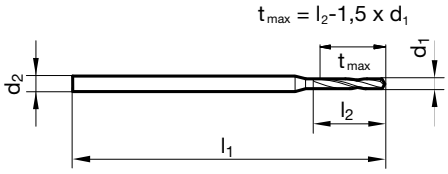
Microforets sans trou d'huile

N° d'article 87016

P	M	K	N	S	H
●	●	●	●	○	

HSS-E-PM | ○ | N | ~5xD | DIN 1899 | 118° | 0/-0,004 | L | Cyl

affûtage en pente • < Ø 0,15 mm acier rapide au Co • avec attachement renforcé
aciers hautement alliés



d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,160	1,000	25,000	1,100	0,710	1,000	25,000	4,800
0,200	1,000	25,000	1,500	0,740	1,000	25,000	4,800
0,210	1,000	25,000	1,500	0,750	1,000	25,000	4,800
0,220	1,000	25,000	1,500	0,760	1,000	25,000	5,300
0,230	1,000	25,000	1,500	0,780	1,000	25,000	5,300
0,240	1,000	25,000	1,500	0,820	1,500	25,000	5,300
0,280	1,000	25,000	1,900	0,830	1,500	25,000	5,300
0,300	1,000	25,000	1,900	0,840	1,500	25,000	5,300
0,310	1,000	25,000	2,400	0,870	1,500	25,000	6,000
0,330	1,000	25,000	2,400	0,890	1,500	25,000	6,000
0,350	1,000	25,000	2,400	0,900	1,500	25,000	6,000
0,360	1,000	25,000	2,400	0,910	1,500	25,000	6,000
0,370	1,000	25,000	2,400	0,920	1,500	25,000	6,000
0,380	1,000	25,000	2,400	0,930	1,500	25,000	6,000
0,390	1,000	25,000	3,000	0,940	1,500	25,000	6,000
0,400	1,000	25,000	3,000	0,950	1,500	25,000	6,000
0,410	1,000	25,000	3,000	0,970	1,500	25,000	6,800
0,420	1,000	25,000	3,000	0,980	1,500	25,000	6,800
0,440	1,000	25,000	3,000	0,990	1,500	25,000	6,800
0,450	1,000	25,000	3,000	1,000	1,500	25,000	6,800
0,460	1,000	25,000	3,000	1,010	1,500	25,000	6,800
0,470	1,000	25,000	3,000	1,050	1,500	25,000	6,800
0,480	1,000	25,000	3,000	1,080	1,500	25,000	7,600
0,490	1,000	25,000	3,400	1,100	1,500	25,000	7,600
0,500	1,000	25,000	3,400	1,150	1,500	25,000	7,600
0,510	1,000	25,000	3,400	1,250	1,500	25,000	8,500
0,520	1,000	25,000	3,400	1,300	1,500	25,000	8,500
0,540	1,000	25,000	3,900	1,340	1,500	25,000	9,500
0,550	1,000	25,000	3,900	1,350	1,500	25,000	9,500
0,570	1,000	25,000	3,900				
0,600	1,000	25,000	3,900				
0,610	1,000	25,000	4,200				
0,660	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				

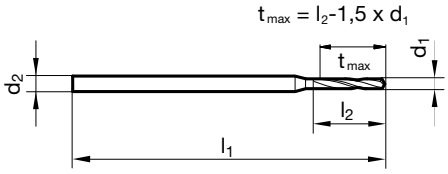
Microforets sans trou d'huile

N° d'article 84810

P	M	K	N	S	H
●	●	●	●	○	

HSS-E-PM | T | N | ~5xD | DIN 1899 | 118° | 0/-0,004 | R | Cyl

affûtage en pente • avec attachement renforcé • meilleure résistance à l´usure
aciers hautement alliés



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	1,300	1,500	25,000	8,500
0,590	1,000	25,000	3,900	1,400	1,500	25,000	9,500
0,600	1,000	25,000	3,900	1,450	1,500	25,000	9,500
0,700	1,000	25,000	4,800	1,500	2,000	30,000	9,500
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				

HARTNER

Microforets sans trou d'huile

N° d'article 86402

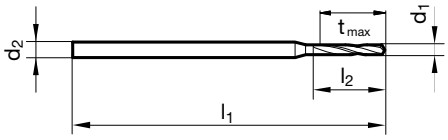
P	M	K	N	S	H
•		•			

VHM | A | N | WN | 140° | h7 | R | Cyl

amin. de l'âme ≥ Ø 0,800 • affûtage en pente • diamètre unique d´attachement 3 mm • longueur unique 38 mm

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • fontes • usinage des platines

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm
0,100		3,000	38,000	1,200
0,150		3,000	38,000	2,000
0,200		3,000	38,000	2,500
0,250		3,000	38,000	3,000
0,300		3,000	38,000	5,000
0,310		3,000	38,000	5,000
0,350		3,000	38,000	6,000
0,370		3,000	38,000	6,000
0,400		3,000	38,000	7,000
0,450		3,000	38,000	7,000
0,500		3,000	38,000	7,000
0,550		3,000	38,000	7,000
0,600		3,000	38,000	7,000
0,640		3,000	38,000	7,000
0,650		3,000	38,000	7,000
0,700		3,000	38,000	8,000
0,710		3,000	38,000	8,000
0,720		3,000	38,000	8,000
0,740		3,000	38,000	8,000
0,750		3,000	38,000	8,000
0,760		3,000	38,000	8,000
0,770		3,000	38,000	8,000
0,780		3,000	38,000	8,000
0,790		3,000	38,000	8,000
0,800		3,000	38,000	10,000
0,810		3,000	38,000	10,000
0,820		3,000	38,000	10,000
0,830		3,000	38,000	10,000
0,840		3,000	38,000	10,000
0,850		3,000	38,000	10,000
0,860		3,000	38,000	10,000
0,870		3,000	38,000	10,000
0,880		3,000	38,000	10,000
0,890		3,000	38,000	10,000
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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm
0,980		3,000	38,000	10,000
0,990		3,000	38,000	10,000
1,000		3,000	38,000	10,000
1,100		3,000	38,000	10,000
1,110		3,000	38,000	10,000
1,150		3,000	38,000	10,000
1,200		3,000	38,000	10,000
1,210		3,000	38,000	10,000
1,400		3,000	38,000	10,000
1,450		3,000	38,000	10,000
1,500		3,000	38,000	10,000
1,510		3,000	38,000	10,000
1,520		3,000	38,000	10,000
1,550		3,000	38,000	10,000
1,600		3,000	38,000	12,000
1,650		3,000	38,000	12,000
1,700		3,000	38,000	12,000
1,800		3,000	38,000	12,000
1,810		3,000	38,000	12,000
1,830		3,000	38,000	12,000
1,850		3,000	38,000	12,000
1,900		3,000	38,000	12,000
1,920		3,000	38,000	12,000
1,950		3,000	38,000	12,000
1,980		3,000	38,000	12,000
2,000		3,000	38,000	12,000
2,050		3,000	38,000	12,000
2,100		3,000	38,000	12,000
2,400		3,000	38,000	12,000
2,500		3,000	38,000	12,000
2,600		3,000	38,000	12,000
2,750		3,000	38,000	12,000
2,950		3,000	38,000	12,000
3,000		3,000	38,000	12,000

Microforets sans trou d'huile

N° d'article 86400

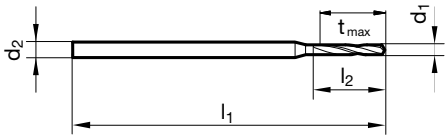
P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 4xD | WN | 140° | m7 | R | Cyl

amin. de l'âme ≥ Ø 0,500 • affûtage en pente • arête de coupe principale rectiligne • affilage de l'arête de coupe automatisé

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 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					

Microforets sans trou d’huile

N° d’article 89281

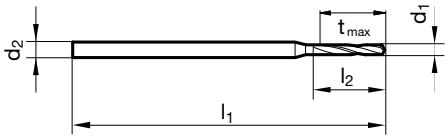
P	M	K	N	S	H
●	○	●	○	○	○

VHM | N | ~5xD | WN | 130° | 0/-0,004 | R | Cyl

amin. de l’âme ≥ Ø 0,800 • affûtage en pente • arête de coupe principale rectiligne

aciers de construction et de cémentation • fontes • bronze, laiton • aluminium et alliages d’aluminium • magnésium, alliages de magnésium • matières synthét. et mat.synthét.renforcées de fibres

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



d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,200	1,000	25,000	1,500	0,800	1,500	25,000	5,300
0,300	1,000	25,000	1,900	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
0,700	1,000	25,000	4,800				

HARTNER

Microforets sans trou d'huile

N° d'article 86401

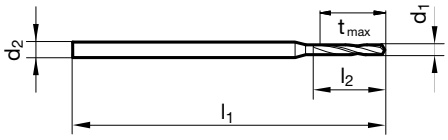
P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 7xD | WN | 140° | m7 | R | Cyl

amin. de l'âme ≥ Ø 0,500 • affûtage en pente • arête de coupe principale rectiligne • affilage de l'arête de coupe automatisé

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 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					

HARTNER

Microforets à trous d'huile

N° d'article 86405

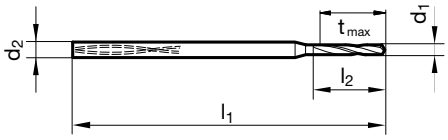
P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 5xD | WN | 140° | m7 | R | Cyl

amin. de l'âme ≥ Ø 1,400 • affûtage en pente • arête de coupe principale rectiligne • affilage de l'arête de coupe automatisé

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes

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



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					

Microforets à trous d'huile

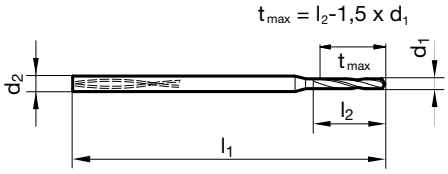
N° d'article 86408

P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 8xD | WN | 135° | h7 | R | Cyl

amin. de l'âme ≥ Ø 1,400 • affûtage en pente • arête de coupe principale rectiligne • affilage de l'arête de coupe automatisé

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes



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				

HARTNER

Microforets à trous d'huile

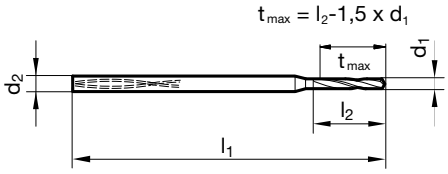
N° d'article 86412

P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 15xD | WN | 135° | h7 | R | Cyl

amin. de l'âme ≥ Ø 1,400 • affûtage en pente • arête de coupe principale rectiligne • affilage de l'arête de coupe automatisé

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm² • aciers inoxydables • fontes



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

FORETS ÉTAGÉS / FORETS À CENTRER

Forets étagés courts, forets étagés à listels continus HSS et CW mono, avec queue cyl. ou queue CM

Forets à centrer, HSS, HSS-E et CW mono poli et revêtus

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Angle / forme	d1/mm	N° d'article	Progr. page
Forets étagés pour centres int.selon DIN 332															
															
●	○	●	●	○		Norme usine	N	**HSS**	◯	à droite	cyl.	90	8,000 - 40,000	**85910**	345
															
●	○	●	●	○		Norme usine	N	**HSS**	◯	à droite	cyl.	90	8,000 - 40,000	**85911**	345
															
●	○	●	●			Norme usine	N	**HSS**	◯	à droite	cyl.	90	8,000 - 20,000	**85912**	346
															
●	○	●	●	●		Norme usine	N	**HSS**	◯	à droite	CM	90	14,000 - 40,000	**85914**	347
Forets étagés à queue cylindrique, courts															
															
●	○	●	●			Norme usine	N	**HSS**	Ⓣ	à droite	cyl.	90	3,400 - 13,500	**84445**	348
															
●	○	●	●	●		Norme usine	N	**HSS**	◯	à droite	cyl.	90	6,000 - 19,000	**85916**	349
															
●	○	●	●	●		Norme usine	N	**HSS**	◯	à droite	cyl.	90	6,600 - 21,500	**85917**	350
															
●	○	●	●	●		Norme usine	N	**HSS**	◯	à droite	cyl.	180	6,000 - 18,000	**85918**	351
															
●	○	●	●	●		Norme usine	N	**HSS**	◯	à droite	cyl.	90	3,400 - 13,500	**85920**	352
															
○	○	○	●	○		Norme usine	N	**CW monobloc**	◯	à droite	HE	90	5,500 - 9,000	**89254**	353
Forets étagés à listels continus, queue cyl.															
															
●	○	●	○			DIN 8374	N	**HSS**	◯	à droite	cyl.	90	6,000 - 19,000	**85010**	354
															
●	○	●	○			DIN 8374	N	**HSS**	◯	à droite	cyl.	90	7,500 - 19,000	**85218**	355

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Angle / forme	d1/mm	N° d'article	Progr. page

Forets étagés à listels continus, queue cyl.

●	○	●	○			DIN 8376	N	HSS	◯	à droite	cyl.	180	6,000 - 18,000	**85210**	356

●	○	●	○			DIN 8378	N	HSS	◯	à droite	cyl.	90	3,400 - 13,500	**85310**	357

●	○	●	○			Norme usine	N	HSS	◯	à droite	cyl.	90	6,600 - 17,200	**85110**	358

●	○	●	○			Norme usine	N	HSS	◯	à droite	cyl.	180	5,900 - 16,500	**85216**	359

○	○	○	○	●	○		N	CW monobloc	○	à droite	cyl.	180	6,000 - 11,000	**89252**	360

Forets étagés à listels continus, queue CM

●	○	●	○			DIN 8375	N	HSS	◯	à droite	CM	90	12,000 - 23,000	**85619**	361

●	○	●	○			DIN 8377	N	HSS	◯	à droite	CM	180	10,000 - 33,000	**85610**	362

●	○	●	○			DIN 8379	N	HSS	◯	à droite	CM	90	9,000 - 22,000	**85710**	363

●	○	●	○			Norme usine	N	HSS	◯	à droite	CM	90	11,000 - 26,000	**85510**	364

●	○	●	○			Norme usine	N	HSS	◯	à droite	CM	180	9,400 - 33,000	**85616**	365

Forets à centrer sans méplat

●	○	●	●	○		DIN 333	N	HSS	◯	à droite	cyl.	A	0,500 - 12,500	**83100**	366

●	○	●	●	○		DIN 333	N	HSS	Ⓣ	à droite	cyl.	A	0,500 - 12,500	**84450**	366

Forets à centrer sans méplat

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Angle / forme	d1/mm	N° d'article	Progr. page
															
●	○	●	●	○		DIN 333	N	HSS	◯	à gauche	cyl.	A	0,500 - 4,000	**83105**	367
															
●	○	●	●	○		DIN 333	N	HSS	◯	à droite	cyl.	R	0,500 - 10,000	**83000**	368
															
●	○	●	●	○		DIN 333	N	HSS	Ⓣ	à droite	cyl.	R	0,500 - 10,000	**84448**	368
															
●	○	●	●	○		DIN 333	N	HSS	◯	à droite	cyl.	A	1,000 - 10,000	**83300**	369
															
●	○	●	●	○		DIN 333	N	HSS	◯	à droite	cyl.	B	1,000 - 10,000	**83200**	370
															
●	○	●	●	○		DIN 333	N	HSS	◯	à gauche	cyl.	R	1,000 - 4,000	**83005**	371
															
●	○	●	●	○		Norme usine	N	HSS	◯	à droite	cyl.	A	1,000 - 3,150	**83110**	372
															
●	●	●	●	○		DIN 333	N	HSS-E	◯	à droite	cyl.	A	1,000 - 4,000	**83101**	373
															
●	●	●	○	●		DIN 333	N	HSS-E	Ⓕ	à droite	cyl.	A	0,500 - 4,000	**83102**	374
															
○	○	○	○	○	○	Norme usine	N	CW monobloc	◯	à droite	cyl.	A	0,500 - 6,300	**83370**	375

Forets à centrer avec méplat

															
●	○	●	●	○		DIN 333	N	HSS	◯	à droite	cyl.	A	1,600 - 10,000	**83600**	376
															
●	○	●	●	○		DIN 333	N	HSS	◯	à droite	cyl.	R	1,600 - 10,000	**83500**	376
															
●	○	●	●	○		DIN 333	N	HSS	◯	à droite	cyl.	B	1,600 - 8,000	**83700**	377

HARTNER

Forets étagés pour centres int.selon DIN 332

N° d'article 85910

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 118° | h8 | R | Cyl | D

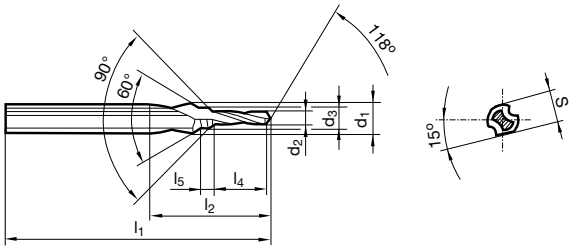
amin. de l'âme ≥ Ø 8,000 • affûtage à dépouille conique • queue à méplat • angle de chanfreinage à 60° • selon DIN 332, page 2, forme D • utilisation sur machines: à centrer, à tronçonner

N° d'article 85911

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 118° | h8 | R | Cyl | R

amin. de l'âme ≥ Ø 8,000 • affûtage à dépouille conique • queue à méplat • angle de chanfreinage à 60° • selon DIN 332, page 2, forme DR • utilisation sur machines: à centrer, à tronçonner



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

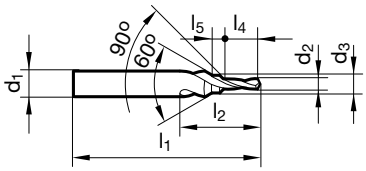
Forets étagés pour centres int.selon DIN 332

N° d'article 85912

P	M	K	N	S	H
●	○	●	●		

HSS | N | WN | 118° | h8 | R | Cyl | D

amin. de l'âme ≥ Ø 8,000 • affûtage à dépouille conique • angle de chanfreinage à 60° • selon DIN 332, page 2, forme D



d1 h7 mm	d3 h11 mm	d2 h8 mm	l1 mm	l2 mm	l4 mm	l5 mm	pour filetage
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

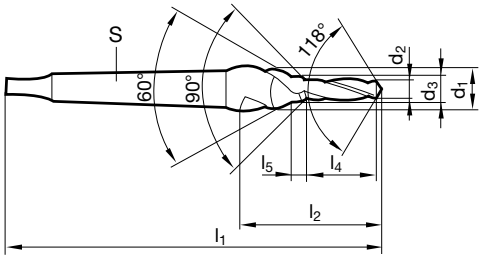
Forets étagés pour centres int.selon DIN 332

N° d'article 85914

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 118° | h8 | R | MK | D

amin. de l'âme ≥ Ø 14,000 • affûtage à dépouille conique • angle de chanfreinage à 60° • selon DIN 332, page 2, forme D



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

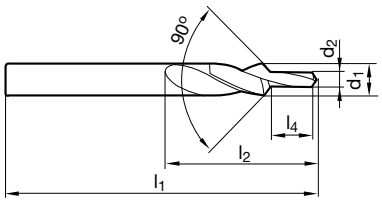
Forets étagés à queue cylindrique, courts

N° d'article 84445

P	M	K	N	S	H
●	○	●	●		

HSS | T | N | WN | 118° | h6 | R | Cyl

amin. de l'âme ≥ Ø 3,400 • affûtage à dépouille conique • très résistant à la torsion • pour les machines à commande numérique • pour les perçages avant filetages, selon Norme DIN 336 • pour chanfreinages à 90° • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
3,400	2,500	52,000	20,000	8,800	M 3
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	M10
13,500	10,200	107,000	54,000	30,000	M12

HARTNER

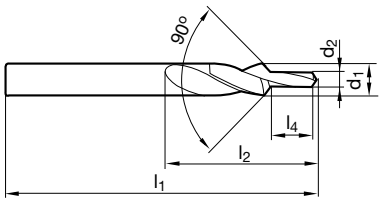
Forets étagés à queue cylindrique, courts

N° d'article 85916

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 118° | h6 | R | Cyl

amin. de l'âme ≥ Ø 6,000 • affûtage à dépouille conique • très résistant à la torsion • pour les machines à commande numérique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance fine • pour le chanfreinage des têtes de vis à 90° • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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	M10

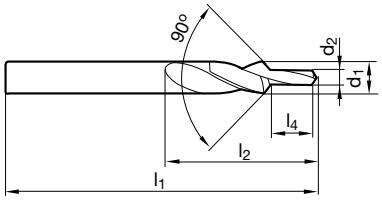
Forets étagés à queue cylindrique, courts

N° d'article 85917

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 118° | h6 | R | Cyl

amin. de l'âme ≥ Ø 6,600 • affûtage à dépouille conique • très résistant à la torsion • pour les machines à commande numérique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance moyenne • pour les chanfreinages de têtes de vis à 90° selon DIN 74, forme A • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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	M10

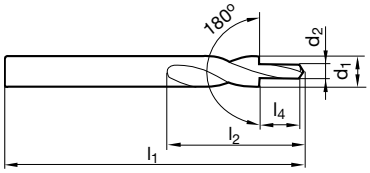
Forets étagés à queue cylindrique, courts

N° d'article 85918

P	M	K	N	S	H
●	○	●	●	●	

HSS | ◯ | N | WN | 118° | h6 | R | Cyl

amin. de l'âme ≥ Ø 6,000 • affûtage à dépouille conique • très résistant à la torsion • pour les machines à commande numérique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance moyenne • pour le lamage des têtes de vis à 180° • pour les vis selon Norme DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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	M10

HARTNER

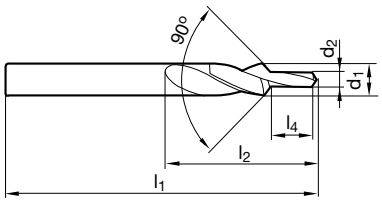
Forets étagés à queue cylindrique, courts

N° d'article 85920

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 118° | h6 | R | Cyl

amin. de l'âme ≥ Ø 3,400 • affûtage à dépouille conique • très résistant à la torsion • pour les machines à commande numérique • pour les perçages avant filetages, selon Norme DIN 336 • pour chanfreinages à 90° • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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	M10
13,500	10,200	107,000	54,000	30,000	M12

HARTNER

Forets étagés à queue cylindrique, courts

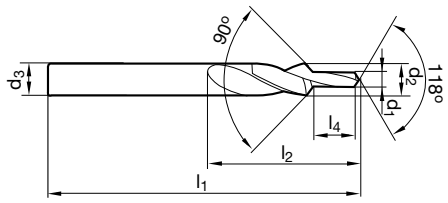
N° d'article 89254

P	M	K	N	S	H
○	○	○	●	○	

VHM | N | WN | 118° | h7 | R | HE

amin. de l'âme ≥ Ø 3,400 • affûtage en pente • très résistant à la torsion • pour les machines à commande numérique • pour les perçages avant filetages, selon Norme DIN 336 • pour chanfreinages à 90° • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre

fontes aciérées, fontes grises et fontes dures • aciers durs au Mn, bronzes • alliages légers et non-ferreux • matières abrasives (alliages d'aluminium chargés de Si) • matières synthétiques renforcées de fibres • thermodurcissables abrasifs avec effet abrasif sur arêtes de coupe et listels



d1 h7 mm	d2 h9 mm	d3 mm	l1 mm	l2 mm	l4 mm	pour filetage
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

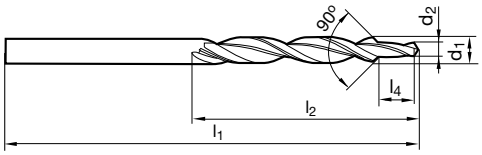
Forets étagés à listels continus, queue cyl.

N° d'article 85010

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8374 | 118° | h8 | R | Cyl | A

amin. de l'âme ≥ Ø 6,000 • affûtage à dépouille conique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance fine • pour le chanfreinage des têtes de vis à 90° • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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	M10

HARTNER

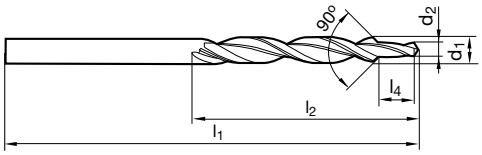
Forets étagés à listels continus, queue cyl.

N° d'article 85218

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8374 | 118° | h8 | R | Cyl | B

amin. de l'âme ≥ Ø 7,500 • affûtage à dépouille conique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance moyenne • pour les chanfreinages de têtes de vis à 90° selon Norme DIN 74, formes A et F • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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

HARTNER

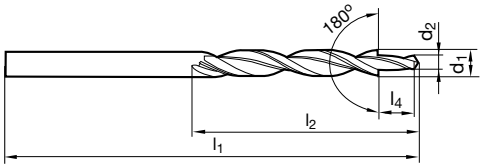
Forets étagés à listels continus, queue cyl.

N° d'article 85210

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8376 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 6,000 • affûtage à dépouille conique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance moyenne • pour le lamage des têtes de vis à 180° • pour les vis selon Norme DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 et DIN 7513, 7516, 7500 - 1 • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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	M10

HARTNER

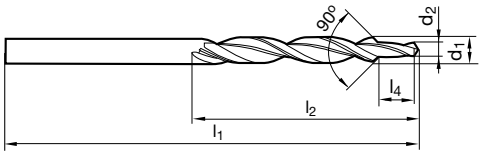
Forets étagés à listels continus, queue cyl.

N° d'article 85310

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8378 | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 3,400 • affûtage à dépouille conique • pour les perçages avant filetages, selon Norme DIN 336 • pour chanfreinages à 90° • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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	M10
13,500	10,200	160,000	108,000	30,000	M12

HARTNER

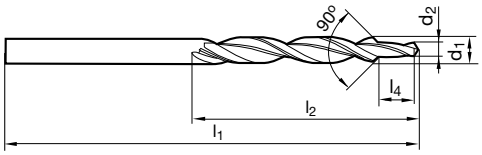
Forets étagés à listels continus, queue cyl.

N° d'article 85110

P	M	K	N	S	H
●	○	●	○		

HSS | N | WN | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 6,600 • affûtage à dépouille conique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance moyenne • pour les chanfreinages de têtes de vis à 90° selon Norme DIN 74 partie 1 (Edition 12.1980 retirée), formes A et B, classe moyenne • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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

HARTNER

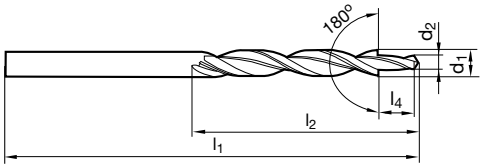
Forets étagés à listels continus, queue cyl.

N° d'article 85216

P	M	K	N	S	H
●	○	●	○		

HSS | N | WN | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 5,900 • affûtage à dépouille conique • pour les perçages débouchants avec des lamages / chanfreinages, version ancienne, formes H, J, K selon Norme DIN 75, partie 2 (Edition 04. 1968 retirée), tolérances moyennes et fines • pour vis selon DIN 84, 912, 6912 • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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	M10

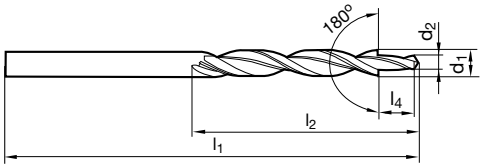
Forets étagés à listels continus, queue cyl.

N° d'article 89252

P	M	K	N	S	H
○	○	○	○	●	○

VHM | ◯ | N | 118° | h8 | R | Cyl

amin. de l'âme ≥ Ø 8,000 • affûtage à dépouille conique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance moyenne • pour le lamage des têtes de vis à 180° • pour les vis selon Norme DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 et DIN 7513, 7516, 7500 - 1 • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	pour filetage
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

HARTNER

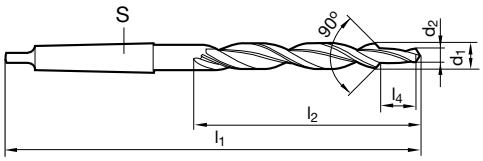
Forets étagés à listels continus, queue CM

N° d'article 85619

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8375 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 12,000 • affûtage à dépouille conique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance fine • pour les chanfreinages de têtes de vis à 90° selon Norme DIN 74, formes A et F • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	pour filetage
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

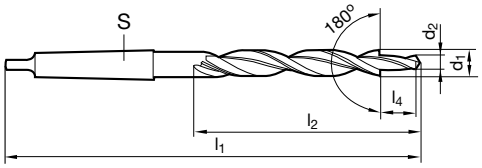
Forets étagés à listels continus, queue CM

N° d'article 85610

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8377 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 10,000 • affûtage à dépouille conique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance moyenne • pour le lamage des têtes de vis à 180° • pour les vis selon Norme DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 et DIN 7513, 7516, 7500 - 1 • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	pour filetage
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	M10
20,000	13,500	MK-2	238,000	140,000	27,000	M12
24,000	15,500	MK-3	281,000	160,000	31,000	M14
26,000	17,500	MK-3	286,000	165,000	35,000	M16
30,000	20,000	MK-3	296,000	175,000	39,000	M18
33,000	22,000	MK-4	334,000	185,000	43,000	M20

HARTNER

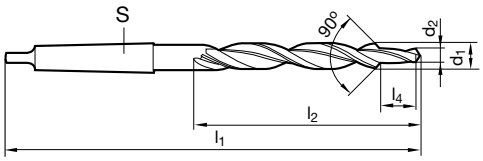
Forets étagés à listels continus, queue CM

N° d'article 85710

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8379 | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 9,000 • affûtage à dépouille conique • pour les perçages avant filetages, selon Norme DIN 336 • pour chanfreinages à 90° • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	pour filetage
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	M10
13,500	10,200	MK-1	189,000	108,000	30,000	M12
15,500	12,000	MK-2	218,000	120,000	34,500	M14
17,500	14,000	MK-2	228,000	130,000	38,500	M16
20,000	15,500	MK-2	238,000	140,000	43,500	M18
22,000	17,500	MK-2	248,000	150,000	47,500	M20

HARTNER

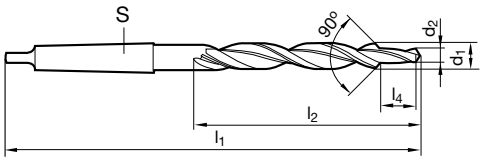
Forets étagés à listels continus, queue CM

N° d'article 85510

P	M	K	N	S	H
●	○	●	○		

HSS | N | WN | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 11,000 • affûtage à dépouille conique • pour les perçages débouchants selon norme DIN EN 20 273, tolérance moyenne • pour les chanfreinages de têtes de vis à 90° selon Norme DIN 74 partie 1 (Edition 12.1980 retirée), formes A et B, classe moyenne • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	pour filetage
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	M10
26,000	14,000	MK-3	286,000	165,000	27,000	M12

HARTNER

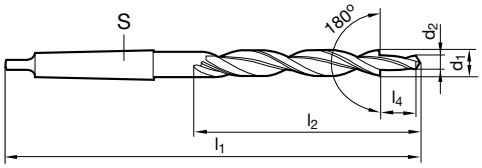
Forets étagés à listels continus, queue CM

N° d'article 85616

P	M	K	N	S	H
●	○	●	○		

HSS | N | WN | 118° | h8 | R | MK

amin. de l'âme ≥ Ø 9,400 • affûtage à dépouille conique • pour les perçages débouchants avec des lamages / chanfreinages, version ancienne, formes H, J, K selon Norme DIN 75, partie 2 (Edition 04. 1968 retirée), tolérances moyennes et fines • pour vis selon DIN 84, 912, 6912 • f en fonction du plus petit diamètre • vc calculée sur le grand diamètre



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	pour filetage
9,400	5,300	MK-1	162,000	81,000	16,000	M 5
14,500	9,500	MK-2	212,000	114,000	22,000	M 8
19,000	13,000	MK-2	233,000	135,000	28,000	M12
20,000	14,000	MK-2	238,000	140,000	28,000	M12
23,000	15,000	MK-2	253,000	155,000	30,000	M14
25,000	17,000	MK-3	281,000	160,000	33,000	M16
28,000	19,000	MK-3	291,000	170,000	36,000	M18
29,000	20,000	MK-3	296,000	175,000	36,000	M18
31,000	21,000	MK-3	301,000	180,000	39,000	M20
33,000	23,000	MK-4	334,000	185,000	39,000	M20

Forets à centrer sans méplat

N° d'article 83100

P	M	K	N	S	H
●	○	●	●	○	

HSS | ○ | N | DIN 333 | 118° | R | Cyl | A

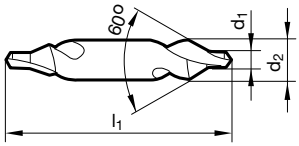
amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • sans chanfrein de protection • selon DIN 332, page 1, forme A • d1 ≤ 0,8 mm : avec une seule pointe

N° d'article 84450

P	M	K	N	S	H
●	○	●	●	○	

HSS | T | N | DIN 333 | 118° | R | Cyl | A

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • sans chanfrein de protection • selon DIN 332, page 1, forme A • d1 ≤ 0,8 mm : avec une seule pointe • meilleure résistance à l´usure



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			

HARTNER

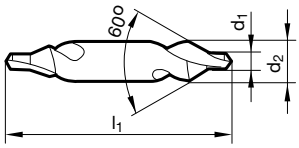
Forets à centrer sans méplat

N° d'article 83105

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | DIN 333 | 118° | L | Cyl | A

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • sans chanfrein de protection • selon DIN 332, page 1, forme A • d1 ≤ 0,8 mm : avec une seule pointe



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			

Forets à centrer sans méplat

N° d'article 83000

P	M	K	N	S	H
●	○	●	●	○	

HSS | ◯ | N | DIN 333 | 118° | R | Cyl | R

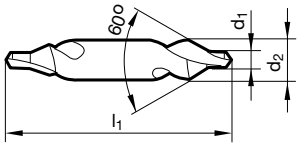
amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • dispositif correct entre pointes de centrage • pour les centrages selon Norme DIN 332, Partie 1, Forme R • d1 ≤ 0,8 mm : avec une seule pointe

N° d'article 84448

P	M	K	N	S	H
●	○	●	●	○	

HSS | T | N | DIN 333 | 118° | R | Cyl | R

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • dispositif correct entre pointes de centrage • pour les centrages selon Norme DIN 332, Partie 1, Forme R • d1 ≤ 0,8 mm : avec une seule pointe • meilleure résistance à l´usure



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			

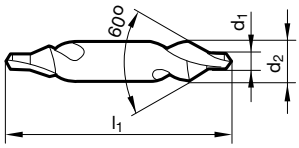
Forets à centrer sans méplat

N° d'article 83300

P	M	K	N	S	H
●	○	●	●	○	

HSS | ◯ | N | DIN 333 | 118° | R | Cyl | | A |

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • avec épaulement, plus résistant à la casse • sans chanfrein de protection • chambrage entre chanfr. et perç. p. réserve de lubrif., graisse • selon DIN 332, page 1, forme 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			

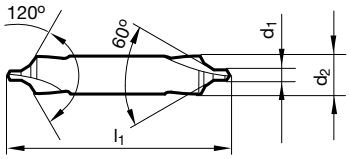
Forets à centrer sans méplat

N° d'article 83200

P	M	K	N	S	H
●	○	●	●	○	

HSS | ◯ | N | DIN 333 | 118° | R | Cyl | B

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • selon DIN 332, page 1, forme B • avec chanfrein de protection 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			

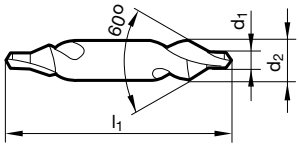
Forets à centrer sans méplat

N° d'article 83005

P	M	K	N	S	H
●	○	●	●	○	

HSS | ○ | N | DIN 333 | 118° | L | Cyl | R

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • dispositif correct entre pointes de centrage • pour les centrages selon Norme DIN 332, Partie 1, Forme R • d1 ≤ 0,8 mm : avec une seule pointe



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			

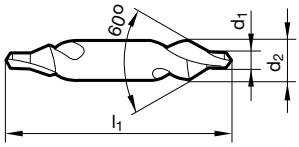
Forets à centrer sans méplat

N° d'article 83110

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 118° | R | Cyl | A

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • forets à centrer extra-longs • sans chanfrein de protection • pour les centrages semblables à la Norme DIN 332, Page 1, Forme A • pour les centrages placés en profondeur



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			

Forets à centrer sans méplat

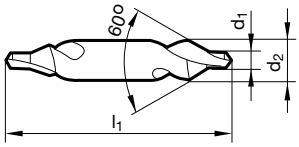
N° d'article 83101

P	M	K	N	S	H
●	●	●	●	○	

HSS-E | N | DIN 333 | 118° | R | Cyl | A

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • sans chanfrein de protection • meilleure résistance à l´usure • selon DIN 332, page 1, forme A

matériaux > 800 N/mm² • aciers au Cr Ni, inox., inaltérables aux acides, réfractaires



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			

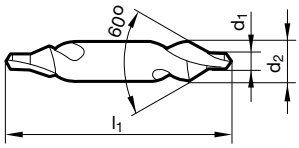
Forets à centrer sans méplat

N° d'article 83102

P	M	K	N	S	H
●	●	●	○	●	

HSS-E | F | N | DIN 333 | 118° | R | Cyl | A

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • sans chanfrein de protection • selon DIN 332, page 1, forme A • d1 ≤ 0,8 mm : avec une seule pointe



d1 mm	d2 h8 mm	l1 mm	d1 mm	d2 h8 mm	l1 mm
0,500	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			
2,500	6,300	45,000			

Forets à centrer sans méplat

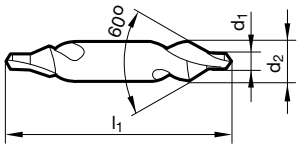
N° d'article 83370

P	M	K	N	S	H
○	○	○	○	○	○

VHM | ◯ | N | WN | 118° | R | Cyl | | A |

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • sans chanfrein de protection • selon DIN 332, page 1, forme A • d1 ≤ 0,8 mm : avec une seule pointe

universelle aptitude matérielle



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			

Forets à centrer avec méplat

N° d'article 83600

P	M	K	N	S	H
●	○	●	●	○	

HSS | ◯ | N | DIN 333 | 118° | R | Cyl | A

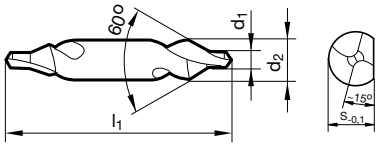
amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • selon DIN 332, page 1, forme A • sans chanfrein de protection

N° d'article 83500

P	M	K	N	S	H
●	○	●	●	○	

HSS | ◯ | N | DIN 333 | 118° | R | Cyl | R

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • dispositif correct entre pointes de centrage • pour les centrages selon Norme DIN 332, Partie 1, Forme R



d1 mm	d2 h8 mm	l1 mm	S mm
1,600	4,000	35,500	3,250
2,000	5,000	40,000	4,200
2,500	6,300	45,000	5,350
3,150	8,000	50,000	6,950
4,000	10,000	56,000	8,400
5,000	12,500	63,000	10,950

d1 mm	d2 h8 mm	l1 mm	S mm
6,300	16,000	71,000	14,000
8,000	20,000	80,000	17,900
10,000	25,000	100,000	22,500

HARTNER

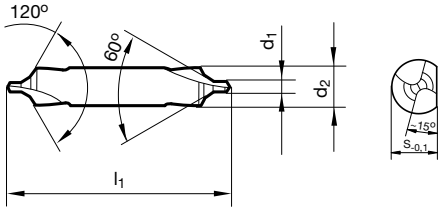
Forets à centrer avec méplat

N° d'article 83700

P	M	K	N	S	H
●	○	●	●	○	

HSS | ◯ | N | DIN 333 | 118° | R | Cyl | | B |

amin. de l'âme ≥ Ø 2,000 • affûtage à dépouille conique • selon DIN 332, page 1, forme B • avec chanfrein de protection 120°



d1 mm	d2 h8 mm	l1 mm	S mm
1,600	6,300	45,000	5,350
2,000	8,000	50,000	6,950
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

d1 mm	d2 h8 mm	l1 mm	S mm
6,300	20,000	80,000	17,900
8,000	25,000	100,000	22,500

HARTNER

Precision Cutting Tools

OUTILS DE CHANFREINAGE & OUTILS À ÉBAVURER

HSS, HSS-E, CW
polis et revêtus

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Angle / forme	d1/mm	N° d'article	Progr. page
Fraises à chanfreiner 90°															
															
●	○	●	●	○		DIN 335		**HSS**	◯	à droite	cyl.	C	4,300 - 31,000	**88200**	382
Fraises à chanfreiner, hélicoïdales 90°															
															
●	●	●	○	○		DIN 335		**HSS-E**	Ⓐ	à droite	cyl.	C	6,300 - 31,000	**88201**	383
Coffrets de fraises à chanfreiner 90°															
															
●	○	●	●	○		DIN 335		**HSS**	◯	à droite	cyl.	C		**88021**	384
Coffrets de fraises à chanfreiner, hélicoïdales 90°															
															
●	●	●	○	○		DIN 335		**HSS-E**	Ⓐ	à droite	cyl.	C		**88022**	385

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Forme de queue	Angle / forme	d1/mm	N° d'article	Progr. page
Outils d´ébavurage															
															
●	●	●	○	●	○	Norme usine	TS 100 EG	**CW monobloc**	◯	à droite	cyl.			**84100**	386
															
●	●	●	○	●	○	Norme usine	TS 100 EG	**CW monobloc**	◯	à droite	HA			**84101**	387
Ebavureur en avant et en arrière 90°															
															
●	●	●	○	●	○	Norme usine	TS 100 VR	**CW monobloc**	ⓐ	à droite	~HA		3,000 - 12,000	**80495**	388

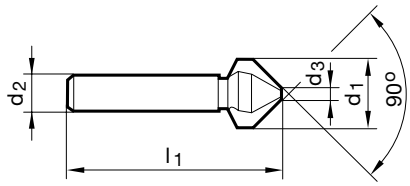
Fraises à chanfreiner 90°

N° d'article 88200

P	M	K	N	S	H
●	○	●	●	○	

HSS | DIN 335 | 90° | R | Cyl | C

détalonnage radial • 3 dents



d1 mm	d2 h9 mm	d3 mm	l1 mm	Z	N° de code
4,300	4,000	1,300	40,000	3	4,300
5,000	4,000	1,500	40,000	3	5,000
5,300	4,000	1,500	40,000	3	5,300
5,800	5,000	1,500	45,000	3	5,800
6,000	5,000	1,500	45,000	3	6,000
6,300	5,000	1,500	45,000	3	6,300
7,000	6,000	1,800	50,000	3	7,000
7,300	6,000	1,800	50,000	3	7,300
8,000	6,000	2,000	50,000	3	8,000
8,300	6,000	2,000	50,000	3	8,300
9,400	6,000	2,200	50,000	3	9,400
10,000	6,000	2,500	50,000	3	10,000
10,400	6,000	2,500	50,000	3	10,400
11,500	8,000	2,800	56,000	3	11,500
12,400	8,000	2,800	56,000	3	12,400
13,400	8,000	2,900	56,000	3	13,400
15,000	10,000	3,200	60,000	3	15,000
16,500	10,000	3,200	60,000	3	16,500
19,000	10,000	3,500	63,000	3	19,000
20,500	10,000	3,500	63,000	3	20,500
23,000	10,000	3,800	67,000	3	23,000
25,000	10,000	3,800	67,000	3	25,000
26,000	10,000	3,800	67,000	3	26,000
28,000	12,000	4,000	71,000	3	28,000
30,000	12,000	4,200	71,000	3	30,000
31,000	12,000	4,200	71,000	3	31,000

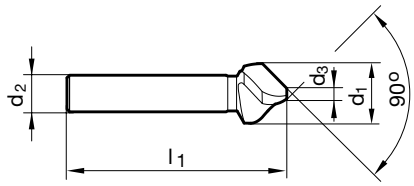
Fraises à chanfreiner 90°

N° d'article 88201

P	M	K	N	S	H
●	●	●	○	○	

HSS-E | A | DIN 335 | 90° | R | Cyl | C

3 arêtes de coupe convexes différentes • conditions de découpe anti-vibrations • pour des lamages circulaires et sans à-coups • pression d'avance significativement réduite requise • pour applications universelles • plus petit Ø de perçage p. chanfreinage: voir «conseils d'utilisation pour fraises à chanfreiner»



d1 mm	d2 h9 mm	d3 mm	l1 mm	Z	N° de code
6,300	5,000	1,500	45,000	3	6,300
8,000	6,000	2,000	50,000	3	8,000
8,300	6,000	2,000	50,000	3	8,300
10,000	6,000	2,500	50,000	3	10,000
10,400	6,000	2,500	50,000	3	10,400
11,500	8,000	2,800	56,000	3	11,500
12,400	8,000	2,800	56,000	3	12,400
15,000	10,000	3,200	60,000	3	15,000
16,500	10,000	3,200	60,000	3	16,500
19,000	10,000	3,500	63,000	3	19,000
20,500	10,000	3,500	63,000	3	20,500
23,000	10,000	3,800	67,000	3	23,000
25,000	10,000	3,800	67,000	3	25,000
31,000	12,000	4,200	71,000	3	31,000

Fraises à chanfreiner 90°

N° d'article 88021

P	M	K	N	S	H
●	○	●	●	○	

HSS | DIN 335 | 90° | R | Cyl | C

jeu en coffret, composé de n° d'article: 88200 • détalonnage radial • 3 dents

d1 mm	mm	Pièces/coffret	N° de code
6,30-20,50	6.3/8.3/10.4/12.4/16.5/20.5	6	7,000

Fraises à chanfreiner 90°

N° d'article 88022

P	M	K	N	S	H
●	●	●	○	○	

HSS-E | A | DIN 335 | 90° | R | Cyl | C

jeu en coffret, composé de n° d'article: 88201 • 3 arêtes de coupe convexes différentes • conditions de découpe anti-vibrations • pour des lamages circulaires et sans à-coups • pression d'avance significativement réduite requise • pour applications universelles • plus petit Ø de perçage p. chanfreinage: voir «conseils d'utilisation pour fraises à chanfreiner»

d1 mm	 mm	Pièces/coffret	N° de code
6,30-20,50	6.3/8.3/10.4/12.4/16.5/20.5	6	1,000

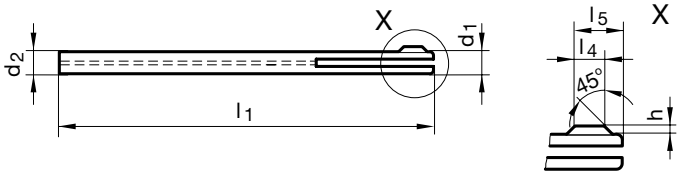
Outils d´ébavurage

N° d'article 84100

P	M	K	N	S	H
●	●	●	○	●	○

VHM | TS 100 EG | WN | R | Cyl

avec refroidissement intér. • avec diam. d´attach. cyl. identique au diam. nominal, pour les pinces de serrage
ébavurage intérieur et extérieur • utilisation universelle sur machines-outils, fraiseuses, tours et aussi sur machines robotisées



Plage de Ø	d1 mm	d2 mm	l1 mm	l4 mm	l5 mm	h mm	N° de code
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

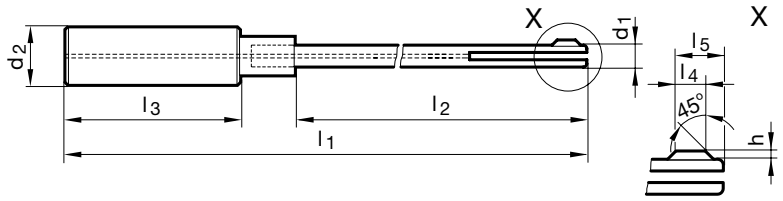
Outils d´ébavurage

N° d'article 84101

P	M	K	N	S	H
●	●	●	○	●	○

VHM | TS 100 EG | WN | R | HA

pour les mandrins hydrauliques et mandrins à fretter • avec attachement selon DIN 6535 • avec refroidissement intér.
ébavurage intérieur et extérieur • utilisation universelle sur machines-outils, fraiseuses, tours et aussi sur machines robotisées



Plage de Ø	d1 mm	d2 mm	l1 mm	l2 mm	l3 mm	l4 mm	l5 mm	h mm	N° de code
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

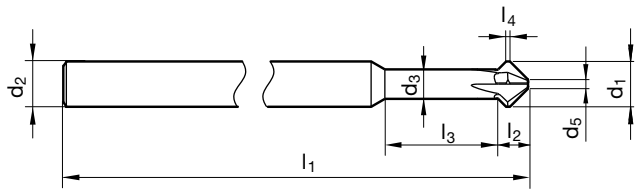
Ebavureur en avant et en arrière 90°

N° d'article 80495

P	M	K	N	S	H
●	●	●	○	●	○

VHM | a | TS 100 VR | WN | 90° | R | ~HA

avec attachement selon DIN 6535 • pour les mandrins hydrauliques et mandrins à fretter
ébavurage intérieur et extérieur • ébavurage de perçages et contours



d1 mm	d2 h6 mm	d3 mm	d5 mm	l1 mm	l2 mm	l3 mm	l4 mm	Z	N° de code
3,000	4,000	2,200	0,600	75,000	2,10	11,400	0,500	4	3,000
4,000	4,000	2,900	0,800	75,000	2,70	15,000	0,500	4	4,000
5,000	5,000	3,900	1,000	75,000	3,00	18,000	0,500	4	5,000
6,000	6,000	3,900	1,200	100,000	3,90	18,200	0,500	4	6,000
8,000	6,000	6,000	1,600	100,000	4,70	55,000	0,500	4	8,000
10,000	6,000	6,000	2,000	100,000	6,50	55,000	0,500	4	10,000
12,000	6,000	6,000	2,400	100,000	8,30	55,500	0,500	4	12,000

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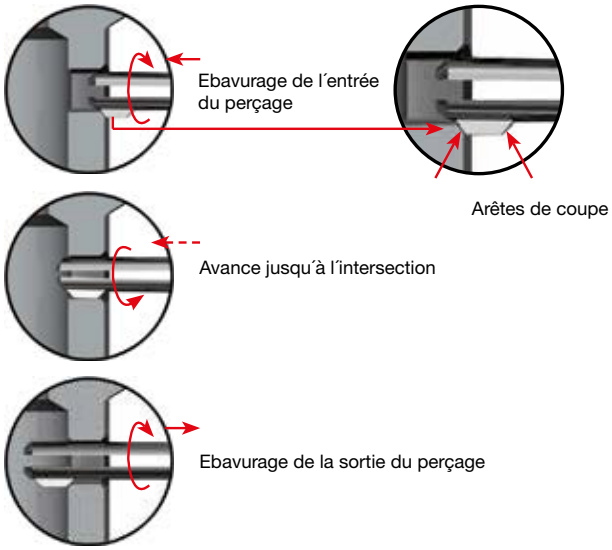
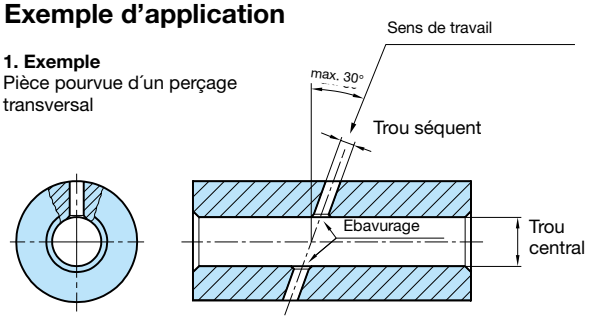
Ebavureur fourchette carbure monobloc TS 100 EG

Opération



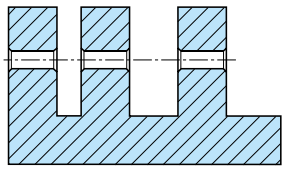
Exemple d'application

1. Exemple
Pièce pourvue d´un perçage transversal



Précautions pour l´usinage avec perçage transversal:
- la valeur du Ø du perçage transversal ne doit pas dépasser 35% de celle du Ø du perçage central
- le diamètre du trou central doit être 40% plus grand que la longueur de coupe l_4

2. Exemple
Pièce avec ébavurage multiple



Etape par etape:
Ebavurage automatique inter. et exter. des trous avec l'ébavureur fourchette carbure monobloc TS 100 EG est simple et permet la réduction des coûts et est une alternative à l'ébavurage manuel. Un outil pour toutes les étapes d'ébavurage.

Application universelle:
Le nouvel ébavureur fourchette permet l'ébavurage de pièce avec ébavurage multiple avec une grande précision et une bonne qualité.

Plage du Ø (mm)	v_c m/min	fu (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

Attention:
Il s´agit de valeurs de coupe approximatives qui, en fonction de l´application, peuvent varier, donc être augmentées ou diminuées.

Outil à ébavurer TS 100 VR en poussée et tirage

Conditions de coupe des outils à ébavurer en poussant et en tirant TS 100 VR

Matières	Résistance Dureté MPa (N/mm²)	v_c (m/min)	Gamme d'av. n°
Aciers	< 850	*120 - 200*	71
	850-1200	*100 - 180*	71
	> 1200	*80 - 140*	71
Aciers trempés	< 54 HRC	*60 - 120*	71
	54-60 HRC	*40 - 80*	71
Aciers inox./inalt. aux acides	< 850	*80 - 120*	71
Alliages à base de nickel	< 1300	*30 - 60*	71
Alliages de Titane	< 1300	*50 - 100*	71
Fontes	< 240 HB30	*120 - 180*	72
	> 240 HB30	*100 - 160*	72
Alliages malléab. d'Al < 3% Si		*150 - 250*	72
Alliages d'Al d'inject. > 3% Si		*100 - 200*	72
Alliages de Magnésium		*150 - 250*	72
Alliages non-ferreux	< 850	*30 - 200*	72

Gamme d'avance n° (mm / tr.)

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

Attention:
Il s´agit de valeurs de coupe approximatives qui, en fonction de l´application, peuvent varier, donc être augmentées ou amoindries.

HARTNER

Precision Cutting Tools

MULTIPLEX
MULTIPLEX HPC

Forets à plaquettes interchangeables avec trous d'huile
Plaquettes interchangeables en HSS-E, HSS-E PM,
CW monobloc
polis et revêtus

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Lubrifi-cation intérieure	Profon-deur	d1/mm	N° d'ar-ticle	Progr. page

Porte-outils Multiplex avec queue cylindrique

	Norme usine		Ni	à droite	avec	3xD		**86612**	399

	Norme usine		Ni	à droite	avec	5xD		**86622**	400

	Norme usine		Ni	à droite	avec	7xD		**86624**	401

	Norme usine		Ni	à droite	avec			**86628**	402

Porte-outils Multiplex avec queue cône morse

	Norme usine		Ni	à droite	avec			**86630**	404

	Norme usine		Ni	à droite	avec			**86650**	405

	Norme usine		B	à droite	avec			**86670**	406

	Norme usine		B	à droite	avec			**86680**	407

	Norme usine		Ni	à droite	avec			**86678**	408

Plaquettes interchangeables

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Lubrifi-cation intérieure	Profon-deur	d1/mm	N° d'ar-ticle	Progr. page
●	○	●	○			Norme usine		HSS-E-PM	T	à droite			10,000 - 25,000	**86602**	411
○	●	○	●	●		Norme usine		HSS-E	T	à droite			25,000 - 102,000	**86605**	412
●	○	●	○			Norme usine		HSS-E-PM	F	à droite			10,000 - 25,000	**86608**	413
●	○	●	○			Norme usine		HSS-E-PM	A	à droite			25,000 - 210,000	**86609**	414
●	○	●	○			Norme usine		HSS-E-PM	A	à droite			10,000 - 65,000	**86611**	415
●	○	●	○			Norme usine		CW monobloc	F	à droite			10,000 - 35,000	**86701**	417
●	○	●	○			Norme usine		CW monobloc	F	à droite			10,000 - 35,000	**86702**	418
●	○	●	○			Norme usine		CW monobloc	T	à droite			10,000 - 35,000	**86708**	419
●	○	●	○			Norme usine		CW monobloc	T	à droite			9,920 - 35,000	**86709**	420
			●			Norme usine		CW monobloc	◯	à droite			10,000 - 65,000	**86711**	421

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Lubrifi-cation intérieure	Profon-deur	d1/mm	N° d'ar-ticle	Progr. page

Bagues d´alimentation du liquide de refroidissement

	Norme usine													**86690**	422

Tube d‘adduction

	Norme usine					●								**82571**	423

Déconnexion rapide

	Norme usine													**82578**	424

Tournevis Torx

	Norme usine													**86842**	425

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Lubrification intérieure	Profondeur	d1/mm	N° d'article	Progr. page

Mandrin avec arrosage pour Multiplex

						Norme usine			Ⓑ					**86691**	426

						Norme usine			Ⓑ					**86692**	427

						Norme usine			Ⓑ					**86693**	428

						Norme usine			Ⓑ					**86694**	429

Douille de réduction pour queue cylindrique

						Norme usine			Ⓑ					**86699**	430

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Lubrifi-cation intérieure	Profon-deur	d1/mm	N° d'ar-ticle	Progr. page

Porte-outils Multiplex HPC

	Norme usine	HPC		Ni	à droite	avec	1xD	11,000 - 36,005	**86681**	432

	Norme usine	HPC		Ni	à droite	avec	1,5xD	11,000 - 39,005	**86682**	433

	Norme usine	HPC		Ni	à droite	avec	3xD	11,000 - 39,005	**86683**	435

	Norme usine	HPC		Ni	à droite	avec	5xD	11,000 - 39,000	**86684**	437

	Norme usine	HPC		Ni	à droite	avec	7xD	11,000 - 31,505	**86685**	439

	Norme usine	HPC		Ni	à droite	avec	10xD	11,000 - 31,505	**86686**	441

Plaquettes interchangeables Multiplex HPC

○	○	○	○	○	○	Norme usine	HPC	**CW monobloc**	a	à droite			11,000 - 40,000	**86721**	443

•	○	○				Norme usine	HPC	**CW monobloc**	F	à droite			11,000 - 40,000	**86722**	446

○		•				Norme usine	HPC	**CW monobloc**	Y	à droite			11,000 - 40,000	**86723**	449

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Lubrifi-cation intérieure	Profon-deur	d1/mm	N° d'ar-ticle	Progr. page

Plaquettes interchangeables Multiplex HPC

			●			Norme usine	HPC	**CW monobloc**	◯	à droite			11,000 - 40,000	**86724**	452

○	●			○	○	Norme usine	HPC	**CW monobloc**	Ⓐ	à droite			11,000 - 40,000	**86725**	455

●						Norme usine		**CW monobloc**	Ⓕ	à droite			12,000 - 40,000	**86729**	458

Plaquette de lamage Multiplex HPC

○		●				Norme usine		**CW monobloc**	Ⓐ	neutre			52,020 - 93,080	**86726**	459

			●			Norme usine		**CW monobloc**	◯	à droite			52,020 - 93,080	**86727**	459

●	○	○		○	○	Norme usine		**CW monobloc**	Ⓣ	à droite			52,020 - 93,080	**86728**	460

Vis de serrage p. porte-outils Multiplex HPC 1,5-10xD

						Norme usine								**86843**	461

Clés dynamométriques

						Norme usine								**86844**	462

P	M	K	N	S	H	Norme	Type	Matière de coupe	Surface	Sens de coupe	Lubrifi-cation intérieure	Profon-deur	d1/mm	N° d'ar-ticle	Progr. page

Embouts pour vis Torx

						Norme usine								**86845**	463

Vis de serrage p. porte-outil de lamage Multiplex HPC

						Norme usine								**86846**	464

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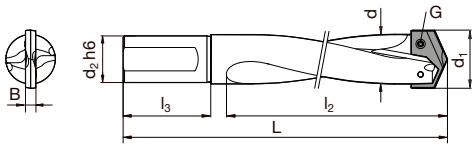
Porte-outils Multiplex avec queue cylindrique

N° d'article 86612

nickelé • Support pour plaquettes de coupe interchangeables. Le support avec attachement cylindrique, est pourvu canal d'arrosage pour la lubrification et le refroidissement. Les goujures volumineuses assurent l´évacuation optimale des copeaux. Le changement des plaquettes de coupe, par vis de blocage et sans ajustage, est simple et rapide. Le foret hélicoïdal à plaquette interchangeable est prévu pour le perçage dans le plein et n´est pas approprié pour l´agrandissement de perçages réalisés auparavant. Y compris vis de blocage n° d´article 86807



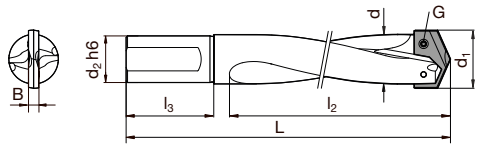
d1 mm	d mm	d2 h6 mm	L mm	l2 mm	l3 mm	B mm	G	N° de code
10.00-11.7	9,500	20,000	108,000	50,000	40,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	20,000	109,000	53,000	40,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	20,000	116,000	60,000	40,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	20,000	118,000	65,000	40,000	3,500	86807 2.501	**16,000**
18,91-22,4	18,500	20,000	124,000	73,000	40,000	4,000	86807 3.000	**18,500**
22,41-25,4	22,000	20,000	127,000	78,000	40,000	4,000	86807 3.001	**22,000**
25,41-29,0	24,000	32,000	178,000	105,000	60,000	5,000	86807 3.500	**24,000**
29,01-35,0	28,000	32,000	178,000	108,000	60,000	5,000	86807 3.500	**28,000**
35,01-45,0	34,000	32,000	223,000	152,000	60,000	7,000	86807 4.001	**34,000**
45,01-55,0	44,000	40,000	233,000	152,000	70,000	7,000	86807 4.001	**44,000**
55,01-65,0	54,000	40,000	233,000	152,000	70,000	7,000	86807 4.001	**54,000**

HARTNER

Porte-outils Multiplex avec queue cylindrique

N° d'article 86622

nickelé • Support pour plaquettes de coupe interchangeables. Le support avec attachement cylindrique, est pourvu canal d'arrosage pour la lubrification et le refroidissement. Les goujures volumineuses assurent l´évacuation optimale des copeaux. Le changement des plaquettes de coupe, par vis de blocage et sans ajustage, est simple et rapide. Le foret hélicoïdal à plaquette interchangeable est prévu pour le perçage dans le plein et n´est pas approprié pour l´agrandissement de perçages réalisés auparavant. Y compris vis de blocage n° d´article 86807



d1 **mm**	d mm	d2 h6 mm	L mm	l2 mm	l3 mm	B mm	G	**N° de code**
10.00-11.7	9,500	20,000	140,000	83,000	40,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	20,000	150,000	94,000	40,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	20,000	160,000	104,000	40,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	20,000	170,000	117,000	40,000	3,500	86807 2.501	**16,000**
18,91-22,4	18,500	20,000	180,000	129,000	40,000	4,000	86807 3.000	**18,500**
22,41-25,4	22,000	20,000	180,000	131,000	40,000	4,000	86807 3.001	**22,000**
25,41-29,0	24,000	32,000	240,000	166,000	60,000	5,000	86807 3.500	**24,000**
29,01-35,0	28,000	32,000	240,000	170,000	60,000	5,000	86807 3.500	**28,000**
35,01-45,0	34,000	32,000	280,000	210,000	60,000	7,000	86807 4.001	**34,000**
45,01-55,0	44,000	40,000	290,000	210,000	70,000	7,000	86807 4.001	**44,000**
55,01-65,0	54,000	40,000	290,000	210,000	70,000	7,000	86807 4.001	**54,000**

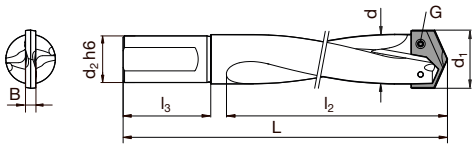
HARTNER

Porte-outils Multiplex avec queue cylindrique

N° d'article 86624

Ni | 7xD | WN | R | ~HB

nickelé • Support pour plaquettes de coupe interchangeables. Le support avec attachement cylindrique, est pourvu canal d'arrosage pour la lubrification et le refroidissement. Les goujures volumineuses assurent l´évacuation optimale des copeaux. Le changement des plaquettes de coupe, par vis de blocage et sans ajustage, est simple et rapide. Le foret hélicoïdal à plaquette interchangeable est prévu pour le perçage dans le plein et n´est pas approprié pour l´agrandissement de perçages réalisés auparavant. Y compris vis de blocage n° d´article 86807



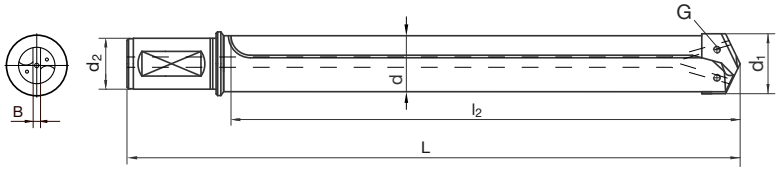
d1 mm	d mm	d2 h6 mm	L mm	l2 mm	l3 mm	B mm	G	N° de code
10.00-11.7	9,500	20,000	180,000	123,000	40,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	20,000	190,000	134,000	40,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	20,000	210,000	155,000	40,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	20,000	220,000	168,000	40,000	3,500	86807 2.501	**16,000**
18,91-22,4	18,500	20,000	250,000	199,000	40,000	4,000	86807 3.000	**18,500**
22,41-25,4	22,000	20,000	250,000	201,000	40,000	4,000	86807 3.001	**22,000**
25,41-29,0	24,000	32,000	320,000	246,000	60,000	5,000	86807 3.500	**24,000**
29,01-35,0	28,000	32,000	320,000	250,000	60,000	5,000	86807 3.500	**28,000**
35,01-45,0	34,000	32,000	380,000	310,000	60,000	7,000	86807 4.001	**34,000**
45,01-55,0	44,000	40,000	390,000	310,000	70,000	7,000	86807 4.001	**44,000**
55,01-65,0	54,000	40,000	390,000	310,000	70,000	7,000	86807 4.001	**54,000**

HARTNER

Porte-outils Multiplex avec queue cylindrique

N° d'article 86628

nickelé • Support pour plaquettes de coupe interchangeables. Le support, version extra longue, avec attachement cylindrique, est pourvu d´un système d´adduction interne du produit de lubrification et de refroidissement. Les goujures volumineuses assurent l´évacuation optimale des copeaux. L´échange des plaquettes de coupe, par vis de blocage et sans ajustage, est simple et rapide. Le foret hélicoïdal à plaquette interchangeable est prévu pour le perçage dans le plein et n´est pas approprié pour l´agrandissement de perçages réalisés auparavant.
Ycompris vis de blocage 86807



d1 mm	d mm	d2 h6 mm	L mm	l2 mm	B mm	G	N° de code
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 3.500	**23,063**
25,41-29,0	23,000	32,000	173,000	98,000	5,000	86807 3.500	**23,098**
25,41-29,0	23,000	32,000	225,000	150,000	5,000	86807 3.500	**23,150**
25,41-29,0	23,000	32,000	273,000	198,000	5,000	86807 3.500	**23,198**
25,41-29,0	23,000	32,000	343,000	268,000	5,000	86807 3.500	**23,268**
25,41-29,0	23,000	32,000	433,000	358,000	5,000	86807 3.500	**23,358**
25,41-29,0	23,000	32,000	503,000	428,000	5,000	86807 3.500	**23,428**
25,41-29,0	23,000	32,000	683,000	608,000	5,000	86807 3.500	**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**

HARTNER

Porte-outils Multiplex avec queue cylindrique

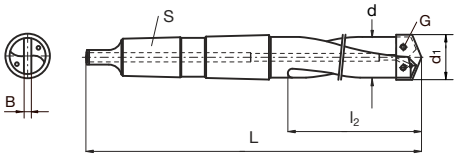
d1 mm	d mm	d2 h6 mm	L mm	l2 mm	B mm	G	N° de code
35,01-45,0	34,000	32,000	907,000	838,000	7,000	86807 4.001	**34,838**
45,01-55,0	44,000	40,000	467,000	394,000	7,000	86807 4.001	**44,394**
45,01-55,0	44,000	40,000	617,000	544,000	7,000	86807 4.001	**44,544**
45,01-55,0	44,000	40,000	917,000	844,000	7,000	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**

HARTNER

Porte-outils Multiplex avec queue cône morse

N° d'article 86630

nickelé • Support pour plaquettes de coupe interchangeables. Le support, version courte, avec attachement conique, est pourvu d´un système d´adduction interne du produit de lubrification et de refroidissement. Les goujures volumineuses assurent l´évacuation optimale des copeaux. L´échange des plaquettes de coupe, par vis de blocage et sans ajustage, est simple et rapide. Le foret hélicoïdal à plaquette interchangeable est prévu pour le perçage dans le plein et n´est pas approprié pour l´agrandissement de perçages réalisés auparavant.
Arrosage au centre (radial sur demande)
Vis de blocage 86607 incluse



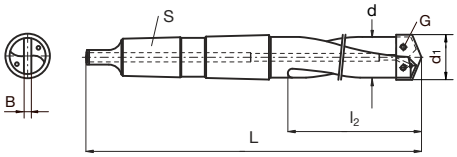
d1 mm	d mm	S	L mm	l2 mm	B mm	G	N° de code
10.00-11.7	9,500	MK-2	139,000	56,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	MK-2	141,000	58,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	MK-2	148,000	63,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	MK-2	150,000	67,000	3,500	86807 2.501	**16,000**
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**

HARTNER

Porte-outils Multiplex avec queue cône morse

N° d'article 86650

nickelé • Support pour plaquettes de coupe interchangeables. Le support, version long, avec attachement conique, est pourvu d´un système d´adduction interne du produit de lubrification et de refroidissement. Les goujures volumineuses assurent l´évacuation optimale des copeaux. L´échange des plaquettes de coupe, par vis de blocage et sans ajustage, est simple et rapide. Le foret hélicoïdal à plaquette interchangeable est prévu pour le perçage dans le plein et n´est pas approprié pour l´agrandissement de perçages réalisés auparavant.
Arrosage au centre (radial sur demande)
Vis de blocage 86607 incluse



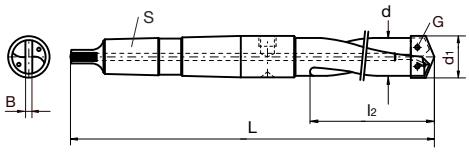
d1 mm	d mm	S	L mm	l2 mm	B mm	G	N° de code
10.00-11.7	9,500	MK-2	186,000	103,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	MK-2	191,000	108,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	MK-2	210,000	125,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	MK-2	218,000	135,000	3,500	86807 2.501	**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**

HARTNER

Porte-outils Multiplex avec queue cône morse

N° d'article 86670

≤ Ø 28 mm: nickelé, > Ø 28 mm: bruni • Support pour plaquettes de coupe interchangeables pour bague annulaire d´adduction. Le support, version courte, avec attachement conique, est pourvu d´un système d´adduction interne du produit de lubrification et de refroidissement. Les goujures volumineuses assurent l´évacuation optimale des copeaux. L´échange des plaquettes de coupe, par vis de blocage et sans ajustage, est simple et rapide. Le foret hélicoïdal à plaquette interchangeable est prévu pour le perçage dans le plein et n´est pas approprié pour l´agrandissement de perçages réalisés auparavant.
Arrosage radial (au centre sur demande)
Support à partir du Ø = 63,00 mm: à goujutres droites
Taille du cône CM 5: avec rainure transversale pour clavette
Vis de blocage 86607 incluse



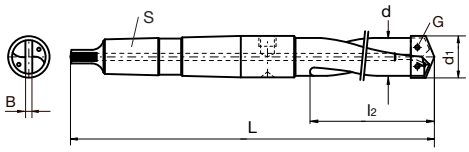
d1 mm	d mm	S	L mm	l2 mm	B mm	G	N° de code
25.01-29.0	24,000	MK-4	279,000	108,000	5,000	86807 3.500	**24,000**
29,01-35,0	28,000	MK-4	279,000	108,000	5,000	86807 3.500	**28,000**
35,01-45,0	34,000	MK-4	324,000	152,000	7,000	86807 4.001	**34,000**
45,01-55,0	44,000	MK-4	324,000	152,000	7,000	86807 4.001	**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**

HARTNER

Porte-outils Multiplex avec queue cône morse

N° d'article 86680

≤ Ø 28 mm: nickelé, > Ø 28 mm: bruni • Support pour plaquettes de coupe interchangeables pour bague annulaire d´adduction.
Le support, version long, avec attachement conique, est pourvu d´un système d´adduction interne du produit de lubrification et de refroidissement. Les goujures volumineuses assurent l´évacuation optimale des copeaux. L´échange des plaquettes de coupe, par vis de blocage et sans ajustage, est simple et rapide. Le foret hélicoïdal à plaquette interchangeable est prévu pour le perçage dans le plein et n´est pas approprié pour l´agrandissement de perçages réalisés auparavant.
Arrosage radial (au centre sur demande)
Support à partir du Ø = 63,00 mm: à goujutres droites
Taille du cône CM 5: avec rainure transversale pour clavette
Vis de blocage 86607 incluse



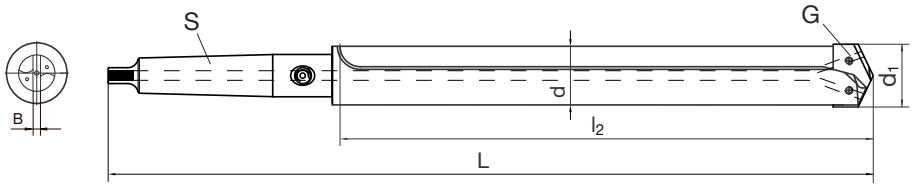
d1 **mm**	d mm	S	L mm	l2 mm	B mm	G	**N° de code**
25.01-29.0	24,000	MK-4	379,000	208,000	5,000	86807 3.500	**24,000**
29,01-35,0	28,000	MK-4	379,000	208,000	5,000	86807 3.500	**28,000**
35,01-45,0	34,000	MK-4	429,000	257,000	7,000	86807 4.001	**34,000**
45,01-55,0	44,000	MK-4	429,000	257,000	7,000	86807 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**

HARTNER

Porte-outils Multiplex avec queue cône morse

N° d'article 86678

état de surface ≤ 1000 mm de longueur totale, nickelé, > 1000 mm de longueur totale, bruni • Support pour plaquettes de coupe interchangeables. Le support, version rallongé, avec attachement conique, est pourvu d´un système d´adduction interne du produit de lubrification et de refroidissement. Les goujures volumineuses assurent l´évacuation optimale des copeaux. L´échange des plaquettes de coupe, par vis de blocage et sans ajustage, est simple et rapide. Le foret hélicoïdal à plaquette interchangeable est prévu pour le perçage dans le plein et n´est pas approprié pour l´agrandissement de perçages réalisés auparavant.
Arrosage radial (au centre sur demande)
Vis de blocage 86607 incluse



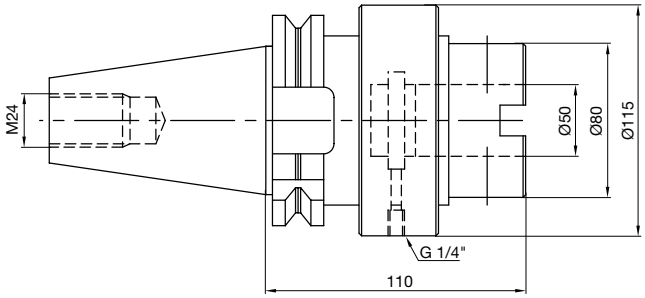
d1 mm	d mm	S	L mm	l2 mm	B mm	G	N° de code
35,01-45,0	34,000	MK-4	566,000	393,000	7,000	86807 4.001	**34,393**
35,01-45,0	34,000	MK-4	716,000	543,000	7,000	86807 4.001	**34,543**
35,01-45,0	34,000	MK-4	1016,000	843,000	7,000	86807 4.001	**34,843**
45,01-55,0	44,000	MK-4	566,000	394,500	7,000	86807 4.001	**44,395**
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**

Gamme speciale de systemes modulaires pour Multiplex Ø 97 - 210 mm

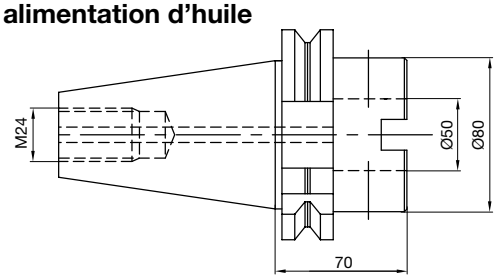
Attachements

Les versions présentées ci-après sont disponibles sur demande:

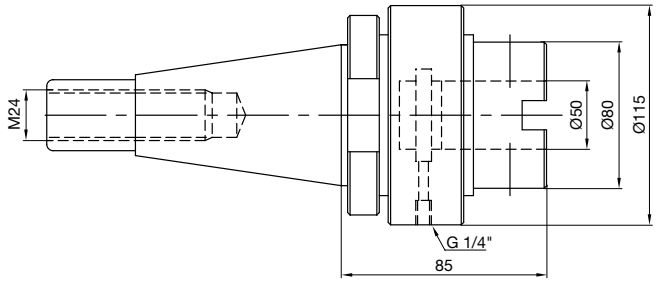
- SK50 DIN 69871 attachements avec alimentation d'huile



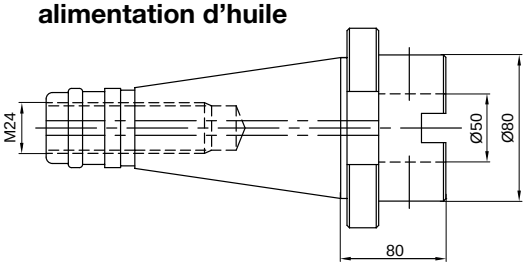
- SK50 DIN 69871 attachements sans alimentation d'huile



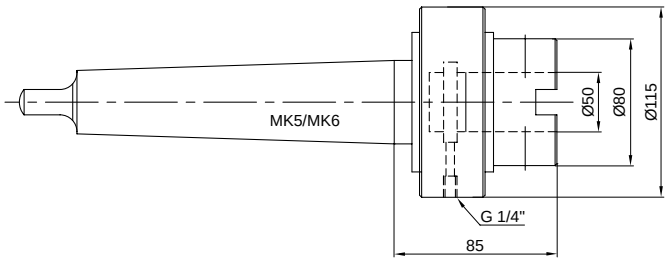
- SK50 DIN 2080 attachements avec alimentation d'huile



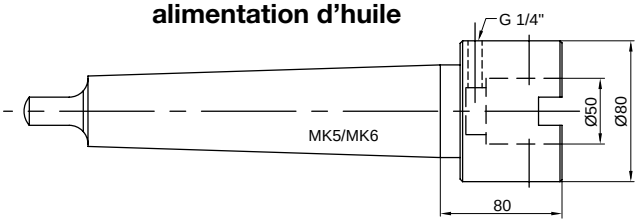
- SK50 DIN 2080 attachements sans alimentation d'huile



- MT 5 /MT 6 attachements avec alimentation d'huile



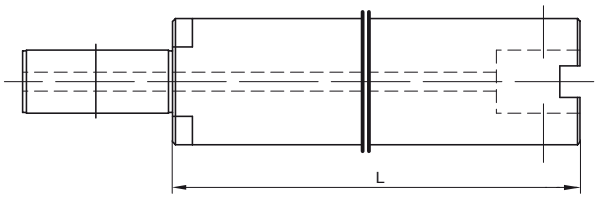
- MT 5 /MT 6 attachements sans alimentation d'huile



Gamme speciale de systemes modulaires pour Multiplex Ø 97 - 210 mm

Rallonges pour tête de foret

Rallonges pour tête de foret
Ø 97 mm - Ø 130 mm
L = 186 mm
L = 300 mm



Rallonges pour tête de foret
Ø 131 mm - Ø 165 mm und Ø 164 mm - Ø 210 mm
L = 204 mm
L = 300 mm
L = 500 mm

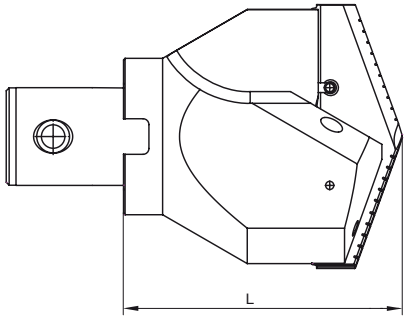
Bagues de raccord

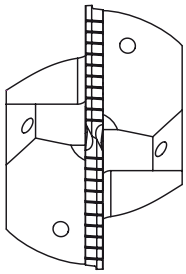
petite pour tête de foret
Ø 97 mm - Ø 130 mm,
largeur 14 mm

grande pour tête de foret
Ø 131 mm - Ø 165 mm
et Ø 164 mm - Ø 210 mm, largeur 16 mm

Tête de forage

Les dimensions suivantes sont disponibles sur demande :
- Ø 97 mm bis Ø 130 mm, L = 118,5 mm
- Ø 131 mm bis Ø 165 mm, L = 142,5 mm
- Ø 164 mm bis Ø 210 mm, L = 142,5 mm





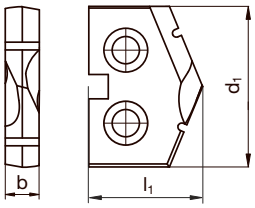
Plaquettes interchangeables

N° d'article 86602

P	M	K	N	S	H
●	○	●	○		

HSS-E-PM | T | WN | 135° | R | 0/+0,05

amin. de l'âme ≥ Ø 9,800 • Plaquette de coupe interchangeable sans rainures brise-copeaux. Angle au sommet 135°. Pour applications universelles.



d1 mm	l1 mm	b mm	N° de code
10,000	8,700	2,500	**10,000**
10,200	8,700	2,500	**10,200**
10,500	8,700	2,500	**10,500**
11,000	8,700	2,500	**11,000**
11,110	8,700	2,500	**11,110**
11,500	8,700	2,500	**11,500**
11,750	8,700	2,500	**11,750**
12,000	8,700	2,500	**12,000**
12,250	8,700	2,500	**12,250**
12,400	8,700	2,500	**12,400**
12,500	8,700	2,500	**12,500**
12,750	8,700	2,500	**12,750**
13,000	8,700	2,500	**13,000**
13,250	8,700	2,500	**13,250**
13,500	11,700	3,500	**13,500**
13,750	11,700	3,500	**13,750**
14,000	11,700	3,500	**14,000**
14,250	11,700	3,500	**14,250**
14,500	11,700	3,500	**14,500**
14,750	11,700	3,500	**14,750**
15,000	11,700	3,500	**15,000**
15,250	11,700	3,500	**15,250**
15,300	11,700	3,500	**15,300**
15,500	11,700	3,500	**15,500**
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**
18,000	11,700	3,500	**18,000**
18,250	11,700	3,500	**18,250**
18,500	11,700	3,500	**18,500**
18,750	11,700	3,500	**18,750**
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**
20,250	13,700	4,000	**20,250**
20,500	13,700	4,000	**20,500**
21,000	13,700	4,000	**21,000**
21,250	13,700	4,000	**21,250**
21,500	13,700	4,000	**21,500**
21,750	13,700	4,000	**21,750**
22,000	13,700	4,000	**22,000**
22,500	13,700	4,000	**22,500**
23,000	13,700	4,000	**23,000**
23,500	13,700	4,000	**23,500**
24,000	13,700	4,000	**24,000**
24,500	13,700	4,000	**24,500**
25,000	13,700	4,000	**25,000**

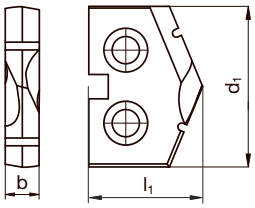
Plaquettes interchangeables

N° d'article 86605

P	M	K	N	S	H
○	●	○	●	●	

HSS-E | T | WN | 132° | R | 0/+0,05

amin. de l'âme ≥ Ø 25,000 • Plaquette de coupe interchangeable avec rainures brise-copeaux. Géométrie inox : pour acier inoxydable, alliages d'aluminium et métaux non-ferreux.
Angle au sommet:
≥ Ø 25,0 mm = 132°
> Ø 66,0 mm = 140°



d1 mm	l1 mm	b mm	N° de code
25,000	17,300	5,000	**25,000**
25,500	17,300	5,000	**25,500**
26,000	17,300	5,000	**26,000**
26,500	17,300	5,000	**26,500**
27,000	17,300	5,000	**27,000**
28,000	17,300	5,000	**28,000**
29,000	17,300	5,000	**29,000**
29,500	17,300	5,000	**29,500**
30,000	17,300	5,000	**30,000**
31,000	17,300	5,000	**31,000**
32,000	17,300	5,000	**32,000**
33,000	17,300	5,000	**33,000**
34,000	17,300	5,000	**34,000**
35,000	17,300	5,000	**35,000**
36,000	24,000	7,000	**36,000**
37,000	24,000	7,000	**37,000**
37,500	24,000	7,000	**37,500**
38,000	24,000	7,000	**38,000**
39,000	24,000	7,000	**39,000**
40,000	24,000	7,000	**40,000**
41,000	24,000	7,000	**41,000**
42,000	24,000	7,000	**42,000**
43,000	24,000	7,000	**43,000**
44,000	24,000	7,000	**44,000**
45,000	24,000	7,000	**45,000**
46,000	24,000	7,000	**46,000**
47,000	24,000	7,000	**47,000**
48,000	24,000	7,000	**48,000**
49,000	24,000	7,000	**49,000**
50,000	24,000	7,000	**50,000**
50,500	24,000	7,000	**50,500**
51,000	24,000	7,000	**51,000**
52,000	24,000	7,000	**52,000**
53,000	24,000	7,000	**53,000**
54,000	24,000	7,000	**54,000**
55,000	24,000	7,000	**55,000**

d1 mm	l1 mm	b mm	N° de code
56,000	24,000	7,000	**56,000**
57,000	24,000	7,000	**57,000**
58,000	24,000	7,000	**58,000**
59,000	24,000	7,000	**59,000**
60,000	24,000	7,000	**60,000**
62,000	24,000	7,000	**62,000**
64,000	24,000	7,000	**64,000**
65,000	24,000	7,000	**65,000**
66,000	37,000	9,000	**66,000**
68,000	37,000	9,000	**68,000**
70,000	37,000	9,000	**70,000**
74,000	37,000	9,000	**74,000**
75,000	37,000	9,000	**75,000**
78,000	37,000	9,000	**78,000**
80,000	37,000	9,000	**80,000**
82,000	37,000	9,000	**82,000**
84,000	37,000	9,000	**84,000**
85,000	37,000	9,000	**85,000**
88,000	37,000	9,000	**88,000**
90,000	37,000	9,000	**90,000**
94,000	37,000	9,000	**94,000**
95,000	37,000	9,000	**95,000**
96,000	37,000	9,000	**96,000**
98,000	37,000	9,000	**98,000**
100,000	37,000	9,000	**100,000**
102,000	37,000	9,000	**102,000**

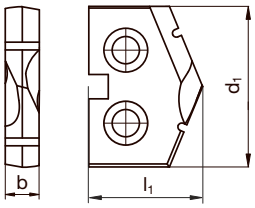
Plaquettes interchangeables

N° d'article 86608

P	M	K	N	S	H
●	○	●	○		

HSS-E-PM | F | WN | 135° | R | 0/+0,05

amin. de l'âme ≥ Ø 10,000 • Plaquette de coupe interchangeable sans rainures brise-copeaux. Angle au sommet 135°. Pour applications universelles.



d1 mm	l1 mm	b mm	N° de code
10,000	8,700	2,500	**10,000**
10,200	8,700	2,500	**10,200**
10,500	8,700	2,500	**10,500**
11,000	8,700	2,500	**11,000**
11,500	8,700	2,500	**11,500**
11,750	8,700	2,500	**11,750**
12,000	8,700	2,500	**12,000**
12,500	8,700	2,500	**12,500**
12,750	8,700	2,500	**12,750**
13,000	8,700	2,500	**13,000**
13,250	8,700	2,500	**13,250**
13,500	11,700	3,500	**13,500**
13,750	11,700	3,500	**13,750**
14,000	11,700	3,500	**14,000**
14,250	11,700	3,500	**14,250**
14,500	11,700	3,500	**14,500**
14,750	11,700	3,500	**14,750**
15,000	11,700	3,500	**15,000**
15,250	11,700	3,500	**15,250**
15,500	11,700	3,500	**15,500**
15,750	11,700	3,500	**15,750**
16,000	11,700	3,500	**16,000**
16,500	11,700	3,500	**16,500**
17,000	11,700	3,500	**17,000**

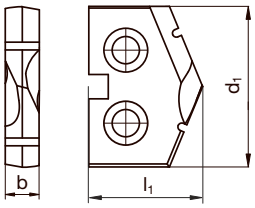
d1 mm	l1 mm	b mm	N° de code
17,500	11,700	3,500	**17,500**
17,750	11,700	3,500	**17,750**
18,000	11,700	3,500	**18,000**
18,250	11,700	3,500	**18,250**
18,500	11,700	3,500	**18,500**
18,750	11,700	3,500	**18,750**
19,000	13,700	4,000	**19,000**
19,500	13,700	4,000	**19,500**
19,750	13,700	4,000	**19,750**
20,000	13,700	4,000	**20,000**
20,500	13,700	4,000	**20,500**
21,000	13,700	4,000	**21,000**
21,500	13,700	4,000	**21,500**
21,750	13,700	4,000	**21,750**
22,000	13,700	4,000	**22,000**
22,500	13,700	4,000	**22,500**
23,000	13,700	4,000	**23,000**
23,500	13,700	4,000	**23,500**
24,000	13,700	4,000	**24,000**
24,500	13,700	4,000	**24,500**
24,750	13,700	4,000	**24,750**
25,000	13,700	4,000	**25,000**

Plaquettes interchangeables

N° d'article 86609

P	M	K	N	S	H
●	○	●	○		

amin. de l'âme ≥ Ø 25,000 • Plaquette de coupe interchangeable avec rainures brise-copeaux. Pour applications universelles.
Angle au sommet:
≥ Ø 25,0 mm = 132°
> Ø 66,0 mm = 140°
> Ø 190,0 mm = 150°
Matière de coupe:
≤ Ø 66,0 mm HSS-E-PM
> Ø 66,0 mm HSS-E



d1 mm	l1 mm	b mm	N° de code
25,000	17,300	5,000	**25,000**
25,500	17,300	5,000	**25,500**
26,000	17,300	5,000	**26,000**
26,500	17,300	5,000	**26,500**
27,000	17,300	5,000	**27,000**
28,000	17,300	5,000	**28,000**
29,000	17,300	5,000	**29,000**
29,500	17,300	5,000	**29,500**
30,000	17,300	5,000	**30,000**
31,000	17,300	5,000	**31,000**
32,000	17,300	5,000	**32,000**
33,000	17,300	5,000	**33,000**
34,000	17,300	5,000	**34,000**
35,000	17,300	5,000	**35,000**
36,000	24,000	7,000	**36,000**
37,000	24,000	7,000	**37,000**
38,000	24,000	7,000	**38,000**
39,000	24,000	7,000	**39,000**
40,000	24,000	7,000	**40,000**
41,000	24,000	7,000	**41,000**
42,000	24,000	7,000	**42,000**
43,000	24,000	7,000	**43,000**
44,000	24,000	7,000	**44,000**
45,000	24,000	7,000	**45,000**
46,000	24,000	7,000	**46,000**
47,000	24,000	7,000	**47,000**
48,000	24,000	7,000	**48,000**
49,000	24,000	7,000	**49,000**
50,000	24,000	7,000	**50,000**
51,000	24,000	7,000	**51,000**
52,000	24,000	7,000	**52,000**
53,000	24,000	7,000	**53,000**
54,000	24,000	7,000	**54,000**
55,000	24,000	7,000	**55,000**
56,000	24,000	7,000	**56,000**
57,000	24,000	7,000	**57,000**
58,000	24,000	7,000	**58,000**
59,000	24,000	7,000	**59,000**
60,000	24,000	7,000	**60,000**
62,000	24,000	7,000	**62,000**
64,000	24,000	7,000	**64,000**
65,000	24,000	7,000	**65,000**

d1 mm	l1 mm	b mm	N° de code
66,000	37,000	9,000	**66,000**
68,000	37,000	9,000	**68,000**
70,000	37,000	9,000	**70,000**
74,000	37,000	9,000	**74,000**
75,000	37,000	9,000	**75,000**
78,000	37,000	9,000	**78,000**
80,000	37,000	9,000	**80,000**
82,000	37,000	9,000	**82,000**
84,000	37,000	9,000	**84,000**
85,000	37,000	9,000	**85,000**
88,000	37,000	9,000	**88,000**
90,000	37,000	9,000	**90,000**
93,000	37,000	9,000	**93,000**
95,000	37,000	9,000	**95,000**
96,000	37,000	9,000	**96,000**
98,000	37,000	9,000	**98,000**
100,000	37,000	9,000	**100,000**
102,000	37,000	9,000	**102,000**
103,000	37,000	9,000	**103,000**
105,000	37,000	9,000	**105,000**
110,000	37,000	9,000	**110,000**
115,000	37,000	9,000	**115,000**
120,000	37,000	9,000	**120,000**
125,000	37,000	9,000	**125,000**
130,000	37,000	9,000	**130,000**
135,000	47,000	9,000	**135,000**
140,000	47,000	9,000	**140,000**
145,000	47,000	9,000	**145,000**
150,000	47,000	9,000	**150,000**
155,000	47,000	9,000	**155,000**
160,000	47,000	9,000	**160,000**
165,000	47,000	9,000	**165,000**
170,000	47,000	9,000	**170,000**
175,000	47,000	9,000	**175,000**
180,000	47,000	9,000	**180,000**
185,000	47,000	9,000	**185,000**
190,000	47,000	9,000	**190,000**
195,000	47,000	9,000	**195,000**
200,000	47,000	9,000	**200,000**
205,000	47,000	9,000	**205,000**
210,000	47,000	9,000	**210,000**

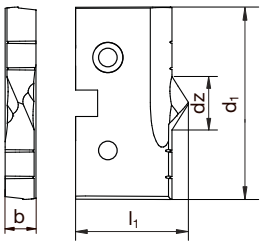
Plaquettes interchangeables

N° d'article 86611

P	M	K	N	S	H
●	○	●	○		

HSS-E-PM | A | WN | 180° | R | -0,02/ -0,07

amin. de l'âme ≥ Ø 10,000 • Interchangeable insert with chip breakers. For universal application.
Point angle of the centring tip:
≤ Ø 35.0 mm = 120°
> Ø 35.0 mm = 140°



d1 mm	l1 mm	b mm	N° de code
10,000	10,000	2,500	**10,000**
10,500	10,000	2,500	**10,500**
11,000	10,000	2,500	**11,000**
11,500	10,000	2,500	**11,500**
11,750	10,000	2,500	**11,750**
12,000	10,000	2,500	**12,000**
12,500	10,000	2,500	**12,500**
12,700	10,000	2,500	**12,700**
12,750	10,000	2,500	**12,750**
13,000	10,000	2,500	**13,000**
13,250	10,000	2,500	**13,250**
13,500	13,000	3,500	**13,500**
13,750	13,000	3,500	**13,750**
14,000	13,000	3,500	**14,000**
14,250	13,000	3,500	**14,250**
14,500	13,000	3,500	**14,500**
14,750	13,000	3,500	**14,750**
15,000	13,000	3,500	**15,000**
15,250	13,000	3,500	**15,250**
15,500	13,000	3,500	**15,500**
15,750	13,000	3,500	**15,750**
16,000	13,000	3,500	**16,000**
16,500	13,000	3,500	**16,500**
17,000	13,000	3,500	**17,000**
17,500	13,000	3,500	**17,500**
17,750	13,000	3,500	**17,750**
18,000	13,000	3,500	**18,000**
18,250	13,000	3,500	**18,250**
18,500	13,000	3,500	**18,500**
18,750	13,000	3,500	**18,750**
19,000	15,000	4,000	**19,000**
19,500	15,000	4,000	**19,500**
19,750	15,000	4,000	**19,750**
20,000	15,000	4,000	**20,000**
20,250	15,000	4,000	**20,250**
20,500	15,000	4,000	**20,500**
21,000	15,000	4,000	**21,000**
21,250	15,000	4,000	**21,250**
21,500	15,000	4,000	**21,500**
21,750	15,000	4,000	**21,750**
22,000	15,000	4,000	**22,000**
22,500	15,000	4,000	**22,500**

d1 mm	l1 mm	b mm	N° de code
23,000	15,000	4,000	**23,000**
23,500	15,000	4,000	**23,500**
24,000	15,000	4,000	**24,000**
24,500	15,000	4,000	**24,500**
24,750	15,000	4,000	**24,750**
25,000	15,000	4,000	**25,000**
25,000	18,500	5,000	**25,001**
25,400	18,500	5,000	**25,400**
25,500	18,500	5,000	**25,500**
26,000	18,500	5,000	**26,000**
26,500	18,500	5,000	**26,500**
27,000	18,500	5,000	**27,000**
28,000	18,500	5,000	**28,000**
29,000	18,500	5,000	**29,000**
29,500	18,500	5,000	**29,500**
30,000	18,500	5,000	**30,000**
31,000	18,500	5,000	**31,000**
32,000	18,500	5,000	**32,000**
33,000	18,500	5,000	**33,000**
34,000	18,500	5,000	**34,000**
35,000	18,500	5,000	**35,000**
36,000	25,500	7,000	**36,000**
37,000	25,500	7,000	**37,000**
38,000	25,500	7,000	**38,000**
39,000	25,500	7,000	**39,000**
40,000	25,500	7,000	**40,000**
41,000	25,500	7,000	**41,000**
42,000	25,500	7,000	**42,000**
43,000	25,500	7,000	**43,000**
44,000	25,500	7,000	**44,000**
45,000	25,500	7,000	**45,000**
46,000	25,500	7,000	**46,000**
47,000	25,500	7,000	**47,000**
48,000	25,500	7,000	**48,000**
49,000	25,500	7,000	**49,000**
50,000	25,500	7,000	**50,000**
51,000	25,500	7,000	**51,000**
52,000	25,500	7,000	**52,000**
53,000	25,500	7,000	**53,000**
54,000	25,500	7,000	**54,000**
55,000	25,500	7,000	**55,000**
56,000	25,500	7,000	**56,000**

Plaquettes interchangeables

d1 mm	l1 mm	b mm	**N° de code**
57,000	25,500	7,000	**57,000**
58,000	25,500	7,000	**58,000**
59,000	25,500	7,000	**59,000**
60,000	25,500	7,000	**60,000**
62,000	25,500	7,000	**62,000**
64,000	25,500	7,000	**64,000**

d1 mm	l1 mm	b mm	**N° de code**
65,000	25,500	7,000	**65,000**

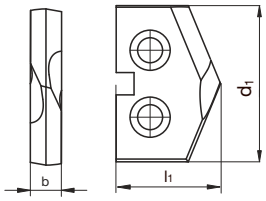
Plaquettes interchangeables

N° d'article 86701

P	M	K	N	S	H
●	○	●	○		

VHM | F | WN | 135° | R | 0/+0,05

amin. de l'âme ≥ Ø 10,000 • Plaquette de coupe interchangeable sans rainures de division des copeaux. Pour materiaux supérieur à 600 N/mm². Pour applications universelles.
Angle de pointe:
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°
Sans chanfrein (voir «Conseils d'utilisation pour Multiplex « / Caractéristiques techniques)



d1 mm	l1 mm	b mm	N° de code
10,000	8,700	2,500	**10,000**
10,200	8,700	2,500	**10,200**
10,500	8,700	2,500	**10,500**
11,000	8,700	2,500	**11,000**
11,500	8,700	2,500	**11,500**
12,000	8,700	2,500	**12,000**
12,500	8,700	2,500	**12,500**
12,750	8,700	2,500	**12,750**
13,000	8,700	2,500	**13,000**
13,500	11,700	3,500	**13,500**
13,750	11,700	3,500	**13,750**
14,000	11,700	3,500	**14,000**
14,500	11,700	3,500	**14,500**
14,750	11,700	3,500	**14,750**
15,000	11,700	3,500	**15,000**
15,500	11,700	3,500	**15,500**
15,750	11,700	3,500	**15,750**
16,000	11,700	3,500	**16,000**
16,250	11,700	3,500	**16,250**
16,500	11,700	3,500	**16,500**
16,750	11,700	3,500	**16,750**
17,000	11,700	3,500	**17,000**
17,500	11,700	3,500	**17,500**
17,750	11,700	3,500	**17,750**

d1 mm	l1 mm	b mm	N° de code
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**
20,000	13,700	4,000	**20,000**
20,500	13,700	4,000	**20,500**
21,000	13,700	4,000	**21,000**
21,500	13,700	4,000	**21,500**
22,000	13,700	4,000	**22,000**
23,000	13,700	4,000	**23,000**
24,000	13,700	4,000	**24,000**
24,500	13,700	4,000	**24,500**
25,000	13,700	4,000	**25,000**
26,000	17,300	5,000	**26,000**
27,000	17,300	5,000	**27,000**
28,000	17,300	5,000	**28,000**
29,000	17,300	5,000	**29,000**
30,000	17,300	5,000	**30,000**
31,000	17,300	5,000	**31,000**
32,000	17,300	5,000	**32,000**
33,000	17,300	5,000	**33,000**
34,000	17,300	5,000	**34,000**
35,000	17,300	5,000	**35,000**

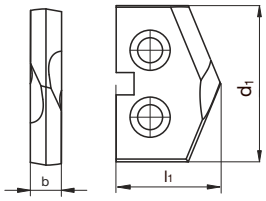
Plaquettes interchangeables

N° d'article 86702

P	M	K	N	S	H
●	○	●	○		

VHM | F | WN | 135° | R | 0/+0,05

amin. de l'âme ≥ Ø 10,000 • Plaquette de coupe interchangeable sans rainures brise-copeaux. Pour materiaux supérieur à 600 N/mm².
Pour applications universelles.
Angle de pointe:
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°
Avec chanfrein (voir «Conseils d'utilisation pour Multiplex « / Caractéristiques techniques)



d1 mm	l1 mm	b mm	N° de code
10,000	8,700	2,500	**10,000**
10,200	8,700	2,500	**10,200**
10,500	8,700	2,500	**10,500**
11,000	8,700	2,500	**11,000**
12,000	8,700	2,500	**12,000**
12,500	8,700	2,500	**12,500**
12,750	8,700	2,500	**12,750**
13,000	8,700	2,500	**13,000**
13,500	11,700	3,500	**13,500**
13,750	11,700	3,500	**13,750**
14,000	11,700	3,500	**14,000**
14,100	11,700	3,500	**14,100**
14,500	11,700	3,500	**14,500**
14,750	11,700	3,500	**14,750**
15,000	11,700	3,500	**15,000**
15,500	11,700	3,500	**15,500**
16,000	11,700	3,500	**16,000**
16,250	11,700	3,500	**16,250**
16,500	11,700	3,500	**16,500**
17,000	11,700	3,500	**17,000**
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**
20,500	13,700	4,000	**20,500**

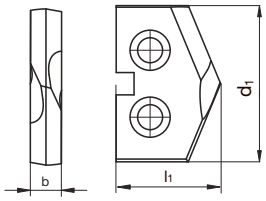
d1 mm	l1 mm	b mm	N° de code
21,000	13,700	4,000	**21,000**
21,500	13,700	4,000	**21,500**
22,000	13,700	4,000	**22,000**
22,300	13,700	4,000	**22,300**
22,750	13,700	4,000	**22,750**
23,000	13,700	4,000	**23,000**
24,250	13,700	4,000	**24,250**
24,500	13,700	4,000	**24,500**
25,000	13,700	4,000	**25,000**
26,000	17,300	5,000	**26,000**
26,500	17,300	5,000	**26,500**
27,000	17,300	5,000	**27,000**
28,000	17,300	5,000	**28,000**
29,000	17,300	5,000	**29,000**
29,800	17,300	5,000	**29,800**
30,000	17,300	5,000	**30,000**
32,000	17,300	5,000	**32,000**
33,000	17,300	5,000	**33,000**
34,000	17,300	5,000	**34,000**
35,000	17,300	5,000	**35,000**

Plaquettes interchangeables

N° d'article 86708

P	M	K	N	S	H
●	○	●	○		

amin. de l'âme ≥ Ø 9,800 • Plaquette de coupe interchangeable sans rainures brise-copeaux. Pour materiaux supérieur à 600 N/mm².
Pour applications universelles.
Angle de pointe:
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°
Avec chanfrein (voir «Conseils d'utilisation pour Multiplex « / Caractéristiques techniques)



d1 mm	l1 mm	b mm	N° de code
10,000	8,700	2,500	**10,000**
10,200	8,700	2,500	**10,200**
10,500	8,700	2,500	**10,500**
11,000	8,700	2,500	**11,000**
11,500	8,700	2,500	**11,500**
12,500	8,700	2,500	**12,500**
12,750	8,700	2,500	**12,750**
13,000	8,700	2,500	**13,000**
13,500	11,700	3,500	**13,500**
13,750	11,700	3,500	**13,750**
14,000	11,700	3,500	**14,000**
14,500	11,700	3,500	**14,500**
14,750	11,700	3,500	**14,750**
15,000	11,700	3,500	**15,000**
15,500	11,700	3,500	**15,500**
15,750	11,700	3,500	**15,750**
16,000	11,700	3,500	**16,000**
16,250	11,700	3,500	**16,250**
16,500	11,700	3,500	**16,500**
16,750	11,700	3,500	**16,750**
17,000	11,700	3,500	**17,000**
17,500	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**

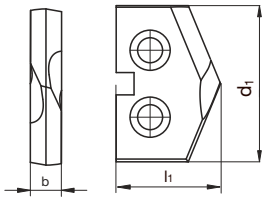
d1 mm	l1 mm	b mm	N° de code
20,500	13,700	4,000	**20,500**
21,000	13,700	4,000	**21,000**
21,500	13,700	4,000	**21,500**
22,000	13,700	4,000	**22,000**
22,500	13,700	4,000	**22,500**
22,750	13,700	4,000	**22,750**
23,000	13,700	4,000	**23,000**
23,500	13,700	4,000	**23,500**
24,000	13,700	4,000	**24,000**
24,250	13,700	4,000	**24,250**
24,500	13,700	4,000	**24,500**
25,000	13,700	4,000	**25,000**
26,000	17,300	5,000	**26,000**
27,000	17,300	5,000	**27,000**
28,000	17,300	5,000	**28,000**
29,000	17,300	5,000	**29,000**
30,000	17,300	5,000	**30,000**
31,000	17,300	5,000	**31,000**
32,000	17,300	5,000	**32,000**
34,000	17,300	5,000	**34,000**
35,000	17,300	5,000	**35,000**

Plaquettes interchangeables

N° d'article 86709

P	M	K	N	S	H
●	○	●	○		

amin. de l'âme ≥ Ø 9,800 • Plaquette de coupe interchangeable sans rainures de division des copeaux. Pour materiaux supérieur à 600 N/mm². Pour applications universelles.
Angle de pointe:
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°
Sans chanfrein (voir «Conseils d'utilisation pour Multiplex « / Caractéristiques techniques)



d1 mm	l1 mm	b mm	N° de code
9,920	8,700	2,500	**9,920**
10,000	8,700	2,500	**10,000**
10,200	8,700	2,500	**10,200**
10,500	8,700	2,500	**10,500**
11,000	8,700	2,500	**11,000**
11,110	8,700	2,500	**11,110**
12,000	8,700	2,500	**12,000**
12,500	8,700	2,500	**12,500**
12,700	8,700	2,500	**12,700**
12,750	8,700	2,500	**12,750**
13,000	8,700	2,500	**13,000**
13,500	11,700	3,500	**13,500**
14,000	11,700	3,500	**14,000**
14,500	11,700	3,500	**14,500**
15,000	11,700	3,500	**15,000**
15,880	11,700	3,500	**15,880**
16,250	11,700	3,500	**16,250**
16,500	11,700	3,500	**16,500**
16,670	11,700	3,500	**16,670**
16,750	11,700	3,500	**16,750**
17,000	11,700	3,500	**17,000**
17,500	11,700	3,500	**17,500**
17,750	11,700	3,500	**17,750**
18,000	11,700	3,500	**18,000**

d1 mm	l1 mm	b mm	N° de code
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**
20,000	13,700	4,000	**20,000**
20,500	13,700	4,000	**20,500**
21,000	13,700	4,000	**21,000**
21,500	13,700	4,000	**21,500**
22,000	13,700	4,000	**22,000**
23,000	13,700	4,000	**23,000**
23,250	13,700	4,000	**23,250**
24,500	13,700	4,000	**24,500**
25,000	13,700	4,000	**25,000**
26,000	17,300	5,000	**26,000**
27,000	17,300	5,000	**27,000**
28,000	17,300	5,000	**28,000**
29,000	17,300	5,000	**29,000**
30,000	17,300	5,000	**30,000**
33,000	17,300	5,000	**33,000**
34,000	17,300	5,000	**34,000**
35,000	17,300	5,000	**35,000**

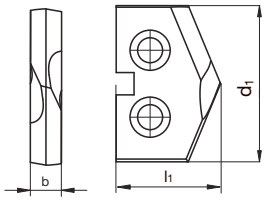
Plaquettes interchangeables

N° d'article 86711

P	M	K	N	S	H
			•		

VHM | WN | 135° | R | 0/+0,05

amin. de l'âme ≥ Ø 10,000 • Plaquette interchangeable avec fraises d'ébauche. Géométrie en aluminium pour alliages d'aluminium, métaux non ferreux et matières plastiques :
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°



d1 mm	l1 mm	b mm	N° de code
10,000	8,700	2,500	**10,000**
10,200	8,700	2,500	**10,200**
10,500	8,700	2,500	**10,500**
11,000	8,700	2,500	**11,000**
11,500	8,700	2,500	**11,500**
12,000	8,700	2,500	**12,000**
12,250	8,700	2,500	**12,250**
12,500	8,700	2,500	**12,500**
12,700	8,700	2,500	**12,700**
12,750	8,700	2,500	**12,750**
13,000	8,700	2,500	**13,000**
13,500	11,700	3,500	**13,500**
13,750	11,700	3,500	**13,750**
14,000	11,700	3,500	**14,000**
14,250	11,700	3,500	**14,250**
14,500	11,700	3,500	**14,500**
14,750	11,700	3,500	**14,750**
15,000	11,700	3,500	**15,000**
15,500	11,700	3,500	**15,500**
15,750	11,700	3,500	**15,750**
16,000	11,700	3,500	**16,000**
16,250	11,700	3,500	**16,250**
16,500	11,700	3,500	**16,500**
16,750	11,700	3,500	**16,750**
17,000	11,700	3,500	**17,000**
17,500	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**
20,500	13,700	4,000	**20,500**
21,000	13,700	4,000	**21,000**
21,500	13,700	4,000	**21,500**
22,000	13,700	4,000	**22,000**
22,500	13,700	4,000	**22,500**
22,750	13,700	4,000	**22,750**
23,000	13,700	4,000	**23,000**
23,500	13,700	4,000	**23,500**

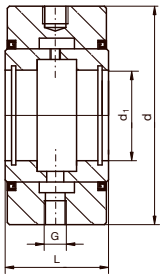
d1 mm	l1 mm	b mm	N° de code
24,000	13,700	4,000	**24,000**
24,250	13,700	4,000	**24,250**
24,500	13,700	4,000	**24,500**
25,000	13,700	4,000	**25,000**
25,400	17,300	5,000	**25,400**
26,000	17,300	5,000	**26,000**
27,000	17,300	5,000	**27,000**
28,000	17,300	5,000	**28,000**
29,000	17,300	5,000	**29,000**
30,000	17,300	5,000	**30,000**
31,000	17,300	5,000	**31,000**
32,000	17,300	5,000	**32,000**
34,000	17,300	5,000	**34,000**
35,000	17,300	5,000	**35,000**
36,000	24,000	7,000	**36,000**
37,000	24,000	7,000	**37,000**
38,000	24,000	7,000	**38,000**
39,000	24,000	7,000	**39,000**
40,000	24,000	7,000	**40,000**
41,000	24,000	7,000	**41,000**
42,000	24,000	7,000	**42,000**
43,000	24,000	7,000	**43,000**
44,000	24,000	7,000	**44,000**
45,000	24,000	7,000	**45,000**
46,000	24,000	7,000	**46,000**
47,000	24,000	7,000	**47,000**
48,000	24,000	7,000	**48,000**
49,000	24,000	7,000	**49,000**
50,000	24,000	7,000	**50,000**
51,000	24,000	7,000	**51,000**
52,000	24,000	7,000	**52,000**
53,000	24,000	7,000	**53,000**
54,000	24,000	7,000	**54,000**
55,000	24,000	7,000	**55,000**
56,000	24,000	7,000	**56,000**
57,000	24,000	7,000	**57,000**
58,000	24,000	7,000	**58,000**
59,000	24,000	7,000	**59,000**
60,000	24,000	7,000	**60,000**
62,000	24,000	7,000	**62,000**
64,000	24,000	7,000	**64,000**
65,000	24,000	7,000	**65,000**

Bagues d´alimentation du liquide de refroidissement

N° d'article 86690

WN

Bague d'adduction du produit de lubrification, pour support avec attachement conique CM et bague annulaire d´adduction 86670 et 86680 (sans le jeu: raccord d´accouplement).



pour	d1 mm	d mm	G	L mm	**N° de code**
MK 4	31,750	80,000	G1/4	45,000	**31,750**
MK 5	63,500	127,000	G1/2	60,000	**63,500**

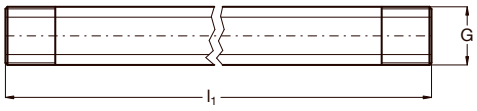
HARTNER

Tube d‘adduction

N° d’article 82571

WN

Tuyau d’alimentation du produit de lubrification et refroidissement pour bague d’adduction de lubrification n° d´article 86690.



G	l1 mm	N° de code
G1/4	200,000	**13,160**
G1/2	200,000	**20,960**

Déconnexion rapide

N° d’article 82578

WN

raccord rapide pour lubrification, N° d’article 82571

G	d mm	l1 mm	**N° de code**
G1/4	9,000	118,000	**9,000**
G1/2	13,000	118,000	**13,000**

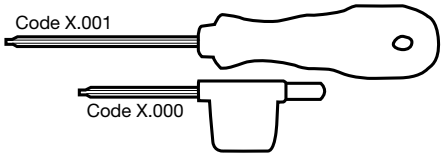
HARTNER

Tournevis Torx

N° d'article 86842

WN

Tourne-vis Torx



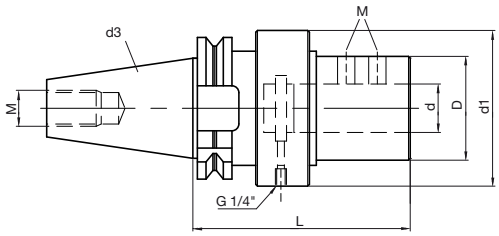
Torx	l1 mm	N° de code
T5	130,000	**5,001**
T6	69,000	**6,000**
T6	150,000	**6,001**
T7	74,000	**7,000**
T7	150,000	**7,001**
T8	150,000	**8,001**
T9	150,000	**9,001**
T10	170,000	**10,001**
T15	80,000	**15,000**
T15	190,000	**15,001**
T20	205,000	**20,001**
T25	207,000	**25,001**

Mandrin avec arrosage pour Multiplex

N° d'article 86691

B WN SK

Mandrin de serrage à cône SA selon Norme DIN ISO 7388-1, avec adduction du produit de refroidissement et de lubrification, avec alésage cylindrique pour les attachements d´outils cylindriques. Pour le serrage des attachements de Ø inférieurs, utiliser les douilles de réduction.



d3	d mm	D mm	D1 mm	L mm	M	 kg	N° de code
SK 40	32,000	65,000	88,000	130,000	M16	4,000	**32,040**
SK 50	40,000	65,000	98,000	135,000	M24	5,400	**40,050**
SK 50	50,000	90,000	123,000	165,000	M24	9,520	**50,050**

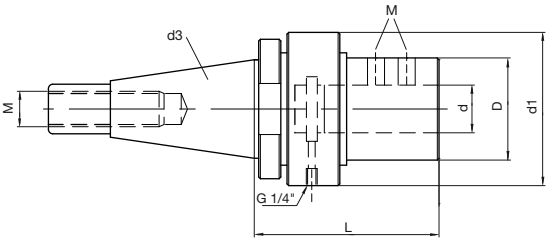
HARTNER

Mandrin avec arrosage pour Multiplex

N° d'article 86692

B WN SK

Mandrin de serrage à cône SA selon Norme DIN 2080, avec adduction du produit de refroidissement et de lubrification, avec alésage cylindrique pour les attachements d´outils cylindriques. Pour le serrage des attachements de Ø inférieurs, utiliser les douilles de réduction.



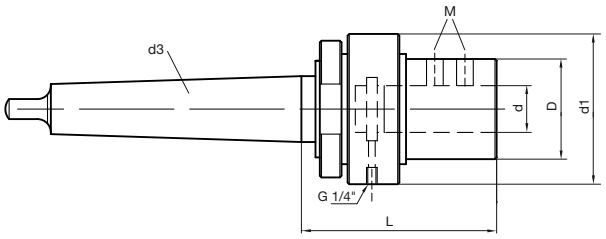
d3	d mm	D mm	D1 mm	L mm	M	 kg	N° de code
SK 40	32,000	65,000	88,000	110,000	M16	0,931	**32,040**
SK 50	40,000	65,000	98,000	120,000	M24	5,825	**40,050**
SK 50	50,000	90,000	123,000	145,000	M24	9,116	**50,050**

Mandrin avec arrosage pour Multiplex

N° d'article 86693

B WN MK

Mandrin de serrage à cône Morse CM selon Norme DIN 228 B, avec adduction du produit de refroidissement et de lubrification, avec alésage cylindrique pour les attachements d´outils cylindriques. Pour le serrage des attachements de Ø inférieurs, utiliser les douilles de réduction.



d3	d mm	D mm	D1 mm	L mm	M	 kg	N° de code
MK-4	32,000	65,000	88,000	100,000	M14	3,498	**32,400**
MK-5	40,000	75,000	98,000	110,000	M16	7,325	**40,500**
MK-6	40,000	75,000	98,000	120,000	M16	8,000	**40,600**
MK-5	50,000	90,000	123,000	140,000	M20	7,278	**50,500**
MK-6	50,000	90,000	123,000	140,000	M20	3,997	**50,600**

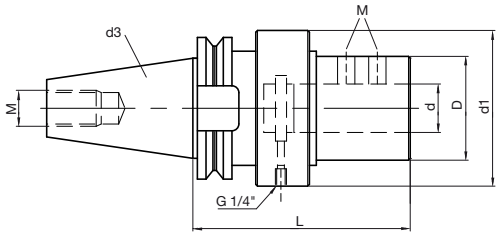
HARTNER

Mandrin avec arrosage pour Multiplex

N° d'article 86694

B WN MAS-BT

Mandrin de serrage à cône MAS BT selon Norme DIN ISO 7388 - 2, avec adduction du produit de refroidissement et de lubrification, avec alésage cylindrique pour les attachements d´outils cylindriques. Pour le serrage des attachements de Ø inférieurs, utiliser les douilles de réduction.



d3	d mm	D mm	D1 mm	L mm	M	 kg	N° de code
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	6,800	**40,050**
BT 50	50,000	90,000	123,000	170,000	M24	10,183	**50,050**

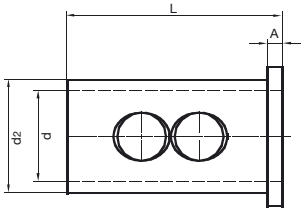
HARTNER

Douille de réduction pour queue cylindrique

N° d'article 86699

B WN Cyl

Douilles de réduction, pour les mandrins de serrage avec adduction du produit de lubrification et de refroidissement, pourvues d´un alésage cylindrique pour les attachements d´outils cylindriques de diamètres inférieurs



d mm	d2 mm	L mm	A mm	**N° de code**
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

MULTIPLEX HPC

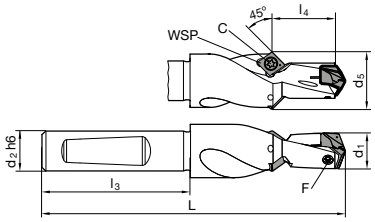
Porte-outils Multiplex HPC

N° d'article 86681

Ni | HPC | 1xD | WN | R | HE

résistance à l'usure particulièrement élevée • section des goujures optimisée • sortie optimisée des can.de refroid. • y compris vis de serrage n° d´article 86843 et 86846 • tournevis n°86842 incluse

p. pilotes de guid.et chanfr. 45°



Taille mm	d1	d2 h6 mm	d5 mm	L mm	l3 mm	l4 mm	F	C	N° de code
110	11,00-11,99	12,000	17,000	81,000	45,000	12,000	86843 2.200	86846 2.000	**11,000**
110	11,00-11,99	12,700	17,000	81,000	45,000	12,000	86843 2.200	86846 2.000	**11,005**
120	12,00-12,99	12,000	18,000	84,000	45,000	13,000	86843 2.201	86846 2.000	**12,000**
120	12,00-12,99	12,700	18,000	84,000	45,000	13,000	86843 2.201	86846 2.000	**12,005**
130	13,00-13,99	14,000	18,000	86,000	45,000	14,000	86843 2.500	86846 2.000	**13,000**
130	13,00-13,99	15,875	18,000	86,000	45,000	14,000	86843 2.500	86846 2.000	**13,005**
140	14,00-15,99	16,000	18,000	93,000	48,000	16,000	86843 3.000	86846 2.000	**14,000**
140	14,00-15,99	15,875	18,000	93,000	48,000	16,000	86843 3.000	86846 2.000	**14,005**
160	16,00-17,99	18,000	20,000	99,000	48,000	18,000	86843 3.500	86846 2.500	**16,000**
160	16,00-17,99	19,050	20,000	99,000	48,000	18,000	86843 3.500	86846 2.500	**16,005**
180	18,00-19,99	20,000	22,000	106,000	50,000	20,000	86843 4.000	86846 2.500	**18,000**
180	18,00-19,99	19,050	22,000	106,000	50,000	20,000	86843 4.000	86846 2.500	**18,005**
200	20,00-21,99	25,000	25,000	117,000	56,000	22,000	86843 4.500	86846 2.500	**20,000**
200	20,00-21,99	25,400	25,400	117,000	56,000	22,000	86843 4.500	86846 2.500	**20,005**
220	22,00-23,99	25,000	26,000	122,000	56,000	24,000	86843 5.000	86846 2.500	**22,000**
220	22,00-23,99	25,400	26,000	122,000	56,000	24,000	86843 5.000	86846 2.500	**22,005**
240	24,00-25,99	25,000	28,000	128,000	56,000	26,000	86843 5.001	86846 2.500	**24,000**
240	24,00-25,99	25,400	28,000	128,000	56,000	26,000	86843 5.001	86846 2.500	**24,005**
260	26,00-27,99	32,000	32,000	142,000	60,000	28,000	86843 5.003	86846 2.500	**26,000**
260	26,00-27,99	31,750	32,000	142,000	60,000	28,000	86843 5.003	86846 2.500	**26,005**
280	28,00-29,99	32,000	34,000	147,000	60,000	30,000	86843 5.003	86846 2.500	**28,000**
280	28,00-29,99	31,750	34,000	147,000	60,000	30,000	86843 5.003	86846 2.500	**28,005**
300	30,00-31,99	32,000	38,000	152,000	60,000	32,000	86843 6.000	86846 4.006	**30,000**
300	30,00-31,99	31,750	38,000	152,000	60,000	32,000	86843 6.000	86846 4.006	**30,005**
320	32,00-35,99	32,000	42,000	163,000	60,000	36,000	86843 6.001	86846 4.006	**32,000**
320	32,00-35,99	31,750	42,000	163,000	60,000	36,000	86843 6.001	86846 4.006	**32,005**
360	36,00-40,00	32,000	46,000	173,000	60,000	40,000	86843 6.002	86846 4.006	**36,000**
360	36,00-40,00	31,750	46,000	173,000	60,000	40,000	86843 6.002	86846 4.006	**36,005**

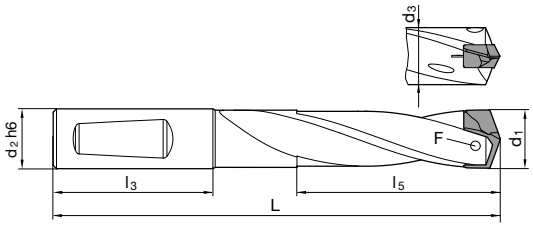
HARTNER

Porte-outils Multiplex HPC

N° d'article 86682

Ni | HPC | 1,5xD | WN | R | HE

résistance à l'usure particulièrement élevée • section des goujures optimisée • sortie optimisée des can.de refroid. • vis de serrage n°86843 incluse • tournevis n°86842 incluse



Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
110	11,00-11,49	12,000	10,700	84,000	45,000	19,300	86843 2.200	**11,000**
110	11,00-11,49	12,700	10,700	84,000	45,000	19,300	86843 2.200	**11,005**
115	11,50-11,99	12,000	11,200	85,000	45,000	20,100	86843 2.200	**11,500**
115	11,50-11,99	12,700	11,200	85,000	45,000	20,100	86843 2.200	**11,505**
120	12,00-12,49	12,000	11,700	87,000	45,000	21,000	86843 2.201	**12,000**
120	12,00-12,49	12,700	11,700	87,000	45,000	21,000	86843 2.201	**12,005**
125	12,50-12,99	14,000	12,200	89,000	45,000	21,900	86843 2.201	**12,500**
125	12,50-12,99	15,875	12,200	89,000	45,000	21,900	86843 2.201	**12,505**
130	13,00-13,49	14,000	12,700	90,000	45,000	22,600	86843 2.500	**13,000**
130	13,00-13,49	15,875	12,700	90,000	45,000	22,600	86843 2.500	**13,005**
135	13,50-13,99	14,000	13,200	92,000	45,000	23,600	86843 2.500	**13,500**
135	13,50-13,99	15,875	13,200	92,000	45,000	23,600	86843 2.500	**13,505**
140	14,00-14,49	14,000	13,700	93,000	45,000	24,500	86843 3.000	**14,000**
140	14,00-14,49	15,875	13,700	93,000	45,000	24,500	86843 3.000	**14,005**
145	14,50-14,99	16,000	14,200	98,000	48,000	25,300	86843 3.000	**14,500**
145	14,50-14,99	15,875	14,200	98,000	48,000	25,300	86843 3.000	**14,505**
150	15,00-15,49	16,000	14,700	100,000	48,000	26,100	86843 3.001	**15,000**
150	15,00-15,49	15,875	14,700	100,000	48,000	26,100	86843 3.001	**15,005**
155	15,50-15,99	16,000	15,200	101,000	48,000	27,000	86843 3.001	**15,500**
155	15,50-15,99	15,875	15,200	101,000	48,000	27,000	86843 3.001	**15,505**
160	16,00-16,49	16,000	15,700	102,000	48,000	27,800	86843 3.500	**16,000**
160	16,00-16,49	15,875	15,700	102,000	48,000	27,800	86843 3.500	**16,005**
165	16,50-16,99	18,000	16,200	105,000	48,000	28,700	86843 3.500	**16,500**
165	16,50-16,99	19,050	16,200	105,000	48,000	28,700	86843 3.500	**16,505**
170	17,00-17,49	18,000	16,700	106,000	48,000	29,600	86843 3.500	**17,000**
170	17,00-17,49	19,050	16,700	106,000	48,000	29,600	86843 3.500	**17,005**
175	17,50-17,99	18,000	17,200	107,000	48,000	30,400	86843 3.500	**17,500**
175	17,50-17,99	19,050	17,200	107,000	48,000	30,400	86843 3.500	**17,505**
180	18,00-18,49	18,000	17,700	109,000	48,000	31,200	86843 4.000	**18,000**
180	18,00-18,49	19,050	17,700	109,000	48,000	31,200	86843 4.000	**18,005**
185	18,50-18,99	20,000	18,200	113,000	50,000	32,100	86843 4.000	**18,500**
185	18,50-18,99	19,050	18,200	113,000	50,000	32,100	86843 4.000	**18,505**
190	19,00-19,49	20,000	18,700	114,000	50,000	32,900	86843 4.000	**19,000**
190	19,00-19,49	19,050	18,700	114,000	50,000	32,900	86843 4.000	**19,005**
195	19,50-19,99	20,000	19,200	116,000	50,000	33,700	86843 4.000	**19,500**
195	19,50-19,99	19,050	19,200	116,000	50,000	33,700	86843 4.000	**19,505**
200	20,00-20,49	20,000	19,700	117,000	50,000	34,600	86843 4.500	**20,000**
200	20,00-20,49	19,050	19,700	117,000	50,000	34,600	86843 4.500	**20,005**
205	20,50-20,99	25,000	20,200	128,000	56,000	35,500	86843 4.500	**20,500**
205	20,50-20,99	25,400	20,200	128,000	56,000	35,500	86843 4.500	**20,505**
210	21,00-21,49	25,000	20,700	129,000	56,000	36,400	86843 4.500	**21,000**
210	21,00-21,49	25,400	20,700	129,000	56,000	36,400	86843 4.500	**21,005**

Porte-outils Multiplex HPC

Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
215	21,50-21,99	25,000	21,200	130,000	56,000	37,200	86843 4.500	**21,500**
215	21,50-21,99	25,400	21,200	130,000	56,000	37,200	86843 4.500	**21,505**
220	22,00-22,49	25,000	21,700	131,000	56,000	38,000	86843 5.000	**22,000**
220	22,00-22,49	25,400	21,700	131,000	56,000	38,000	86843 5.000	**22,005**
225	22,50-22,99	25,000	22,200	134,000	56,000	38,900	86843 5.000	**22,500**
225	22,50-22,99	25,400	22,200	134,000	56,000	38,900	86843 5.000	**22,505**
230	23,00-23,49	25,000	22,700	135,000	56,000	39,800	86843 5.000	**23,000**
230	23,00-23,49	25,400	22,700	135,000	56,000	39,800	86843 5.000	**23,005**
235	23,50-23,99	25,000	23,200	137,000	56,000	40,600	86843 5.000	**23,500**
235	23,50-23,99	25,400	23,200	137,000	56,000	40,600	86843 5.000	**23,505**
240	24,00-24,49	25,000	23,700	138,000	56,000	41,500	86843 5.001	**24,000**
240	24,00-24,49	25,400	23,700	138,000	56,000	41,500	86843 5.001	**24,005**
245	24,50-24,99	25,000	24,200	140,000	56,000	42,300	86843 5.001	**24,500**
245	24,50-24,99	25,400	24,200	140,000	56,000	42,300	86843 5.001	**24,505**
250	25,00-25,49	25,000	24,700	142,000	56,000	43,200	86843 5.001	**25,000**
250	25,00-25,49	25,400	24,700	142,000	56,000	43,200	86843 5.001	**25,005**
255	25,50-25,99	32,000	25,200	148,000	60,000	44,000	86843 5.001	**25,500**
255	25,50-25,99	31,750	25,200	148,000	60,000	44,000	86843 5.001	**25,505**
260	26,00-26,49	32,000	25,700	151,000	60,000	44,300	86843 5.003	**26,000**
260	26,00-26,49	31,750	25,700	151,000	60,000	44,300	86843 5.003	**26,005**
265	26,50-26,99	32,000	26,200	153,000	60,000	45,100	86843 5.003	**26,500**
265	26,50-26,99	31,750	26,200	153,000	60,000	45,100	86843 5.003	**26,505**
270	27,00-27,49	32,000	26,700	155,000	60,000	46,000	86843 5.003	**27,000**
270	27,00-27,49	31,750	26,700	155,000	60,000	46,000	86843 5.003	**27,005**
275	27,50-27,99	32,000	27,200	156,000	60,000	46,800	86843 5.003	**27,500**
275	27,50-27,99	31,750	27,200	156,000	60,000	46,800	86843 5.003	**27,505**
280	28,00-28,49	32,000	27,700	157,000	60,000	47,700	86843 5.003	**28,000**
280	28,00-28,49	31,750	27,700	157,000	60,000	47,700	86843 5.003	**28,005**
285	28,50-28,99	32,000	28,200	159,000	60,000	48,500	86843 5.003	**28,500**
285	28,50-28,99	31,750	28,200	159,000	60,000	48,500	86843 5.003	**28,505**
290	29,00-29,49	32,000	28,700	161,000	60,000	49,400	86843 5.003	**29,000**
290	29,00-29,49	31,750	28,700	161,000	60,000	49,400	86843 5.003	**29,005**
295	29,50-29,99	32,000	29,200	162,000	60,000	50,200	86843 5.003	**29,500**
295	29,50-29,99	31,750	29,200	162,000	60,000	50,200	86843 5.003	**29,505**
300	30,00-30,49	32,000	29,700	164,000	60,000	50,900	86843 6.000	**30,000**
300	30,00-30,49	31,750	29,700	164,000	60,000	50,900	86843 6.000	**30,005**
305	30,50-30,99	32,000	30,200	166,000	60,000	51,700	86843 6.000	**30,500**
305	30,50-30,99	31,750	30,200	166,000	60,000	51,700	86843 6.000	**30,505**
310	31,00-31,49	32,000	30,700	167,000	60,000	52,600	86843 6.000	**31,000**
310	31,00-31,49	31,750	30,700	167,000	60,000	52,600	86843 6.000	**31,005**
315	31,50-31,99	32,000	31,200	168,000	60,000	53,400	86843 6.000	**31,500**
315	31,50-31,99	31,750	31,200	168,000	60,000	53,400	86843 6.000	**31,505**
320	32,00-32,99	32,000	31,700	172,000	60,000	55,100	86843 6.001	**32,000**
320	32,00-32,99	31,750	31,700	172,000	60,000	55,100	86843 6.001	**32,005**
330	33,00-33,99	32,000	32,700	175,000	60,000	56,800	86843 6.001	**33,000**
330	33,00-33,99	31,750	32,700	175,000	60,000	56,800	86843 6.001	**33,005**
340	34,00-34,99	32,000	33,700	178,000	60,000	58,500	86843 6.001	**34,000**
340	34,00-34,99	31,750	33,700	178,000	60,000	58,500	86843 6.001	**34,005**
350	35,00-35,99	32,000	34,700	181,000	60,000	60,200	86843 6.001	**35,000**
350	35,00-35,99	31,750	34,700	181,000	60,000	60,200	86843 6.001	**35,005**
360	36,00-36,99	32,000	35,700	184,000	60,000	61,800	86843 6.002	**36,000**
360	36,00-36,99	31,750	35,700	184,000	60,000	61,800	86843 6.002	**36,005**
370	37,00-37,99	32,000	36,700	188,000	60,000	63,500	86843 6.002	**37,000**
370	37,00-37,99	31,750	36,700	188,000	60,000	63,500	86843 6.002	**37,005**
380	38,00-38,99	32,000	37,700	191,000	60,000	65,200	86843 6.002	**38,000**
380	38,00-38,99	31,750	37,700	191,000	60,000	65,200	86843 6.002	**38,005**
390	39,00-40,00	32,000	38,700	194,000	60,000	66,900	86843 6.002	**39,000**
390	39,00-40,00	31,750	38,700	194,000	60,000	66,900	86843 6.002	**39,005**

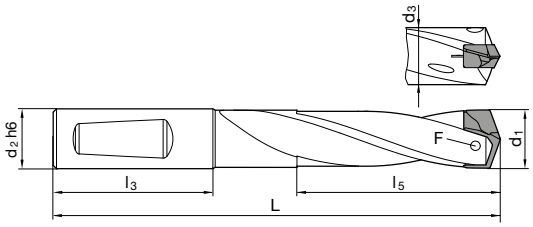
HARTNER

Porte-outils Multiplex HPC

N° d'article 86683

Ni | HPC | 3xD | WN | R | HE

résistance à l'usure particulièrement élevée • section des goujures optimisée • particulièrement rigide • vis de serrage n°86843 incluse • tournevis n°86842 incluse



Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
110	11,00-11,49	12,000	10,700	101,000	45,000	36,600	86843 2.200	**11,000**
110	11,00-11,49	12,700	10,700	101,000	45,000	36,600	86843 2.200	**11,005**
115	11,50-11,99	12,000	11,200	103,000	45,000	38,100	86843 2.200	**11,500**
115	11,50-11,99	12,700	11,200	103,000	45,000	38,100	86843 2.200	**11,505**
120	12,00-12,49	12,000	11,700	106,000	45,000	39,700	86843 2.201	**12,000**
120	12,00-12,49	12,700	11,700	106,000	45,000	39,700	86843 2.201	**12,005**
125	12,50-12,99	14,000	12,200	108,000	45,000	41,300	86843 2.201	**12,500**
125	12,50-12,99	15,875	12,200	108,000	45,000	41,300	86843 2.201	**12,505**
130	13,00-13,49	14,000	12,700	110,000	45,000	42,900	86843 2.500	**13,000**
130	13,00-13,49	15,875	12,700	110,000	45,000	42,900	86843 2.500	**13,005**
135	13,50-13,99	14,000	13,200	113,000	45,000	44,600	86843 2.500	**13,500**
135	13,50-13,99	15,875	13,200	113,000	45,000	44,600	86843 2.500	**13,505**
140	14,00-14,49	14,000	13,700	115,000	45,000	46,200	86843 3.000	**14,000**
140	14,00-14,49	15,875	13,700	115,000	45,000	46,200	86843 3.000	**14,005**
145	14,50-14,99	16,000	14,200	120,000	48,000	47,800	86843 3.000	**14,500**
145	14,50-14,99	15,875	14,200	120,000	48,000	47,800	86843 3.000	**14,505**
150	15,00-15,49	16,000	14,700	123,000	48,000	49,300	86843 3.001	**15,000**
150	15,00-15,49	15,875	14,700	123,000	48,000	49,300	86843 3.001	**15,005**
155	15,50-15,99	16,000	15,200	125,000	48,000	50,900	86843 3.001	**15,500**
155	15,50-15,99	15,875	15,200	125,000	48,000	50,900	86843 3.001	**15,505**
160	16,00-16,49	16,000	15,700	127,000	48,000	52,900	86843 3.500	**16,000**
160	16,00-16,49	15,875	15,700	127,000	48,000	52,900	86843 3.500	**16,005**
165	16,50-16,99	18,000	16,200	130,000	48,000	54,100	86843 3.500	**16,500**
165	16,50-16,99	19,050	16,200	130,000	48,000	54,100	86843 3.500	**16,505**
170	17,00-17,49	18,000	16,700	132,000	48,000	55,800	86843 3.500	**17,000**
170	17,00-17,49	19,050	16,700	132,000	48,000	55,800	86843 3.500	**17,005**
175	17,50-17,99	18,000	17,200	134,000	48,000	57,400	86843 3.500	**17,500**
175	17,50-17,99	19,050	17,200	134,000	48,000	57,400	86843 3.500	**17,505**
180	18,00-18,49	18,000	17,700	137,000	48,000	58,900	86843 4.000	**18,000**
180	18,00-18,49	19,050	17,700	137,000	48,000	58,900	86843 4.000	**18,005**
185	18,50-18,99	20,000	18,200	141,000	50,000	60,500	86843 4.000	**18,500**
185	18,50-18,99	19,050	18,200	141,000	50,000	60,500	86843 4.000	**18,505**
190	19,00-19,49	20,000	18,700	143,000	50,000	62,100	86843 4.000	**19,000**
190	19,00-19,49	19,050	18,700	143,000	50,000	62,100	86843 4.000	**19,005**
195	19,50-19,99	20,000	19,200	146,000	50,000	63,700	86843 4.000	**19,500**
195	19,50-19,99	19,050	19,200	146,000	50,000	63,700	86843 4.000	**19,505**
200	20,00-20,49	20,000	19,700	148,000	50,000	65,300	86843 4.500	**20,000**
200	20,00-20,49	19,050	19,700	148,000	50,000	65,300	86843 4.500	**20,005**
205	20,50-20,99	25,000	20,200	159,000	56,000	67,000	86843 4.500	**20,500**
205	20,50-20,99	25,400	20,200	159,000	56,000	67,000	86843 4.500	**20,505**
210	21,00-21,49	25,000	20,700	161,000	56,000	68,600	86843 4.500	**21,000**
210	21,00-21,49	25,400	20,700	161,000	56,000	68,600	86843 4.500	**21,005**

Porte-outils Multiplex HPC

Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
215	21,50-21,99	25,000	21,200	163,000	56,000	70,100	86843 4.500	**21,500**
215	21,50-21,99	25,400	21,200	163,000	56,000	70,100	86843 4.500	**21,505**
220	22,00-22,49	25,000	21,700	165,000	56,000	71,700	86843 5.000	**22,000**
220	22,00-22,49	25,400	21,700	165,000	56,000	71,700	86843 5.000	**22,005**
225	22,50-22,99	25,000	22,200	168,000	56,000	73,300	86843 5.000	**22,500**
225	22,50-22,99	25,400	22,200	168,000	56,000	73,300	86843 5.000	**22,505**
230	23,00-23,49	25,000	22,700	170,000	56,000	74,900	86843 5.000	**23,000**
230	23,00-23,49	25,400	22,700	170,000	56,000	74,900	86843 5.000	**23,005**
235	23,50-23,99	25,000	23,200	173,000	56,000	76,500	86843 5.000	**23,500**
235	23,50-23,99	25,400	23,200	173,000	56,000	76,500	86843 5.000	**23,505**
240	24,00-24,49	25,000	23,700	175,000	56,000	78,100	86843 5.001	**24,000**
240	24,00-24,49	25,400	23,700	175,000	56,000	78,100	86843 5.001	**24,005**
245	24,50-24,99	25,000	24,200	177,000	56,000	79,700	86843 5.001	**24,500**
245	24,50-24,99	25,400	24,200	177,000	56,000	79,700	86843 5.001	**24,505**
250	25,00-25,49	25,000	24,700	180,000	56,000	81,300	86843 5.001	**25,000**
250	25,00-25,49	25,400	24,700	180,000	56,000	81,300	86843 5.001	**25,005**
255	25,50-25,99	32,000	25,200	187,000	60,000	82,900	86843 5.001	**25,500**
255	25,50-25,99	31,750	25,200	187,000	60,000	82,900	86843 5.001	**25,505**
260	26,00-26,49	32,000	25,700	191,000	60,000	84,000	86843 5.003	**26,000**
260	26,00-26,49	31,750	25,700	191,000	60,000	84,000	86843 5.003	**26,005**
265	26,50-26,99	32,000	26,200	193,000	60,000	86,100	86843 5.003	**26,500**
265	26,50-26,99	31,750	26,200	193,000	60,000	86,100	86843 5.003	**26,505**
270	27,00-27,49	32,000	26,700	196,000	60,000	87,200	86843 5.003	**27,000**
270	27,00-27,49	31,750	26,700	196,000	60,000	87,200	86843 5.003	**27,005**
275	27,50-27,99	32,000	27,200	198,000	60,000	88,900	86843 5.003	**27,500**
275	27,50-27,99	31,750	27,200	198,000	60,000	88,900	86843 5.003	**27,505**
280	28,00-28,49	32,000	27,700	200,000	60,000	90,400	86843 5.003	**28,000**
280	28,00-28,49	31,750	27,700	200,000	60,000	90,400	86843 5.003	**28,005**
285	28,50-28,99	32,000	28,200	202,000	60,000	92,500	86843 5.003	**28,500**
285	28,50-28,99	31,750	28,200	202,000	60,000	92,500	86843 5.003	**28,505**
290	29,00-29,49	32,000	28,700	205,000	60,000	94,600	86843 5.003	**29,000**
290	29,00-29,49	31,750	28,700	205,000	60,000	94,600	86843 5.003	**29,005**
295	29,50-29,99	32,000	29,200	207,000	60,000	95,100	86843 5.003	**29,500**
295	29,50-29,99	31,750	29,200	207,000	60,000	95,100	86843 5.003	**29,505**
300	30,00-30,49	32,000	29,700	210,000	60,000	96,700	86843 6.000	**30,000**
300	30,00-30,49	31,750	29,700	210,000	60,000	96,700	86843 6.000	**30,005**
305	30,50-30,99	32,000	30,200	212,000	60,000	98,300	86843 6.000	**30,500**
305	30,50-30,99	31,750	30,200	212,000	60,000	98,300	86843 6.000	**30,505**
310	31,00-31,49	32,000	30,700	214,000	60,000	99,800	86843 6.000	**31,000**
310	31,00-31,49	31,750	30,700	214,000	60,000	99,800	86843 6.000	**31,005**
315	31,50-31,99	32,000	31,200	216,000	60,000	101,400	86843 6.000	**31,500**
315	31,50-31,99	31,750	31,200	216,000	60,000	101,400	86843 6.000	**31,505**
320	32,00-32,99	32,000	31,700	221,000	60,000	104,600	86843 6.001	**32,000**
320	32,00-32,99	31,750	31,700	221,000	60,000	104,600	86843 6.001	**32,005**
330	33,00-33,99	32,000	32,700	226,000	60,000	107,800	86843 6.001	**33,000**
330	33,00-33,99	31,750	32,700	226,000	60,000	107,800	86843 6.001	**33,005**
340	34,00-34,99	32,000	33,700	230,000	60,000	111,000	86843 6.001	**34,000**
340	34,00-34,99	31,750	33,700	230,000	60,000	111,000	86843 6.001	**34,005**
350	35,00-35,99	32,000	34,700	235,000	60,000	114,200	86843 6.001	**35,000**
350	35,00-35,99	31,750	34,700	235,000	60,000	114,200	86843 6.001	**35,005**
360	36,00-36,99	32,000	35,700	240,000	60,000	117,300	86843 6.002	**36,000**
360	36,00-36,99	31,750	35,700	240,000	60,000	117,300	86843 6.002	**36,005**
370	37,00-37,99	32,000	36,700	245,000	60,000	120,500	86843 6.002	**37,000**
370	37,00-37,99	31,750	36,700	245,000	60,000	120,500	86843 6.002	**37,005**
380	38,00-38,99	32,000	37,700	249,000	60,000	123,700	86843 6.002	**38,000**
380	38,00-38,99	31,750	37,700	249,000	60,000	123,700	86843 6.002	**38,005**
390	39,00-40,00	32,000	38,700	254,000	60,000	126,900	86843 6.002	**39,000**
390	39,00-40,00	31,750	38,700	254,000	60,000	126,900	86843 6.002	**39,005**

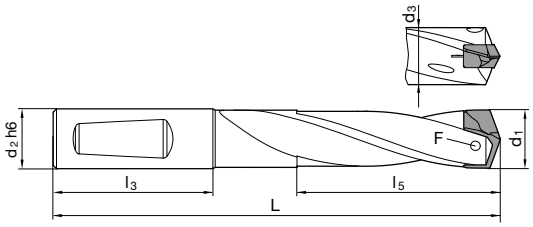
HARTNER

Porte-outils Multiplex HPC

N° d'article 86684

Ni | HPC | 5xD | WN | R | HE

résistance à l'usure particulièrement élevée • section des goujures optimisée • particulièrement rigide • vis de serrage n°86843 incluse • tournevis n°86842 incluse



Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
110	11,00-11,49	12,000	10,700	124,000	45,000	59,600	86843 2.200	**11,000**
110	11,00-11,49	12,700	10,700	124,000	45,000	59,600	86843 2.200	**11,005**
115	11,50-11,99	12,000	11,200	127,000	45,000	62,100	86843 2.200	**11,500**
115	11,50-11,99	12,700	11,200	127,000	45,000	62,100	86843 2.200	**11,505**
120	12,00-12,49	12,000	11,700	131,000	45,000	64,700	86843 2.201	**12,000**
120	12,00-12,49	12,700	11,700	131,000	45,000	64,700	86843 2.201	**12,005**
125	12,50-12,99	14,000	12,200	134,000	45,000	67,300	86843 2.201	**12,500**
125	12,50-12,99	15,875	12,200	134,000	45,000	67,300	86843 2.201	**12,505**
130	13,00-13,49	14,000	12,700	137,000	45,000	69,900	86843 2.500	**13,000**
130	13,00-13,49	15,875	12,700	137,000	45,000	69,900	86843 2.500	**13,005**
135	13,50-13,99	14,000	13,200	141,000	45,000	72,600	86843 2.500	**13,500**
135	13,50-13,99	15,875	13,200	141,000	45,000	72,600	86843 2.500	**13,505**
140	14,00-14,49	14,000	13,700	144,000	45,000	75,200	86843 3.000	**14,000**
140	14,00-14,49	15,875	13,700	144,000	45,000	75,200	86843 3.000	**14,005**
145	14,50-14,99	16,000	14,200	150,000	48,000	77,800	86843 3.000	**14,500**
145	14,50-14,99	15,875	14,200	150,000	48,000	77,800	86843 3.000	**14,505**
150	15,00-15,49	16,000	14,700	154,000	48,000	80,300	86843 3.001	**15,000**
150	15,00-15,49	15,875	14,700	154,000	48,000	80,300	86843 3.001	**15,005**
155	15,50-15,99	16,000	15,200	157,000	48,000	82,900	86843 3.001	**15,500**
155	15,50-15,99	15,875	15,200	157,000	48,000	82,900	86843 3.001	**15,505**
160	16,00-16,49	16,000	15,700	160,000	48,000	85,900	86843 3.500	**16,000**
160	16,00-16,49	15,875	15,700	160,000	48,000	85,900	86843 3.500	**16,005**
165	16,50-16,99	18,000	16,200	164,000	48,000	88,100	86843 3.500	**16,500**
165	16,50-16,99	19,050	16,200	164,000	48,000	88,100	86843 3.500	**16,505**
170	17,00-17,49	18,000	16,700	167,000	48,000	90,800	86843 3.500	**17,000**
170	17,00-17,49	19,050	16,700	167,000	48,000	90,800	86843 3.500	**17,005**
175	17,50-17,99	18,000	17,200	170,000	48,000	93,400	86843 3.500	**17,500**
175	17,50-17,99	19,050	17,200	170,000	48,000	93,400	86843 3.500	**17,505**
180	18,00-18,49	18,000	17,700	174,000	48,000	95,900	86843 4.000	**18,000**
180	18,00-18,49	19,050	17,700	174,000	48,000	95,900	86843 4.000	**18,005**
185	18,50-18,99	20,000	18,200	179,000	50,000	98,500	86843 4.000	**18,500**
185	18,50-18,99	19,050	18,200	179,000	50,000	98,500	86843 4.000	**18,505**
190	19,00-19,49	20,000	18,700	182,000	50,000	101,100	86843 4.000	**19,000**
190	19,00-19,49	19,050	18,700	182,000	50,000	101,100	86843 4.000	**19,005**
195	19,50-19,99	20,000	19,200	186,000	50,000	103,700	86843 4.000	**19,500**
195	19,50-19,99	19,050	19,200	186,000	50,000	103,700	86843 4.000	**19,505**
200	20,00-20,49	20,000	19,700	189,000	50,000	106,300	86843 4.500	**20,000**
200	20,00-20,49	19,050	19,700	189,000	50,000	106,300	86843 4.500	**20,005**
205	20,50-20,99	25,000	20,200	201,000	56,000	109,000	86843 4.500	**20,500**
205	20,50-20,99	25,400	20,200	201,000	56,000	109,000	86843 4.500	**20,505**
210	21,00-21,49	25,000	20,700	204,000	56,000	111,600	86843 4.500	**21,000**
210	21,00-21,49	25,400	20,700	204,000	56,000	111,600	86843 4.500	**21,005**

Porte-outils Multiplex HPC

Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
215	21,50-21,99	25,000	21,200	207,000	56,000	114,100	86843 4.500	**21,500**
215	21,50-21,99	25,400	21,200	207,000	56,000	114,100	86843 4.500	**21,505**
220	22,00-22,49	25,000	21,700	210,000	56,000	116,700	86843 5.000	**22,000**
220	22,00-22,49	25,400	21,700	210,000	56,000	116,700	86843 5.000	**22,005**
225	22,50-22,99	25,000	22,200	214,000	56,000	119,300	86843 5.000	**22,500**
225	22,50-22,99	25,400	22,200	214,000	56,000	119,300	86843 5.000	**22,505**
230	23,00-23,49	25,000	22,700	217,000	56,000	121,900	86843 5.000	**23,000**
230	23,00-23,49	25,400	22,700	217,000	56,000	121,900	86843 5.000	**23,005**
235	23,50-23,99	25,000	23,200	221,000	56,000	124,500	86843 5.000	**23,500**
235	23,50-23,99	25,400	23,200	221,000	56,000	124,500	86843 5.000	**23,505**
240	24,00-24,49	25,000	23,700	224,000	56,000	127,100	86843 5.001	**24,000**
240	24,00-24,49	25,400	23,700	224,000	56,000	127,100	86843 5.001	**24,005**
245	24,50-24,99	25,000	24,200	227,000	56,000	129,700	86843 5.001	**24,500**
245	24,50-24,99	25,400	24,200	227,000	56,000	129,700	86843 5.001	**24,505**
250	25,00-25,49	25,000	24,700	231,000	56,000	132,300	86843 5.001	**25,000**
250	25,00-25,49	25,400	24,700	231,000	56,000	132,300	86843 5.001	**25,005**
255	25,50-25,99	32,000	25,200	239,000	60,000	134,900	86843 5.001	**25,500**
255	25,50-25,99	31,750	25,200	239,000	60,000	134,900	86843 5.001	**25,505**
260	26,00-26,49	32,000	25,700	244,000	60,000	137,000	86843 5.003	**26,000**
265	26,50-26,99	32,000	26,200	247,000	60,000	140,000	86843 5.003	**26,500**
270	27,00-27,49	32,000	26,700	251,000	60,000	142,200	86843 5.003	**27,000**
275	27,50-27,99	32,000	27,200	254,000	60,000	144,800	86843 5.003	**27,500**
280	28,00-28,49	32,000	27,700	257,000	60,000	147,400	86843 5.003	**28,000**
285	28,50-28,99	32,000	28,200	260,000	60,000	150,400	86843 5.003	**28,500**
290	29,00-29,49	32,000	28,700	264,000	60,000	153,500	86843 5.003	**29,000**
295	29,50-29,99	32,000	29,200	267,000	60,000	155,100	86843 5.003	**29,500**
300	30,00-30,49	32,000	29,700	271,000	60,000	157,600	86843 6.000	**30,000**
305	30,50-30,99	32,000	30,200	274,000	60,000	160,200	86843 6.000	**30,500**
310	31,00-31,49	32,000	30,700	277,000	60,000	162,800	86843 6.000	**31,000**
315	31,50-31,99	32,000	31,200	280,000	60,000	165,400	86843 6.000	**31,500**
320	32,00-32,99	32,000	31,700	287,000	60,000	170,600	86843 6.001	**32,000**
330	33,00-33,99	32,000	32,700	294,000	60,000	175,800	86843 6.001	**33,000**
340	34,00-34,99	32,000	33,700	300,000	60,000	181,000	86843 6.001	**34,000**
350	35,00-35,99	32,000	34,700	307,000	60,000	186,200	86843 6.001	**35,000**
360	36,00-36,99	32,000	35,700	314,000	60,000	191,300	86843 6.002	**36,000**
370	37,00-37,99	32,000	36,700	321,000	60,000	196,500	86843 6.002	**37,000**
380	38,00-38,99	32,000	37,700	327,000	60,000	201,700	86843 6.002	**38,000**
390	39,00-40,00	32,000	38,700	334,000	60,000	206,900	86843 6.002	**39,000**

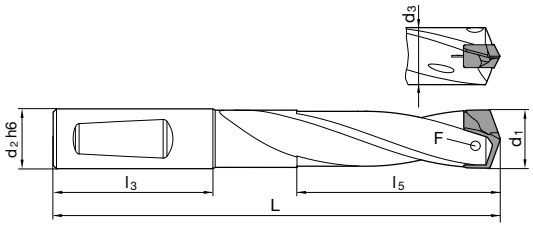
HARTNER

Porte-outils Multiplex HPC

N° d'article 86685

Ni | HPC | 7xD | WN | R | HE

résistance à l'usure particulièrement élevée • section des goujures optimisée • particulièrement rigide • vis de serrage n°86843 incluse • tournevis n°86842 incluse



Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
110	11,00-11,49	12,000	10,700	147,000	45,000	82,600	86843 2.200	**11,000**
110	11,00-11,49	12,700	10,700	147,000	45,000	82,600	86843 2.200	**11,005**
115	11,50-11,99	12,000	11,200	151,000	45,000	86,100	86843 2.200	**11,500**
115	11,50-11,99	12,700	11,200	151,000	45,000	86,100	86843 2.200	**11,505**
120	12,00-12,49	12,000	11,700	156,000	45,000	89,700	86843 2.201	**12,000**
120	12,00-12,49	12,700	11,700	156,000	45,000	89,700	86843 2.201	**12,005**
125	12,50-12,99	14,000	12,200	160,000	45,000	93,300	86843 2.201	**12,500**
125	12,50-12,99	15,875	12,200	160,000	45,000	93,300	86843 2.201	**12,505**
130	13,00-13,49	14,000	12,700	164,000	45,000	96,900	86843 2.500	**13,000**
130	13,00-13,49	15,875	12,700	164,000	45,000	96,900	86843 2.500	**13,005**
135	13,50-13,99	14,000	13,200	169,000	45,000	100,600	86843 2.500	**13,500**
135	13,50-13,99	15,875	13,200	169,000	45,000	100,600	86843 2.500	**13,505**
140	14,00-14,49	14,000	13,700	173,000	45,000	104,200	86843 3.000	**14,000**
140	14,00-14,49	15,875	13,700	173,000	45,000	104,200	86843 3.000	**14,005**
145	14,50-14,99	16,000	14,200	180,000	48,000	107,800	86843 3.000	**14,500**
145	14,50-14,99	15,875	14,200	180,000	48,000	107,800	86843 3.000	**14,505**
150	15,00-15,49	16,000	14,700	185,000	48,000	111,300	86843 3.001	**15,000**
150	15,00-15,49	15,875	14,700	185,000	48,000	111,300	86843 3.001	**15,005**
155	15,50-15,99	16,000	15,200	189,000	48,000	114,900	86843 3.001	**15,500**
155	15,50-15,99	15,875	15,200	189,000	48,000	114,900	86843 3.001	**15,505**
160	16,00-16,49	16,000	15,700	193,000	48,000	118,900	86843 3.500	**16,000**
160	16,00-16,49	15,875	15,700	193,000	48,000	118,900	86843 3.500	**16,005**
165	16,50-16,99	18,000	16,200	198,000	48,000	122,100	86843 3.500	**16,500**
165	16,50-16,99	19,050	16,200	198,000	48,000	122,100	86843 3.500	**16,505**
170	17,00-17,49	18,000	16,700	202,000	48,000	125,800	86843 3.500	**17,000**
170	17,00-17,49	19,050	16,700	202,000	48,000	125,800	86843 3.500	**17,005**
175	17,50-17,99	18,000	17,200	206,000	48,000	129,400	86843 3.500	**17,500**
175	17,50-17,99	19,050	17,200	206,000	48,000	129,400	86843 3.500	**17,505**
180	18,00-18,49	18,000	17,700	211,000	48,000	132,900	86843 4.000	**18,000**
180	18,00-18,49	19,050	17,700	211,000	48,000	132,900	86843 4.000	**18,005**
185	18,50-18,99	20,000	18,200	217,000	50,000	136,500	86843 4.000	**18,500**
185	18,50-18,99	19,050	18,200	217,000	50,000	136,500	86843 4.000	**18,505**
190	19,00-19,49	20,000	18,700	221,000	50,000	140,100	86843 4.000	**19,000**
190	19,00-19,49	19,050	18,700	221,000	50,000	140,100	86843 4.000	**19,005**
195	19,50-19,99	20,000	19,200	226,000	50,000	143,700	86843 4.000	**19,500**
195	19,50-19,99	19,050	19,200	226,000	50,000	143,700	86843 4.000	**19,505**
200	20,00-20,49	20,000	19,700	230,000	50,000	147,300	86843 4.500	**20,000**
200	20,00-20,49	19,050	19,700	230,000	50,000	147,300	86843 4.500	**20,005**
205	20,50-20,99	25,000	20,200	243,000	56,000	151,000	86843 4.500	**20,500**
205	20,50-20,99	25,400	20,200	243,000	56,000	151,000	86843 4.500	**20,505**
210	21,00-21,49	25,000	20,700	247,000	56,000	154,600	86843 4.500	**21,000**
210	21,00-21,49	25,400	20,700	247,000	56,000	154,600	86843 4.500	**21,005**

Porte-outils Multiplex HPC

Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
215	21,50-21,99	25,000	21,200	251,000	56,000	158,100	86843 4.500	**21,500**
215	21,50-21,99	25,400	21,200	251,000	56,000	158,100	86843 4.500	**21,505**
220	22,00-22,49	25,000	21,700	255,000	56,000	161,700	86843 5.000	**22,000**
220	22,00-22,49	25,400	21,700	255,000	56,000	161,700	86843 5.000	**22,005**
225	22,50-22,99	25,000	22,200	260,000	56,000	165,300	86843 5.000	**22,500**
225	22,50-22,99	25,400	22,200	260,000	56,000	165,300	86843 5.000	**22,505**
230	23,00-23,49	25,000	22,700	264,000	56,000	168,900	86843 5.000	**23,000**
230	23,00-23,49	25,400	22,700	264,000	56,000	168,900	86843 5.000	**23,005**
235	23,50-23,99	25,000	23,200	269,000	56,000	172,500	86843 5.000	**23,500**
235	23,50-23,99	25,400	23,200	269,000	56,000	172,500	86843 5.000	**23,505**
240	24,00-24,49	25,000	23,700	273,000	56,000	176,100	86843 5.001	**24,000**
240	24,00-24,49	25,400	23,700	273,000	56,000	176,100	86843 5.001	**24,005**
245	24,50-24,99	25,000	24,200	277,000	56,000	179,700	86843 5.001	**24,500**
245	24,50-24,99	25,400	24,200	277,000	56,000	179,700	86843 5.001	**24,505**
250	25,00-25,49	25,000	24,700	282,000	56,000	183,300	86843 5.001	**25,000**
250	25,00-25,49	25,400	24,700	282,000	56,000	183,300	86843 5.001	**25,005**
255	25,50-25,99	32,000	25,200	291,000	60,000	186,900	86843 5.001	**25,500**
255	25,50-25,99	31,750	25,200	291,000	60,000	186,900	86843 5.001	**25,505**
260	26,00-26,49	32,000	25,700	297,000	60,000	190,000	86843 5.003	**26,000**
260	26,00-26,49	31,750	25,700	297,000	60,000	190,000	86843 5.003	**26,005**
265	26,50-26,99	32,000	26,200	301,000	60,000	194,000	86843 5.003	**26,500**
265	26,50-26,99	31,750	26,200	301,000	60,000	194,000	86843 5.003	**26,505**
270	27,00-27,49	32,000	26,700	306,000	60,000	197,200	86843 5.003	**27,000**
270	27,00-27,49	31,750	26,700	306,000	60,000	197,200	86843 5.003	**27,005**
275	27,50-27,99	32,000	27,200	310,000	60,000	200,800	86843 5.003	**27,500**
275	27,50-27,99	31,750	27,200	310,000	60,000	200,800	86843 5.003	**27,505**
280	28,00-28,49	32,000	27,700	314,000	60,000	204,400	86843 5.003	**28,000**
280	28,00-28,49	31,750	27,700	314,000	60,000	204,400	86843 5.003	**28,005**
285	28,50-28,99	32,000	28,200	318,000	60,000	208,400	86843 5.003	**28,500**
285	28,50-28,99	31,750	28,200	318,000	60,000	208,400	86843 5.003	**28,505**
290	29,00-29,49	32,000	28,700	323,000	60,000	212,500	86843 5.003	**29,000**
290	29,00-29,49	31,750	28,700	323,000	60,000	212,500	86843 5.003	**29,005**
295	29,50-29,99	32,000	29,200	327,000	60,000	215,100	86843 5.003	**29,500**
295	29,50-29,99	31,750	29,200	327,000	60,000	215,100	86843 5.003	**29,505**
300	30,00-30,49	32,000	29,700	332,000	60,000	218,600	86843 6.000	**30,000**
300	30,00-30,49	31,750	29,700	332,000	60,000	218,600	86843 6.000	**30,005**
305	30,50-30,99	32,000	30,200	336,000	60,000	222,200	86843 6.000	**30,500**
305	30,50-30,99	31,750	30,200	336,000	60,000	222,200	86843 6.000	**30,505**
310	31,00-31,49	32,000	30,700	340,000	60,000	225,800	86843 6.000	**31,000**
310	31,00-31,49	31,750	30,700	340,000	60,000	225,800	86843 6.000	**31,005**
315	31,50-31,99	32,000	31,200	344,000	60,000	229,400	86843 6.000	**31,500**
315	31,50-31,99	31,750	31,200	344,000	60,000	229,400	86843 6.000	**31,505**

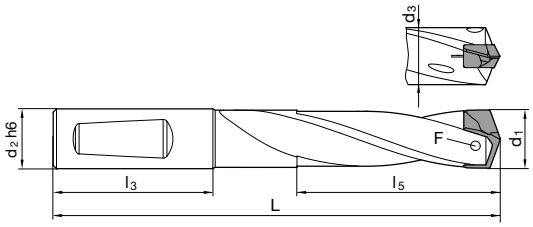
HARTNER

Porte-outils Multiplex HPC

N° d'article 86686

Ni | HPC | 10xD | WN | R | HE

résistance à l'usure particulièrement élevée • section des goujures optimisée • particulièrement rigide • vis de serrage n°86843 incluse • tournevis n°86842 incluse



Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
110	11,00-11,49	12,000	10,700	182,000	45,000	117,100	86843 2.200	**11,000**
110	11,00-11,49	12,700	10,700	182,000	45,000	117,100	86843 2.200	**11,005**
115	11,50-11,99	12,000	11,200	187,000	45,000	122,100	86843 2.200	**11,500**
115	11,50-11,99	12,700	11,200	187,000	45,000	122,100	86843 2.200	**11,505**
120	12,00-12,49	12,000	11,700	194,000	45,000	127,200	86843 2.201	**12,000**
120	12,00-12,49	12,700	11,700	194,000	45,000	127,200	86843 2.201	**12,005**
125	12,50-12,99	14,000	12,200	199,000	45,000	132,300	86843 2.201	**12,500**
125	12,50-12,99	15,875	12,200	199,000	45,000	132,300	86843 2.201	**12,505**
130	13,00-13,49	14,000	12,700	205,000	45,000	137,500	86843 2.500	**13,000**
130	13,00-13,49	15,875	12,700	205,000	45,000	137,500	86843 2.500	**13,005**
135	13,50-13,99	14,000	13,200	211,000	45,000	142,500	86843 2.500	**13,500**
135	13,50-13,99	15,875	13,200	211,000	45,000	142,500	86843 2.500	**13,505**
140	14,00-14,49	14,000	13,700	217,000	45,000	147,700	86843 3.000	**14,000**
140	14,00-14,49	15,875	13,700	217,000	45,000	147,700	86843 3.000	**14,005**
145	14,50-14,99	16,000	14,200	225,000	48,000	152,800	86843 3.000	**14,500**
145	14,50-14,99	15,875	14,200	225,000	48,000	152,800	86843 3.000	**14,505**
150	15,00-15,49	16,000	14,700	232,000	48,000	157,800	86843 3.001	**15,000**
150	15,00-15,49	15,875	14,700	232,000	48,000	157,800	86843 3.001	**15,005**
155	15,50-15,99	16,000	15,200	237,000	48,000	162,900	86843 3.001	**15,500**
155	15,50-15,99	15,875	15,200	237,000	48,000	162,900	86843 3.001	**15,505**
160	16,00-16,49	16,000	15,700	243,000	48,000	168,000	86843 3.500	**16,000**
160	16,00-16,49	15,875	15,700	243,000	48,000	168,000	86843 3.500	**16,005**
165	16,50-16,99	18,000	16,200	249,000	48,000	170,000	86843 3.500	**16,500**
165	16,50-16,99	19,050	16,200	249,000	48,000	170,000	86843 3.500	**16,505**
170	17,00-17,49	18,000	16,700	255,000	48,000	178,300	86843 3.500	**17,000**
170	17,00-17,49	19,050	16,700	255,000	48,000	178,300	86843 3.500	**17,005**
175	17,50-17,99	18,000	17,200	260,000	48,000	183,500	86843 3.500	**17,500**
175	17,50-17,99	19,050	17,200	260,000	48,000	183,500	86843 3.500	**17,505**
180	18,00-18,49	18,000	17,700	267,000	48,000	188,400	86843 4.000	**18,000**
180	18,00-18,49	19,050	17,700	267,000	48,000	188,400	86843 4.000	**18,005**
185	18,50-18,99	20,000	18,200	274,000	50,000	193,500	86843 4.000	**18,500**
185	18,50-18,99	19,050	18,200	274,000	50,000	193,500	86843 4.000	**18,505**
190	19,00-19,49	20,000	18,700	280,000	50,000	198,700	86843 4.000	**19,000**
190	19,00-19,49	19,050	18,700	280,000	50,000	198,700	86843 4.000	**19,005**
195	19,50-19,99	20,000	19,200	286,000	50,000	203,700	86843 4.000	**19,500**
195	19,50-19,99	19,050	19,200	286,000	50,000	203,700	86843 4.000	**19,505**
200	20,00-20,49	20,000	19,700	292,000	50,000	208,900	86843 4.500	**20,000**
200	20,00-20,49	19,050	19,700	292,000	50,000	208,900	86843 4.500	**20,005**
205	20,50-20,99	25,000	20,200	306,000	56,000	214,000	86843 4.500	**20,500**
205	20,50-20,99	25,400	20,200	306,000	56,000	214,000	86843 4.500	**20,505**
210	21,00-21,49	25,000	20,700	312,000	56,000	219,100	86843 4.500	**21,000**
210	21,00-21,49	25,400	20,700	312,000	56,000	219,100	86843 4.500	**21,005**

Porte-outils Multiplex HPC

Taille mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	N° de code
215	21,50-21,99	25,000	21,200	317,000	56,000	224,200	86843 4.500	**21,500**
215	21,50-21,99	25,400	21,200	317,000	56,000	224,200	86843 4.500	**21,505**
220	22,00-22,49	25,000	21,700	323,000	56,000	229,300	86843 5.000	**22,000**
220	22,00-22,49	25,400	21,700	323,000	56,000	229,300	86843 5.000	**22,005**
225	22,50-22,99	25,000	22,200	329,000	56,000	234,400	86843 5.000	**22,500**
225	22,50-22,99	25,400	22,200	329,000	56,000	234,400	86843 5.000	**22,505**
230	23,00-23,49	25,000	22,700	335,000	56,000	239,500	86843 5.000	**23,000**
230	23,00-23,49	25,400	22,700	335,000	56,000	239,500	86843 5.000	**23,005**
235	23,50-23,99	25,000	23,200	341,000	56,000	244,600	86843 5.000	**23,500**
235	23,50-23,99	25,400	23,200	341,000	56,000	244,600	86843 5.000	**23,505**
240	24,00-24,49	25,000	23,700	347,000	56,000	249,700	86843 5.001	**24,000**
240	24,00-24,49	25,400	23,700	347,000	56,000	249,700	86843 5.001	**24,005**
245	24,50-24,99	25,000	24,200	352,000	56,000	254,800	86843 5.001	**24,500**
245	24,50-24,99	25,400	24,200	352,000	56,000	254,800	86843 5.001	**24,505**
250	25,00-25,49	25,000	24,700	359,000	56,000	259,900	86843 5.001	**25,000**
250	25,00-25,49	25,400	24,700	359,000	56,000	259,900	86843 5.001	**25,005**
255	25,50-25,99	32,000	25,200	369,000	60,000	265,000	86843 5.001	**25,500**
255	25,50-25,99	31,750	25,200	369,000	60,000	265,000	86843 5.001	**25,505**
260	26,00-26,49	32,000	25,700	377,000	60,000	270,000	86843 5.003	**26,000**
260	26,00-26,49	31,750	25,700	377,000	60,000	270,000	86843 5.003	**26,005**
265	26,50-26,99	32,000	26,200	382,000	60,000	275,000	86843 5.003	**26,500**
265	26,50-26,99	31,750	26,200	382,000	60,000	275,000	86843 5.003	**26,505**
270	27,00-27,49	32,000	26,700	388,000	60,000	280,100	86843 5.003	**27,000**
270	27,00-27,49	31,750	26,700	388,000	60,000	280,100	86843 5.003	**27,005**
275	27,50-27,99	32,000	27,200	394,000	60,000	285,200	86843 5.003	**27,500**
275	27,50-27,99	31,750	27,200	394,000	60,000	285,200	86843 5.003	**27,505**
280	28,00-28,49	32,000	27,700	400,000	60,000	290,300	86843 5.003	**28,000**
280	28,00-28,49	31,750	27,700	400,000	60,000	290,300	86843 5.003	**28,005**
285	28,50-28,99	32,000	28,200	405,000	60,000	295,400	86843 5.003	**28,500**
285	28,50-28,99	31,750	28,200	405,000	60,000	295,400	86843 5.003	**28,505**
290	29,00-29,49	32,000	28,700	412,000	60,000	300,500	86843 5.003	**29,000**
290	29,00-29,49	31,750	28,700	412,000	60,000	300,500	86843 5.003	**29,005**
295	29,50-29,99	32,000	29,200	418,000	60,000	305,600	86843 5.003	**29,500**
295	29,50-29,99	31,750	29,200	418,000	60,000	305,600	86843 5.003	**29,505**
300	30,00-30,49	32,000	29,700	424,000	60,000	310,600	86843 6.000	**30,000**
300	30,00-30,49	31,750	29,700	424,000	60,000	310,600	86843 6.000	**30,005**
305	30,50-30,99	32,000	30,200	429,000	60,000	315,700	86843 6.000	**30,500**
305	30,50-30,99	31,750	30,200	429,000	60,000	315,700	86843 6.000	**30,505**
310	31,00-31,49	32,000	30,700	435,000	60,000	320,800	86843 6.000	**31,000**
310	31,00-31,49	31,750	30,700	435,000	60,000	320,800	86843 6.000	**31,005**
315	31,50-31,99	32,000	31,200	441,000	60,000	325,900	86843 6.000	**31,500**
315	31,50-31,99	31,750	31,200	441,000	60,000	325,900	86843 6.000	**31,505**

Plaquettes interchangeables Multiplex HPC

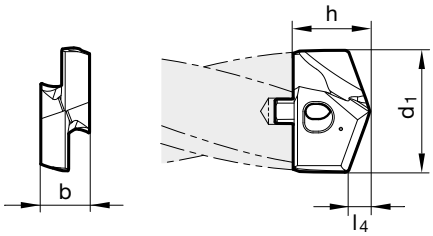
N° d'article 86721

P	M	K	N	S	H
○	○	○	○	○	○

VHM | a | HPC | WN | 145° | m7 | R

amin. de l'âme ≥ Ø 11,000 • affûtage en pente • forme de l´arête de coupe principale, rectiligne, (obtenue par correction) • vis de serrage n°86843 incluse

pilote de guidage dans tous les matériaux



Taille	d1 mm	inch	l4 mm	b mm	h mm	N° de code
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**

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	 inch	l4 mm	b mm	h mm	N° de code
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**

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	 inch	l4 mm	b mm	h mm	N° de code
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**

HARTNER

Plaquettes interchangeables Multiplex HPC

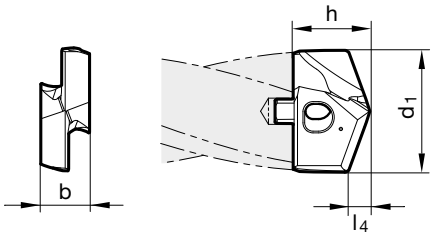
N° d'article 86722

P	M	K	N	S	H
●	○	○			

VHM | F | HPC | WN | 140° | h7 | R

amin. de l'âme ≥ Ø 11,000 • affûtage en pente • forme de l´arête de coupe principale, rectiligne, (obtenue par correction) • vis de serrage n°86843 incluse

aciers de construction et de cémentation • aciers de décolletage, aciers d'amélioration • aciers alliés jusqu'à 1200 N/mm²



Taille	d1 mm	inch	l4 mm	b mm	h mm	N° de code
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**

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	 inch	l4 mm	b mm	h mm	N° de code
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**
185	18,900		3,500	8,000	12,600	**18,900**
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**

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	 inch	l4 mm	b mm	h mm	N° de code
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**
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**

Plaquettes interchangeables Multiplex HPC

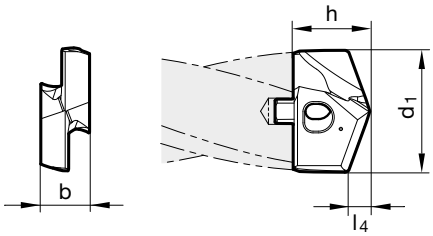
N° d'article 86723

P	M	K	N	S	H
○		●			

VHM | HPC | WN | 140° | m7 | R

amin. de l'âme ≥ Ø 11,000 • affûtage en pente • forme de l´arête de coupe principale, rectiligne, (obtenue par correction) • vis de serrage n°86843 incluse

fontes vermiculaires GGV • fontes grises, fontes malléables, fontes à graphite sphéroïdal



Taille	d1 mm	inch	l4 mm	b mm	h mm	N° de code
110	11,000		2,600	4,500	7,500	**11,000**
110	11,200		2,600	4,500	7,500	**11,200**
115	11,500		2,700	4,500	7,500	**11,500**
115	11,510	29/64	2,700	4,500	7,500	**11,510**
115	11,700		2,700	4,500	7,500	**11,700**
115	11,800		2,700	4,500	7,500	**11,800**
115	11,910	15/32	2,700	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		3,000	5,000	7,700	**12,500**
125	12,600		3,000	5,000	7,700	**12,600**
125	12,700	1/2	3,000	5,000	7,700	**12,700**
125	12,800		3,000	5,000	7,700	**12,800**
125	12,900		3,000	5,000	7,700	**12,900**
130	13,000		3,100	5,500	8,500	**13,000**
130	13,100	33/64	3,100	5,500	8,500	**13,100**
130	13,490	17/32	3,100	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		3,500	6,000	9,600	**14,500**
145	14,600		3,500	6,000	9,600	**14,600**
145	14,680	37/64	3,500	6,000	9,600	**14,680**
145	14,700		3,500	6,000	9,600	**14,700**
145	14,800		3,500	6,000	9,600	**14,800**
150	15,000		3,600	6,000	9,800	**15,000**
150	15,080	19/32	3,600	6,000	9,800	**15,080**
150	15,100		3,600	6,000	9,800	**15,100**
150	15,200		3,600	6,000	9,800	**15,200**
150	15,300		3,600	6,000	9,800	**15,300**
150	15,480	39/64	3,600	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**

HARTNER

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	 inch	l4 mm	b mm	h mm	N° de code
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		3,800	7,000	11,000	**16,000**
160	16,270	41/64	3,800	7,000	11,000	**16,270**
165	16,500		4,000	7,000	11,000	**16,500**
165	16,670	21/32	4,000	7,000	11,000	**16,670**
170	17,000		4,100	7,000	11,000	**17,000**
170	17,070	43/64	4,100	7,000	11,000	**17,070**
170	17,460	11/16	4,100	7,000	11,000	**17,460**
175	17,500		4,200	7,000	11,000	**17,500**
175	17,600		4,200	7,000	11,000	**17,600**
175	17,860	45/64	4,200	7,000	11,000	**17,860**
180	18,000		4,300	8,000	12,600	**18,000**
180	18,260	23/32	4,300	8,000	12,600	**18,260**
185	18,500		4,400	8,000	12,600	**18,500**
185	18,650	47/64	4,400	8,000	12,600	**18,650**
190	19,000		4,600	8,000	12,600	**19,000**
190	19,050	3/4	4,600	8,000	12,600	**19,050**
190	19,250		4,600	8,000	12,600	**19,250**
190	19,450	49/64	4,600	8,000	12,600	**19,450**
195	19,500		4,700	8,000	12,600	**19,500**
195	19,600		4,700	8,000	12,600	**19,600**
195	19,840	25/32	4,700	8,000	12,600	**19,840**
200	20,000		4,800	9,000	13,900	**20,000**
200	20,240	51/64	4,800	9,000	13,900	**20,240**
205	20,500		5,000	9,000	13,900	**20,500**
205	20,640	13/16	5,000	9,000	13,900	**20,640**
210	21,000		5,100	9,000	13,900	**21,000**
210	21,030	53/64	5,100	9,000	13,900	**21,030**
210	21,100		5,100	9,000	13,900	**21,100**
210	21,430	27/32	5,100	9,000	13,900	**21,430**
215	21,500		5,200	9,000	13,900	**21,500**
215	21,830	55/64	5,200	9,000	13,900	**21,830**
220	22,000		5,300	10,000	15,300	**22,000**
220	22,220	7/8	5,300	10,000	15,300	**22,220**
225	22,500		5,400	10,000	15,300	**22,500**
225	22,620	57/64	5,400	10,000	15,300	**22,620**
230	23,000		5,600	10,000	15,300	**23,000**
230	23,020	29/32	5,600	10,000	15,300	**23,020**
230	23,420	59/64	5,600	10,000	15,300	**23,420**
235	23,500		5,700	10,000	15,300	**23,500**
235	23,810	15/16	5,700	10,000	15,300	**23,810**
240	24,000		5,800	11,000	15,800	**24,000**
240	24,100		5,800	11,000	15,800	**24,100**
240	24,210	61/64	5,800	11,000	15,800	**24,210**
245	24,500		6,000	11,000	15,800	**24,500**
245	24,610	31/32	6,000	11,000	15,800	**24,610**
250	25,000	63/64	6,100	11,000	15,800	**25,000**
250	25,400	1	6,100	11,000	15,800	**25,400**
255	25,500		6,200	11,000	15,800	**25,500**
255	25,670		6,200	11,000	15,800	**25,670**
255	25,700		6,200	11,000	15,800	**25,700**
255	25,810		6,200	11,000	15,800	**25,810**
260	26,000		6,000	12,000	20,000	**26,000**
260	26,190	1 1/32	6,000	12,000	20,000	**26,190**
265	26,500		6,100	12,000	20,000	**26,500**
265	26,590	1 3/64	6,100	12,000	20,000	**26,590**
270	27,000		6,300	12,000	20,000	**27,000**
275	27,500		6,400	12,000	20,000	**27,500**
275	27,700		6,400	12,000	20,000	**27,700**
275	27,780	1 3/32	6,400	12,000	20,000	**27,780**
280	28,000		6,600	13,000	20,700	**28,000**
280	28,180	1 7/64	6,600	13,000	20,700	**28,180**
285	28,500		6,700	13,000	20,700	**28,500**
285	28,580		6,700	13,000	20,700	**28,580**
290	29,000		6,900	13,000	20,700	**29,000**
290	29,370	1 5/32	6,900	13,000	20,700	**29,370**
295	29,500		7,000	13,000	20,700	**29,500**
295	29,770	1 11/64	7,000	13,000	20,700	**29,770**
300	30,000		6,900	14,000	22,300	**30,000**
300	30,160	1 3/16	6,900	14,000	22,300	**30,160**
305	30,500		7,000	14,000	22,300	**30,500**

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	 inch	l4 mm	b mm	h mm	N° de code
305	30,960	1 7/32	7,000	14,000	22,300	**30,960**
310	31,000		7,200	14,000	22,300	**31,000**
315	31,500		7,300	14,000	22,300	**31,500**
315	31,750	1 1/4	7,300	14,000	22,300	**31,750**
320	32,000		7,500	15,000	23,100	**32,000**
320	32,500		7,600	15,000	23,100	**32,500**
320	32,540	1 9/32	7,600	15,000	23,100	**32,540**
320	32,940	1 19/64	7,600	15,000	23,100	**32,940**
330	33,000		7,800	15,000	23,100	**33,000**
330	33,340	1 5/16	7,800	15,000	23,100	**33,340**
330	33,500		7,900	15,000	23,100	**33,500**
340	34,000		8,100	15,000	23,100	**34,000**
340	34,130	1 11/32	8,100	15,000	23,100	**34,130**
340	34,500		8,200	15,000	23,100	**34,500**
340	34,930		8,200	15,000	23,100	**34,930**
350	35,000		8,300	15,000	23,100	**35,000**
350	35,500		8,400	15,000	23,100	**35,500**
350	35,720	1 13/32	8,400	15,000	23,100	**35,720**
360	36,000		8,500	16,000	23,900	**36,000**
360	36,500		8,600	16,000	23,900	**36,500**
360	36,510	1 7/16	8,600	16,000	23,900	**36,510**
370	37,000		8,800	16,000	23,900	**37,000**
370	37,310	1 15/32	8,800	16,000	23,900	**37,310**
370	37,500		8,900	16,000	23,900	**37,500**
380	38,000		9,000	16,000	23,900	**38,000**
380	38,100	1 1/2	9,000	16,000	23,900	**38,100**
380	38,500	1 33/64	9,100	16,000	23,900	**38,500**
390	39,000		9,300	16,000	23,900	**39,000**
390	39,500		9,400	16,000	23,900	**39,500**
400	40,000		9,400	16,000	23,900	**40,000**

Plaquettes interchangeables Multiplex HPC

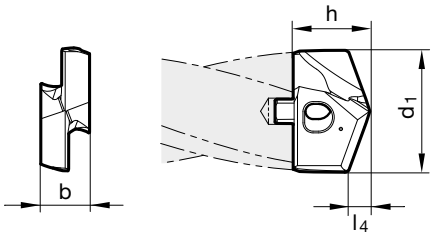
N° d'article 86724

P	M	K	N	S	H
			•		

VHM | ○ | HPC | WN | 140° | h7 | R

amin. de l'âme ≥ Ø 11,000 • affûtage à dépouille conique • vis de serrage n°86843 incluse • forme concave de l´arête de coupe principale

aluminium et alliages d'aluminium • métaux non ferreux



Taille	d1 mm	inch	l4 mm	b mm	h mm	N° de code
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**

HARTNER

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	 inch	l4 mm	b mm	h mm	N° de code
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**

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	 inch	l4 mm	b mm	h mm	N° de code
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**

HARTNER

Plaquettes interchangeables Multiplex HPC

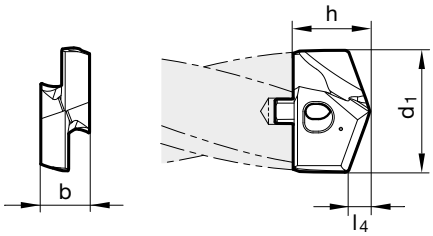
N° d'article 86725

P	M	K	N	S	H
○	●			○	○

VHM | a | HPC | WN | 140° | h7 | R

amin. de l'âme ≥ Ø 11,000 • affûtage à dépouille conique • forme de l´arête de coupe principale, rectiligne, (obtenue par correction) • vis de serrage n°86843 incluse

aciers inoxydables



Taille	d1 mm	inch	l4 mm	b mm	h mm	N° de code
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**

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	inch	l4 mm	b mm	h mm	N° de code
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**

Plaquettes interchangeables Multiplex HPC

Taille	d1 mm	 inch	l4 mm	b mm	h mm	N° de code
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**

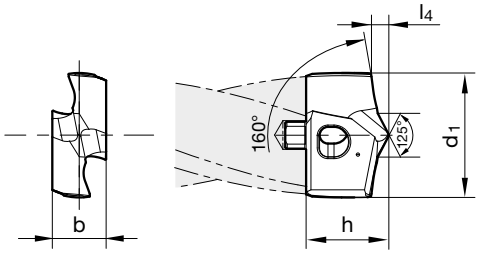
Plaquettes interchangeables Multiplex HPC

N° d'article 86729

P	M	K	N	S	H
•					

VHM | F | WN | 160° 125° | h7 | R

affûtage en pente • forme concave de l´arête de coupe principale • affûtage spéc. au sommet a. un angle à 160° et une pointe de centrage à 125° • vis de serrage n°86843 incluse



Taille	d1 mm	inch	l4 mm	b mm	h mm	N° de code
120	12,000		1,700	5,000	7,500	**12,000**
140	14,000		2,000	6,000	9,500	**14,000**
160	16,000		2,300	7,000	10,800	**16,000**
180	18,000		2,600	8,000	12,300	**18,000**
200	20,000		2,900	9,000	13,600	**20,000**
210	21,000		3,000	9,000	13,600	**21,000**
220	22,000		3,200	10,000	14,900	**22,000**
240	24,000		3,500	11,000	15,500	**24,000**
250	25,000	63/64	3,600	11,000	15,500	**25,000**
260	26,000		3,800	12,000	18,500	**26,000**
270	27,000		3,900	12,000	18,600	**27,000**
280	28,000		4,100	13,000	18,600	**28,000**
290	29,000		4,200	13,000	18,600	**29,000**
300	30,000		4,400	14,000	19,900	**30,000**
320	32,000		4,600	15,000	21,300	**32,000**
330	33,000		4,800	15,000	21,700	**33,000**
340	34,000		4,900	15,000	22,200	**34,000**
360	36,000		5,200	16,000	22,500	**36,000**
380	38,000		5,500	16,000	23,000	**38,000**
400	40,000		5,800	16,000	23,100	**40,000**

HARTNER

Plaquette de lamage Multiplex HPC

N° d'article 86726

P	M	K	N	S	H
○		●			

VHM | A | WN | N

fontes grises, fontes malléables, fontes à graphite sphéroïdal

ISO		Taille porte-outils	N° de code
CPGW050202F	N-K	110-140	**52,020**
CPGW050204F	N-K	110-140	**52,040**
CPGW060202F	N-K	160-280	**62,020**
CPGW060204F	N-K	160-280	**62,040**
CPGW09T308F	N-K	300-360	**93,080**

N° d'article 86727

P	M	K	N	S	H
			●		

VHM | ○ | WN | R

aluminium et alliages d'aluminium • métaux non ferreux

ISO		Taille porte-outils	N° de code
CPGT050202F	R-AL	110-140	**52,020**
CPGT050204F	R-AL	110-140	**52,040**
CPGT060202F	R-AL	160-280	**62,020**
CPGT060204F	R-AL	160-280	**62,040**
CPGT09T308F	R-AL	300-360	**93,080**

HARTNER

Plaquette de lamage Multiplex HPC

N° d'article 86728

P	M	K	N	S	H
●	○	○		○	○

VHM T WN R

acier, fonte aciérée (alliée / non alliée)

ISO		Taille porte-outils	N° de code
CPGT050202F	R-P	110-140	**52,020**
CPGT050204F	R-P	110-140	**52,040**
CPGT060202F	R-P	160-280	**62,020**
CPGT060204F	R-P	160-280	**62,040**
CPGT09T308F	R-P	300-360	**93,080**

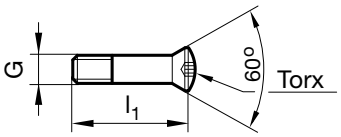
HARTNER

Vis de serrage p. porte-outils Multiplex HPC 1,5-10xD

N° d'article 86843

WN

couple de serrage pour vis torx (voir : multiplex HPC technologie et avantages)



G	l1 mm	Torx	N° de code
M 2.2	9,500	T7	**2,200**
M 2.2	10,500	T7	**2,201**
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**
M 6	28,500	T25	**6,001**
M 6	32,500	T25	**6,002**

Clés dynamométriques

N° d'article 86844

WN

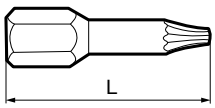
Entraînement	Couple Nm	L mm	Type	**N° de code**
1/4»	0,4-1	100,000	A	**1,001**
1/4»	0,8-2	160,000	A	**2,000**
1/4»	0,8-5	160,000	A	**5,001**
1/4»	2-8	200,000	A	**8,000**
1/4»	5-14	200,000	E	**14,000**

HARTNER

Embouts pour vis Torx

N° d'article 86845

WN



Entraînement		Torx	L mm	**N° de code**
1/4	hexagonal	T5	25,000	**5,000**
1/4	hexagonal	T7	25,000	**7,000**
1/4	hexagonal	T8	25,000	**8,000**
1/4	hexagonal	T9	25,000	**9,000**
1/4	hexagonal	T10	25,000	**10,000**
1/4	hexagonal	T15	25,000	**15,000**
1/4	hexagonal	T20	25,000	**20,000**
1/4	hexagonal	T25	25,000	**25,001**

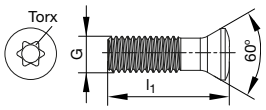
HARTNER

Vis de serrage p. porte-outil de lamage Multiplex HPC

N° d'article 86846

WN

couple de serrage pour vis torx (voir : multiplex HPC technologie et avantages)



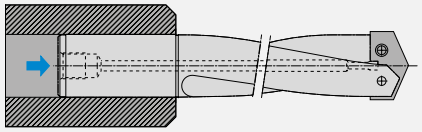
G	l1 mm	Torx	**N° de code**
M 2	5,500	T6	**2,000**
M2,5	5,300	T7	**2,500**
M4	9,500	T15	**4,006**

Multiplex – Le canal d‘alimentation

Tous les corps multiplex ont l’arrosage central qui assure l’acheminement du lubrifiant directement sur l’arête de coupe pour des applications aussi bien verticales que horizontales et améliore la durée de vie. En outre, le refroidissement interne assure l’évacuation optimale des copeaux hors du trou.
Le type d’alimentation du lubrifiant dépend de l’exécution de la queue :

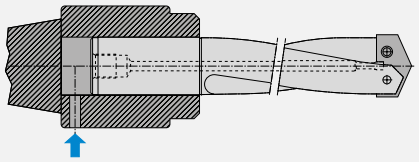
Alimentation du lubrifiant par la partie arrière de la queue

Pour outil **statique** et **rotatif** :
Alimentation par canal central dans le corps.
Pour attachement cylindrique et trou de diamètre 10 à 102mm.
Réf. produit : 86612, 86622, 86624, 86730, 86740, 86750
et porte-outils extra long



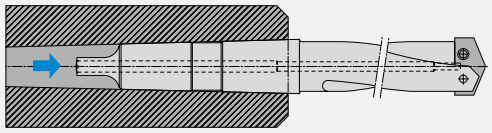
Alimentation par canal latéral à l’extérieur du mandrin

Pour outil **rotatif** :
Alimentation du lubrifiant radiale par le mandrin.
Pour attachement cylindrique et trou de diamètre 10 à 102mm.
Code article : 86612/86622/86624/86730/86740/86750 et porte-outils extra long
Mandrin avec système de refroidissement SK40/50 et cône morse MK4/5/6 sur cyl.



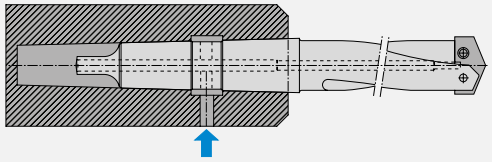
Alimentation du lubrifiant par l’attache

Pour outil **statique** et **rotatif** :
Alimentation axiale par le corps.
Pour attachement cône morse et trou de diamètre 10 à 25mm.
Code article : 86630/86650



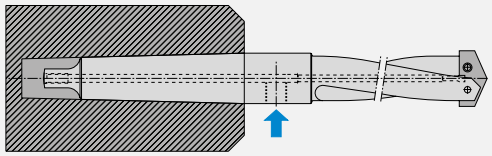
Alimentation par canal latéral sur cône morse

Pour outil **statique** :
Alimentation radiale par le coprs.
Pour attachement cône morse et trou de diamètre 10 à 25mm.
Porte-outils sur demande



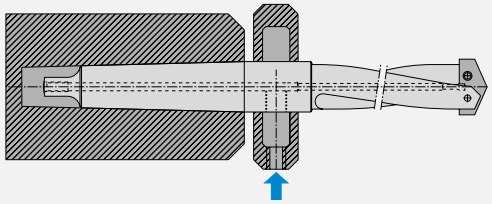
Alimentation latérale du lubrifiant par l’assise du collier

Pour outil **statique** :
Alimentation du lubrifiant dierecte par un raccord fileté R1/4 et R1/2.
Pour attachement cône morse avec siège pour lubrifiant et trou de diamètre 25 à 102mm.
Code article : 86670/86680 et porte-outils extra long



Alimentation latérale du lubrifiant par l’assise du collier

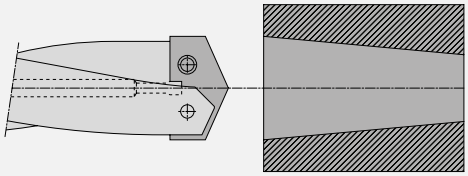
Pour outil **rotatif** :
Alimentation du lubrifiant radiale un adducteur. Pour attachement cône morse avec adducteur de lubrifiant trou de diamètre 25.
Code article : 86670/86680 et porte-outils extra long



Multiplex – Les astuces

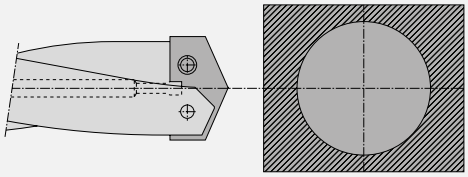
Pré perçage de trou

Comme le système multiplex est guidé par son arête transversale de coupe, il n'est pas conçu pour l'agrandissement d'avant trou ou pour le perçage de trou de fonderie. Cependant il peut être nécessaire d'adapter les conditions de coupe.



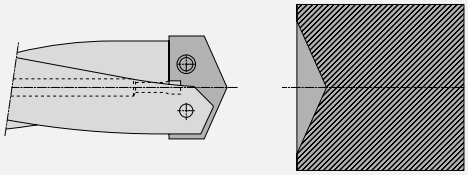
Coupe interrompue

Le système multiplex n'est pas conçu pour les coupes inter-rompues (ex traversé d'un trou du diamètre du foret)



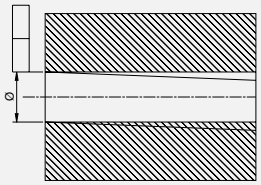
Centrage

Les plaquettes de multiplex sont fines. Cependant le centrage n'est nécessaire seulement pour les perçages profonds. Si le centrage est nécessaire pour des raisons techniques, l'angle de pointe du centrage doit être le même que celui la plaquette.
Les angles sont les suivants : d = 24,5mm = 135°
d = 66,0mm = 132°
d ≥ 66,0mm = 140°
Peut être appliqué aussi pour les perçages courts (3XD)



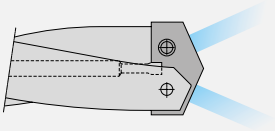
Déviation du perçage

La déviation du perçage peut être due à différents paramètres. La valeur approximative tolérée par la norme sur 7xD est de 0,1-016mm. Pour une tolérance inférieure nous devrons avoir un type de corps plus rigide.



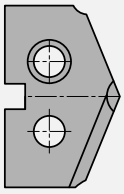
Pression d'arrosage

La lubrification est très importante pour l'évacuation des copeaux. Elle peut être obtenue à une pression d'environ 5 bars. Plus il y a de lubrifiant mieux c'est. Que l'on utilise un collier ou un mandrin pour amener le lubrifiant, le système multiplex peut être utilisé sur tout type de machine même les anciennes machines avec des systèmes de lubrification extérieure. Nos techniciens trouveront une solution à votre application.



Forte usure de l'arête de coupe

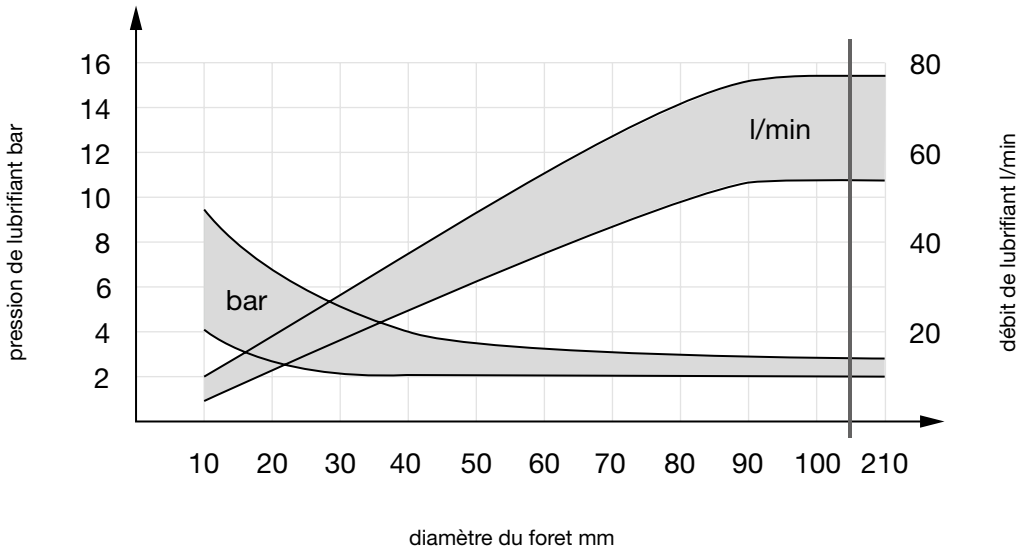
Si chaleur altère les arêtes de coupe, la vitesse de coupe est trop élevée, elle doit être réduite. Mesurer le diamètre de la partie nette de la plaquette, recalculer la vitesse decoupe
selon ce nouveau diamètre. Saisir dans la machine la vitesse
de coupe égale à la valeur trouvée moins 10%.



Multiplex – Lubrification

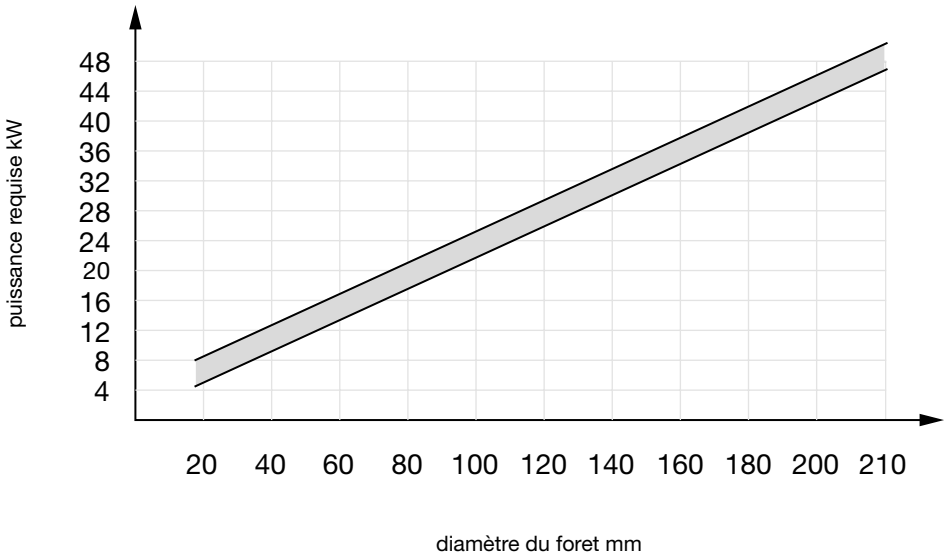
Une lubrification précise permet d'extrêmes performances. Une pression insuffisante ou un faible débit peut entraîner de mauvais états de surface ou des casses d'outils. Si possible, la taille des particules dans le liquide de refroidissement ne doit pas excéder 50 µm.

Pour l'utilisation du multiplex avec plaquette HSS ou Carbure nous recommandons le perçage avec émulsion à 5%.
La pression et le débit sont plus importants que la composition de l'émultion.



Machine et Pièce à usiner

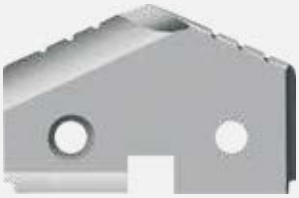
Pour travailler avec des plaquettes carbure il est nécessaire d'avoir une machine, une broche, un système d'attache et un outil très rigides. Une rigidité insuffisante entraîne des vibrations et use les arêtes du foret lors de l'évacuation des copeaux ce qui diminue la durée de vie d'outil et ou casse la plaquette.



Multiplex – Géométries spéciales

Plaquette de moulage d'après le schéma du client
(HSS-E/PM, HSS-E ou carbure)

Plaquette NC (carbure ou HSS-E/HSS-E-PM) à 90° ou 12
(Selon le diamètre l'angle de 90° est distordu à la pointe)



Plaquette avec angles rayonnés
(HSS-E/PM, HSS-E ou carbure)

Plaquette étagée
(HSS-E/PM, HSS-E ou carbure)

Géométrie (carbure)
pour usinage de laiton et matière similaire

Plaquette* pour trou borgne sans point de centre
(HSS-E ou carbure)

Pour fibre plastique
(carbure)

Plaquette selon plan du client, plaquette rayonnée
(HSS-E/PM, HSS-E ou carbure)

*** Avec les trous borgnes et les plaquettes de moulages, veuillez observer :**

- Utilisation seulement d'un porte-outil court
- Le trou est préalablement perçé avec une plaquette Multiplex normale (même Ø ous plus petit)
- Convient uniquement pour perçage dans du plein
- Si possible nous adresser un croquis du trou à réaliser

Ces géométries spéciales sont disponibles sur demande avec les différents revêtements de notre programme.
Contactez-nous pour plus d'explication. **Délai approximatif de 3 semaines**.

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Multiplex HPC – Technologie et avantages

Avec le nouveau système de perçage Multiplex HPC à plaquettes de coupe interchangeables, Hartner vous offre un produit très performant à prix inégalable. Pour les diamètres de perçage entre 11,00 et 40,00 mm, les porte-outils et plaquettes de coupe sont en mesure de vous convaincre avec tous les avantages suivants :

- **Excellente durabilité de coupe**
  Grâce à la microscopie de l´état de surface de la finition des arêtes de coupe et à la spécificité des plaquettes de coupe en fonction de leur application, les outils de perçage du système Multiplex HPC sont particulièrement résistants à l´usure. Les porte – outils du système de perçage Multiplex HPC sont aussi très résistants à l´usure. Cela provient de la nuance optimisée de l´acier utilisé, ensuite nickelé, et de l´échelonnement de leurs tailles et diamètres par 0,5 mm, jusqu'à diamètre 31,99 mm ou par 1,0 mm à partir de diamètre 32,00 mm ce qui réduit l´usure au niveau du dos du porte - outils.

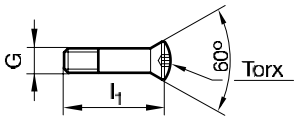
- **Optimisation de l´évacuation des copeaux**
  Grâce à la section bien dimensionnée des goujures des porte – outils du système de perçage Multiplex HPC, l´évacuation des copeaux est garantie jusque dans les plus grandes profondeurs de perçage.

- **Alimentation parfaite des lubrifiants et liquide de refroidissement**
  Afin d´obtenir une lubrification parfaite et un refroidissement optimal, la section des canaux d´adduction est maximale et les canaux débouchent dans les goujures. Ainsi, l´e¾cience de la lubrification et du refroidissement des arêtes de coupe est absolument garantie et favorise énormément l´évacuation des copeaux.

- **Usinage de haute précision et rigidité accrue de l'assise de la plaquette de coupe**
  La précision de la finition des assises des plaquettes de coupe permet de réaliser, directement sur la machine et cela, à l´aide d´une clé Torx conventionnelle, l´échange facile des plaquettes. Grâce à l´optimisation des matériaux de construction des porte – outils du système de perçage Multiplex HPC, et cela par rapport aux systèmes traditionnels, il est possible de réaliser beaucoup plus de changements de plaquettes avant d´être obligé de changer le porte – outils pour des raisons d´usure au niveau des assises des plaquettes de coupe. Même lorsqu´il s´agit d´usinages dans des conditions di¾ciles, sur faibles machines avec tendances aux vibrations, les vis de serrage pourvues de freins de vis, assurent le serrage puissant des plaquettes de coupe sur leurs porte –outils.

- **Porte – outils rigide**
  Non seulement l´échelonnement étroit de leurs tailles et diamètres, réduit l´usure mais, de par le meilleur guidage de l´outil dans son perçage, il renforce aussi toute la robustesse du système de perçage Multiplex HPC. Il en résulte une excellente durabilité de coupe avec un état de surface d´usinage obtenu de meilleure qualité.

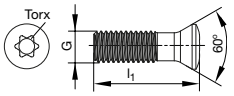
Vis de serrage pour plaquette 1,5 - 10 x D 86843



pour les dimensions	Torx	Code N°
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

pour les dimensions	Torx	Code N°
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

pour plaquette fraiseuse 86846



pour les dimensions	Torx	Code N°
110 - 140	T6	2,000
160 - 280	T7	2,500
300 - 360	T15	4,006

Lors changement de la plaquette de coupe, nous vous recommandons aussi de changer la vis de serrage!
C´est pourquoi chaque porte – outils est livré avec une vis de serrage n° d´article 86843 et avec un tournevis n° d´article 86842.
Chacune des plaquettes de coupe interchangeables est aussi livrée avec une vis de serrage n° d´article 86843.

Valeurs préconisées du couple de serrage de la vis de serrage:

Diamètres	**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**
Filetage	M2,2	M2,5	M3	M3,5	M4	M4,5	M5	M6
Taille Torx	T7	T8	T9	T10	T15	T15	T20	T25
Couple de serrage [Nm]	**0,8**	**1,0**	**1,7**	**2,7**	**4,0**	**6,0**	**8,0**	**14,0**

HARTNER

Precision Cutting Tools

CARACTÉRISTIQUES TECHNIQUES

Dimensions, définitions, conseils d'utilisation

HARTNER

Longueurs des forets hélicoïdaux à queue cylindrique

diamètres jusqu'à (inclus)	DIN 338		DIN 339		DIN 340		DIN 1897		DIN 1869 Forets extra-longs grandeur 1		grandeur 2		grandeur 3	
	long.totale	long.taillée	long. totale	long. taillée	long. totale	long. taillée	long. totale	long. taillée	long. totale	long. taillée	long. totale	long. taillée	long. totale	long. taillée
mm	mm		mm		mm		mm		mm		mm		mm	
≤ 0,24	19	2,5					19	1,5						
0,30	19	3					19	1,5						
0,38	19	4					19	2						
0,48	20	5			30*	10*	19	2,5						
0,53	22	6			32*	12*	20	3						
0,60	24	7	32*	15*	35*	15*	21	3,5						
0,67	26	8	36*	18*	38*	18*	22	4						
0,75	28	9	39*	20*	42*	21*	23	4,5						
0,85	30	10	42*	22*	46*	25*	24	5						
0,95	32	11	45*	24*	51*	29*	25	5,5						
1,06	34	12	48	26	56	33	26	6						
1,18	36	14	50	28	60	37	28	7						
1,32	38	16	52	30	65	41	30	8						
1,50	40	18	55	33	70	45	32	9						
1,70	43	20	58	35	76	50	34	10	115*	75*				
1,90	46	22	62	38	80	53	36	11	120*	80*				
2,12	49	24	66	41	85	56	38	12	125	85	160*	110*	205*	135*
2,36	53	27	70	44	90	59	40	13	135	90	170*	115*	215*	145*
2,65	57	30	74	47	95	62	43	14	140	95	180*	120*	225*	150*
3,00	61	33	79	51	100	66	46	16	150	100	190	130	240*	160*
3,35	65	36	84	55	106	69	49	18	155	105	200	135	250*	170*
3,75	70	39	91	60	112	73	52	20	165	115	210	145	265	180
4,25	75	43	96	64	119	78	55	22	175	120	220	150	280	190
4,75	80	47	102	69	126	82	58	24	185	125	235	160	295	200
5,30	86	52	108	74	132	87	62	26	195	135	245	170	315	210
6,00	93	57	116	80	139	91	66	28	205	140	260	180	330	225
6,70	101	63	124	86	148	97	70	31	215	150	275	190	350	235
7,50	109	69	133	93	156	102	74	34	225	155	290	200	370	250
8,50	117	75	142	100	165	109	79	37	240	165	305	210	390	265
9,50	125	81	151	107	175	115	84	40	250	175	320	220	410	280
10,60	133	87	162	116	184	121	89	43	265	185	340	235	430	295
11,80	142	94	173	125	195	128	95	47	280*	195*	365*	250*	455*	310*
13,20	151	101	184	134	205	134	102	51	295*	205*	375*	260*	480*	330*
14,00	160	108	194	142	214	140	107	54						
15,00	169	114	202	147	220	144	111	56						
16,00	178	120	211	153	227	149	115	58						
17,00	184	125	218	159	235	154	119	60						
18,00	191	130	226	165	241	158	123	62						
19,00	198	135	234	171	247	162	127	64						
20,00	205	140	242	177	254	166	131	66						
21,20					261	171	136	68						
22,40					268	176	141	70						
23,60					275	180	146	72						
25,00					282	185	151	75						
26,50					290	190	156	78						
28,00					298	195	162	81						
30,00					307	201	168	84						
31,50					316	207	174	87						
33,50							180	90						
35,50							186	93						
37,50							193	96						
40,00							200	100						
42,50							207	104						
45,00							214	108						
47,50							221	112						
50,00							228	116						

Hartner vous livre des forets hélicoïdaux, selon Norme Usine, jusqu´à 1000 mm de longueur totale, ce sont les articles n° : 81740, 81750, 81760

* Norme Usine

HARTNER

Longueurs des forets hélicoïdaux à queue cône morse

diamètres jusqu'à (inclus)	DIN 345			DIN 346			DIN 341			Forets pour le perçage / canon avec cône renforcé*			Forets V/IS* pour les matières difficiles			DIN 1870 Forets extra-longs grandeur 1			DIN 1870 Forets extra-longs grandeur 2		
	long. totale	long. taillée	cône Morse	long. totale	long. taillée	cône Morse	long. totale	long. taillée	cône Morse	long. totale	long. taillée	cône Morse	long. totale	long. taillée	cône Morse	long. totale	long. taillée	cône Morse	long. totale	long. taillée	cône Morse
mm	mm			mm			mm			mm			mm			mm			mm		
2,65	111*	30*	1*																		
3,00	114	33	1																		
3,35	117	36	1																		
3,75	120	39	1																		
4,25	124	43	1				145*	64*	1*												
4,75	128	47	1				150*	69*	1*												
5,30	133	52	1				155	74	1												
6,00	138	57	1				161	80	1												
6,70	144	63	1				167	86	1												
7,50	150	69	1				174	93	1												
8,50	156	75	1				181	100	1				130	49	1	265	165	1	330	210	1
9,50	162	81	1				188	107	1				134	53	1	275	175	1	345	220	1
10,60	168	87	1	185*	87*	2*	197	116	1	214	116	2	138	57	1	285	185	1	360	235	1
11,80	175	94	1	192*	94*	2*	206	125	1	223	125	2	142	61	1	300	195	1	375	250	1
13,20	182	101	1	199	101	2	215	134	1	232	134	2	147	66	1	310	205	1	395	260	1
14,00	189	108	1	206	108	2	223	142	1	240	142	2	168	70	2	325	220	1	410	275	1
15,00	212	114	2	235*	114*	3*	245	147	2	268	147	3	172	74	2	340	220	2	425	275	2
16,00	218	120	2	241*	120*	3*	251	153	2	274	153	3	176	78	2	355	230	2	445	295	2
17,00	223	125	2	246*	125*	3*	257	159	2	280	159	3	179	81	2	355	230	2	445	295	2
18,00	228	130	2	251*	130*	3*	263	165	2	286	165	3	183	85	2	370	245	2	465	310	2
19,00	233	135	2	256	135	3	269	171	2	292	171	3	186	88	2	370	245	2	465	310	2
20,00	238	140	2	261	140	3	275	177	2	298	177	3	212	91	3	385	260	2	490	325	2
21,20	243	145	2	266	145	3	282	184	2	305	184	3	216	95	3	385	260	3	490	325	3
22,40	248	150	2	271	150	3	289	191	2	312	191	3	219	98	3	405	270	3	515	345	3
23,02	253	155	2	276	155	3	296	198	2	319	198	3	222	101	3	405	270	3	515	345	3
23,60	276	155	3	304*	155*	4*	319	198	3	347	198	4	222	101	3	425	270	3	535	345	3
25,00	281	160	3	309*	160*	4*	327	206	3	355	206	4	225	104	3	440	290	3	555	365	3
26,50	286	165	3	314*	165*	4*	335	214	3	363	214	4	256	107	4	440	290	3	555	365	3
28,00	291	170	3	319	170	4	343	222	3	371	222	4	259	110	4	460	305	3	580	385	3
30,00	296	175	3	324	175	4	351	230	3	379	230	4	263	114	4	460	305	3	580	385	3
31,50	301	180	3	329	180	4	360	239	3	388	239	4	266	117	4	480	320	3	610	410	3
31,75	306	185	3	334	185	4	369	248	3	397	248	4	269	120	4	480	320	3	610	410	3
33,50	334	185	4	372*	185*	5*	397	248	4	435	248	5	269	120	4	505	320	4	635	410	4
35,50	339	190	4	377*	190*	5*	406	257	4				272	123	4	530	340	4	665	430	4
37,50	344	195	4	382*	195*	5*	416	267	4				276	127	4	530	340	4	665	430	4
40,00	349	200	4	387*	200*	5*	426	277	4				317	130	5	555	360	4	695	460	4
42,50	354	205	4	392	205	5	436	287	4				320	133	5	555	360	4	695	460	4
45,00	359	210	4	397	210	5	447	298	4				323	136	5	585	385	4	735	490	4
47,50	364	215	4	402	215	5	459	310	4							585	385	4	735	490	4
50,00	369	220	4	407	220	5	470	321	4							605	405	4	765	510	4
50,80	374	225	4	412	225	5	475*	326*	4*												
53,00	412	225	5	479*	225*	6*	513*	326*	5*												
56,00	417	230	5	484*	230*	6*	518*	331*	5*												
60,00	422	235	5	489*	235*	6*	523*	336*	5*												
63,00	427	240	5	494*	240*	6*															
67,00	432	245	5	499	245	6															
71,00	437	250	5	504	250	6															
75,00	442	255	5	509	255	6															
76,50	447	260	5	514	206	6															
80,00	514	260	6																		
85,00	519	265	6																		
90,00	524	270	6																		
95,00	529	275	6																		
100,00	534	280	6																		
106,00	539*	285*	6*																		

Hartner vous livre des forets hélicoïdaux, selon Norme Usine, jusqu´à 1000 mm de longueur totale, ce sont les articles n° : 82467, 82468, 82469, 82466

* Norme Usine

HARTNER

Aciers rapides pour les outils Hartner

Tous nos outils en acier rapide sont systématiquement réalisés à partir de matières de coupe de qualité! Nous choisissons ces alliages en fonction de leurs éléments composants avec les propriétés optimales pour chacun des cas d'usinage:

Le tungstène et le molybdène favorisent la résistance au revenu et améliorent la résistance à l´usure
Le Vanadium améliore la résistance à l'usure.
Le Cobalt améliore la résistance à l'usure, ce qui augmente sa résistance aux températures d'usinage plus élevées.

Références Hartner	Type	Domaine d'application, propriétés
HSS	Acier rapide commun	matière standard pour utilisation universelle
HSS-E	Acier rapide au cobalt	Matière de coupe avec haute résistance à la chaleur, pour les usinages thermiquement sollicités, par exemple, températures élevées ou refroidissement défavorable.
M42	Acier rapide avec 8% de cobalt	Matière de coupe avec haute résistance à la chaleur et à la dureté, appropriée pour les usinages des matériaux difficiles à usiner.
HSS-E-PM	Acier rapide fritté, au cobalt	Matière de coupe, très dure, avec structure dense et régulière. Excellente résistance à la chaleur et à l´usure, avec grande stabilité des arêtes de coupe.

HARTNER

Les nuances essentielles de carbures métalliques CW pour les outils Hartner.

Le tableau suivant démontre les nuances essentielles de CW des outils du programme standard de perçage, Hartner, en Hartner. Sur demande, nous vous offrons d´autres nuances.

A notre connaissance, dans plus que 80% des applications d´usinages, les meilleurs résultats obtenus sont réalisés à partir d´outils en DK 460 UF pourvus d´un revêtement approprié. D´autres nuances revêtues n´ont, en aucun cas, réussi à atteindre ces performances. Tel jugement, ajouté à la disponibilité du Hartner, simplifie considérablement le choix d´une nuance ou d´un outil. Nos techniciens spécialistes en usinage vous conseillent volontiers et vous aident à choisir une autre nuance, si nécessaire.

Sorte	Taux de cobalt Co en %	Granulométrie des CW en µ	Dureté [HV]	Classification ISO [ISO 513]	Caractéristiques
DK460UF K40UF	10	0,6	1620	K20-K40	Nuance très universelle, généralement revêtue, pour la plupart des applications sur les aciers, l´Al et ses alliages, les fontes mais aussi sur les « Superalliages » comme l´Inconel 718. Actuellement, cette nuance est l´une des principales activités de notre fabrication de CW.
DK500UF K44UF	12	0,5	1690	K20-K30	Cette nuance, spécialement développée et réalisée pour l´usinage des matériaux durs, est plus dure que le DK 460 UF et sa tolérance de déformation est plus large. Le taux de cobalt est plus élevé, c´est pourquoi il est recommandé de faire un revêtement.
DK255F	8	0,7	1720	K20	Cette nuance est réservée à l´usinage des matériaux durs, fontes dures et alliages d´aluminium chargés de Si et durs, ainsi que pour l´usinage MQL. Il est conseillé de faire un revêtement.
DK120	6	1,3	1620	K15-K20	Nuance particulièrement recommandée lorsqu´il est prévu de réaliser un revêtement diamant sur l´outil.
DK120UF	7	0,7	1850	K05-K10	Nuance de granulométrie ultrafine avec une énorme résistance à l´usure, prévue sur machines très rigides, bien appropriée pour les alésoirs.
K55SF	9	0,2-0,4	1920	K05-K10	Pour l´usinage des mat. résist. à l´usure donc difficiles à usiner, les aciers inox., les composites comme le Kevlar, ainsi que les usinages UGV, UTGV et MQL.
DK400N	10	0,7	1580	K20-K40	Nuance très tenace pour l´usinage des métaux réfractaires.
DK256EH	10	0,6	1750	K20	Cette nuance est particulièrement bien recommandée pour l´usinage des alliages à base de nickel
K6UF	6	0,6	1870	K05-K10	Les nuances de carbures métalliques avec une granulométrie ultrafine, sont extrêmement résistantes à l´usure et particulièrement recommandées pour l´usinage des matériaux haute résistance, très difficiles à usiner, ainsi que pour les composites CFK et Kevlar.
K5UF	5	0,5	2010	K05-K10	Récemment développée pour le perçage et pour l´alésage, cette nuance très dure, est particulièrement recommandée pour les matériaux composites et CFK.

Revêtements et les affinages des états de surface

Etat de surface poli

Spécialement prévus pour les opérations de perçages des fontes d´aluminium et fontes de corroyage avec un pourcentage de silicium modéré, les forets sans revêtement assurent d´excellents rendements d´usinage. Afin d´amoindrir l´usure d´adhésion (collage et arêtes de coupe rapportées) ces outils sont pourvus d´une géométrie spéciale et d´un état de surface de qualité supérieure au niveau des surfaces de dépouille, de l´amincissement de l´âme et des goujures ce qui justifie bien leur utilisation dans ces domaines d´applications.

Traitement vapeur / Nitruration superficielle

Les surfaces traitées à la vapeur sont artificiellement pourvues d´une oxydation superficielle sur une profondeur d´environ 3 à 10 µm afin d´améliorer la protection de l´acier contre la corrosion et de renforcer le comportement tribologique des outils. Pour les applications de perçages des matériaux abrasifs, il est recommandé de nitrurer la superficie ce qui augmente la dureté superficielle des outils et la résistance à l´usure.

Revêtement TiN

Températures maximales d´utilisation: < 600 °C
Couleur: jaune or
Structure: monocouche
Dureté: 2300 HV 0,05

Développé par la Société Hartner au début des années 1980, le revêtement TiN est très universel, à prix avantageux, prévu pour les applications de perçages avec des outils HSS et outils CW.

Revêtements FIRE / nano-FIRE

Températures maximales d´utilisation: < 800 °C
Couleur: violet
Structure: multicouche
Dureté: 3300 HV 0,05

Les revêtements FIRE et nano-FIRE sont structurés à base de titane et d´azote mais aussi avec un apport d´aluminium. Ces revêtements ont été développés à la fin des années 1990 afin de perfectionner les performances du revêtement TiN. Ils se font remarquer par leur dureté, très élevée, par leur excellente résistance thermochimique et sont aussi appropriés pour les revêtements des outils HSS et CW.

Revêtements et les affinages des états de surface

Revêtement TiAlZrN

Températures maximales d´utilisation: < 800 °C
Couleur: Or pâle
Structure: multicouche
Dureté: 3300 HV 0,05

La structure multicouche TiN / TiAlN du revêtement TiAlZrN assure l´excellence performance des résultats d´usinage des aciers. Grâce à sa couche superficielle, à base de zirconium, le coefficient de friction est considérablement amélioré. Les risques d´adhésion sur les aciers (par exemple, aciers ferreux, austénitiques et duplex) sont éliminés, ce qui augmente les performances des résultats d´usinage.

Revêtement TiAlN

Températures maximales d´utilisation: < 800 °C
Couleur: violet
Structure: monocouche
Dureté: 3300 HV 0,05

Le revêtement TiAlN a des propriétés semblables à celles des revêtements Fire et nano-FIRE. Etant donné sa structure monocouche, son domaine d´applications est très souvent réservé aux revêtements des microforets.

Revêtement nano-A

Températures maximales d´utilisation: < 900 °C
Couleur: bleu - violet
Structure: multicouche, structure nanométrique
Dureté: 3300 HV 0,05

Le revêtement nano-A, aussi basé sur le revêtement TiAlN, est surtout remarquable au niveau de l´usinage des aciers inoxydables mais aussi partiellement pour les applications de perçages des fontes, des aciers à base de titane, de nickel et des alliages au cobalt et chrome. De par sa structure multicouche nanométrique, les risques de propagation des fissures du revêtement sont considérablement amoindris. En fonction de sa composition particulièrement bien appropriée, la résistance thermochimique est excellente et beaucoup plus élevée que celle du revêtement TiAlN.

Revêtement AlTiZrN

Températures maximales d´utilisation: < 900 °C
Couleur: Or pâle
Structure: multicouche, structure nanométrique
Dureté: 3400 HV 0,05

Le revêtement AlTiZrN, à base de AlTiN, est particulièrement bien approprié pour l´usinage des aciers inoxydables. De par sa structure multicouche nanométrique, les ténacités et duretés sont optimales. Sa couche superficielle à base de zirconium élimine la réaction chimique avec la matière à usiner et améliore l´évacuation des copeaux.

Revêtements et les affinages des états de surface

Revêtement TiAlSiN

Températures maximales d´utilisation: < 800 °C
Couleur: bronze
Structure: multicouche, structure Nano - composite
Dureté: 5500 HV 0,05

Le revêtement TiAlSiN fait partie des groupes dénommés Nano – composites. Sa microstructure est remarquable de par ses cristaux nanométriques TiAlN, extrêmement fins, noyés dans une matrice de nitrure de silicium vitrifiée, extrêmement résistants aux hautes températures. Le revêtement TiAlSiN est d´une dureté extrême et est surtout réservé aux applications d´usinages des fontes dures et des aciers trempés.

Revêtement TiSiN

Températures maximales d´utilisation: < 800 °C
Couleur: cuivre
Structure: multicouche, structure Nano - composite
Dureté: 4000 HV 0,05

Le revêtement TiSiN est aussi un revêtement des groupes dénommés Nano – composites. Sa structure multicouche est spécialement prévue pour l´usinage des aciers au carbone, des aciers de décolletage et des alliages d´aciers au manganèse.

Revêtement ZrN

Températures maximales d´utilisation: < 700 °C
Couleur: Or pâle
Structure: multicouche, structure nanométrique
Dureté: 2500 HV 0,05

Le revêtement ZrN de structure nanométrique a été spécialement développé et optimisé pour l´usinage des alliages de titane. Sa structure spéciale mais aussi sa composition amoindrissent fortement l´usure tribologique chimique. C´est pourquoi ce revêtement est devenu un vrai spécialiste qui, en parallèle, réalise aussi d´excellentes performances de perçages sur les alliages d´aluminium pourvus d´un pourcentage de silicium modéré.

Revêtement CrN

Températures maximales d´utilisation: < 1000 °C
Couleur: gris métallique
Structure: multicouche
Dureté: 3500 HV 0,05

Le revêtement CrN à base de titane, aluminium et chrome est spécifiquement prévu pour l´usinage des non – ferreux tels les alliages de cuivres ainsi que les bronzes et les laitons.

Revêtements et les affinages des états de surface

Revêtement DLC

Températures maximales d´utilisation: < 500 °C
Couleur: gris - noir
Structure: monocouche
Dureté: 5000 HV 0,05

Le revêtement DLC fait partie du groupe des revêtements DLC (DLC – diamond-like carbon). Ces revêtements « carbone » ont des propriétés semblables au diamant. Le revêtement DLC, de base 100 % carbone avec sa structure (ta - C), est extrêmement dur. C´est pourquoi les performances de perçages des non – ferreux par exemple, des alliages d´aluminiums corroyés et alliages d´aluminiums de fonderie (< 12 % Si), cuivres, laitons et bronzes. En outre, il est très bien approprié au perçage du bois et des matériaux synthétiques non chargés.

Revêtement Cristal

Températures maximales d´utilisation: < 600 °C
Couleur: gris - noir
Structure: monocouche
Dureté: 8000 HV 0,05

Le revêtement Cristal est un revêtement de diamant cristallin pur et ne possède aucun inconvénient par rapport au diamant naturel. En plus de nombreuses propriétés physiques intéressantes, il est remarquable par sa dureté extraordinaire. C´est pourquoi ce revêtement Cristal microcristallin est parfaitement bien approprié à l´usinage des matériaux très abrasifs tels les matériaux synthétiques renforcés de fibres, les céramiques, les graphites et alliages d´aluminiums avec un pourcentage de silicium supérieur à 12 % (> 12 %). Pour des raisons techniques bien particulières, ce revêtement ne peut être réalisé que sur des nuances de carbures métalliques spéciales.

HARTNER

Recommandations des revêtements Hartner par application

	Percer		
	CW		HSS
	Conventionnelle	MQL	
Aciers au carbone	TiSiN	TiSiN	Fire
Aciers de décolletage	TiAlZrN	TiAlZrN	-
Aciers au manganèse	Fire	Fire	-
Aciers faiblement alliés	Fire	Fire	Fire
	TiSiN	TiSiN	TiN
	TiAlZrN	TiAlZrN	
Aciers alliés	Fire	Fire	Fire
	TiAlSiN	TiAlSiN	TiN
	AlTiN nano	AlTiN nano	
Aciers trempés <55 HRC	TiAlSiN	TiAlSiN	-
	Fire	Fire	-
	TiAlN	TiAlN	-
Aciers trempés 55-65 HRC	TiAlSiN	TiAlSiN	-
	Fire	Fire	-
	TiAlN	TiAlN	-
Aciers inoxydables et inaltérables aux acides	AlTiN nano	AlTiN nano	AlTiZrN
	AlTiZrN	AlTiZrN	Fire
	TiSiN	TiSiN	TiN
Fontes grises	TiAlSiN	TiAlSiN	Fire
	Fire	Fire	-
	AlTiN nano	AlTiN nano	-
Alliages corroyés d´aluminium	Poli	Poli	Poli
	DLC	DLC	DLC
	Diamant	Diamant	-
Fontes d´aluminium alliées (< 12% Silicium)	Poli	Poli	Poli
	ZrN	ZrN	ZrN
	DLC	DLC	DLC
Fontes d´aluminium alliées (≥ 12% Silicium)	Diamant	Diamant	-
	-	-	-
	-	-	-
Alliages à base de nickel (par ex.: Inconel)	AlTiN nano	AlTiN nano	Fire
	TiAlSiN	TiAlSiN	-
	Fire	Fire	-
Titane et ses alliages	ZrN	ZrN	Fire
	AlTiN nano	AlTiN nano	-
Cuivres / bronzes / laitons	CrN	CrN	TiN
	DLC	DLC	-
Alliages de chrome et cobalt	AlTiN nano	AlTiN nano	-
	TiAlSiN	TiAlSiN	-
	Fire	Fire	-
Métaux précieux	AlTiN nano	AlTiN nano	-
Céramiques	Diamant	Diamant	-
Matériaux synthétiques non renforcés	DLC	-	-
Matériaux synthétiques renforcés de fibres	Diamant	Diamant	-
	TiAlSiN	TiAlSiN	-

Remarque:

Cette vue d´ensemble montre les recommandations des revêtements Hartner en général en fonction des applications d´usinages. Priorité des recommandations de haut en bas.

HARTNER

Utilisation des revêtements Hartner

		PERÇAGE			FRAISAGE		
		CARBURE		HSS	CARBURE		HSS
		conv.	MQL		conv.	MQL	
Aciers C, aciers de décolletage, aciers Mn	P	TiSiN TiAlZrN Fire	TiSiN TiAlZrN Fire	Fire – –	TiSiN Fire TiAlZrN	Fire TiSiN TiAlZrN	Fire – –
Acier, faiblement allié	P	Fire TiSiN TiAlZrN	Fire TiSiN TiAlZrN	Fire TiN –	Fire TiAlSiN AlTiN nano	Fire TiAlSiN AlTiN nano	Fire TiCN –
Acier, allié	P	Fire TiAlSiN AlTiN nano	Fire TiAlSiN AlTiN nano	Fire TiN –	Fire AlTiN nano TiAlSiN	Fire AlTiN nano TiAlSiN	Fire TiCN –
Acier, trempé, <55 HRC	P	TiAlSiN Fire TiAlN	TiAlSiN Fire TiAlN	– – –	TiAlSiN AlTiN nano TiAlN	TiAlSiN AlTiN nano TiAlN	– – –
Acier, trempé, 55–65 HRC	P	TiAlSiN Fire TiAlN	TiAlSiN Fire TiAlN	– – –	TiAlSiN SuperA AlTiN nano	TiAlSiN SuperA AlTiN nano	– – –
Acier, inoxydable et résistant aux acides	M	AlTiN nano AlTiZrN TiSiN	AlTiN nano AlTiZrN TiSiN	AlTiZrN Fire TiN	AlTiN nano AlTiZrN Fire	AlTiN nano AlTiZrN Fire	Fire – –
Fonte	K	TiAlSiN Fire AlTiN nano	TiAlSiN Fire AlTiN nano	Fire – –	TiAlSiN Fire AlTiN nano	TiAlSiN Fire AlTiN nano	Fire TiCN –
Alliages à base de nickel (p. ex. Inconel)	S	AlTiN nano TiAlSiN Fire	AlTiN nano TiAlSiN Fire	Fire – –	AlTiN nano TiAlSiN ZrN	AlTiN nano TiAlSiN –	Fire – –
Titane/alliages de titane	S	ZrN AlTiN nano	ZrN AlTiN nano	Fire –	ZrN SuperA	ZrN SuperA	Fire –
Alliages de chrome cobalt	S	AlTiN nano TiAlSiN Fire	AlTiN nano TiAlSiN Fire	– – –	AlTiN nano TiAlSiN Fire	AlTiN nano TiAlSiN Fire	– – –
Métaux précieux	S	AlTiN nano	AlTiN nano	–	AlTiN nano	AlTiN nano	–
Alliages d'aluminium corroyés	N	poli DLC Diamant	poli DLC Diamant	poli DLC –	poli DLC ZrN	poli DLC ZrN	poli DLC –
Alliages de fonderie d'aluminium (<12% silicium)	N	poli ZrN DLC	poli ZrN DLC	poli ZrN DLC	ZrN DLC Diamant	ZrN DLC Diamant	poli DLC –
Alliages de fonderie d'aluminium (≥12% silicium)	N	Diamant – –	Diamant – –	– – –	Diamant – –	Diamant – –	– – –
Cuivre/bronze/laiton	N	CrN DLC	CrN DLC	TiN –	CrN DLC	CrN DLC	TiN –
Céramique	N	Diamant	Diamant	–	Diamant	Diamant	–
Plastiques, non renforcés	N	DLC	–	–	DLC	–	–
Plastiques, renforcés de fibres	N	Diamant TiAlSiN	Diamant TiAlSiN	– –	Diamant TiAlSiN	Diamant TiAlSiN	– –
Graphite	N	–	Diamant	–	–	Diamant	–

Remarque: *l'aperçu montre les recommandations d'utilisation générales des revêtements Hartner. La priorisation s'effectue de haut en bas.*

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Utilisation des revêtements Hartner

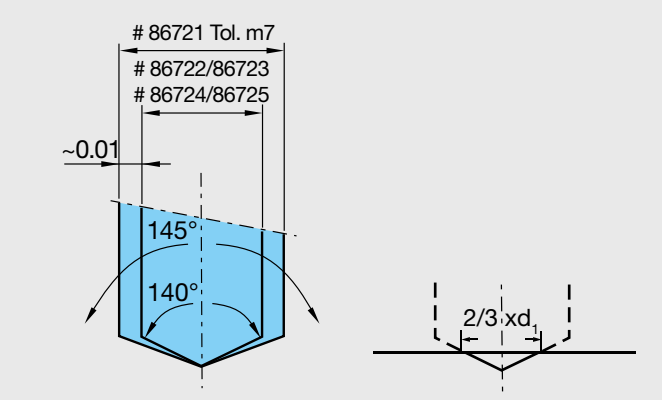
TARAUDAGE			FRAISAGE FILETÉ		TAR. PAR DÉFORMATION			ALÉSAGE		
CARBURE		HSS	CARBURE		CARBURE		HSS	CARBURE		HSS
conv.	MQL		conv.	MQL	conv.	MQL		conv.	MQL	
–	–	TiCN	TiCN	TiCN	TICN	TICN	TiCN	TiSiN	TiSiN	TiN
–	–	TiAlN	–	–	TiN	TiN	TiN	AlTiN nano	AlTiN nano	–
–	–	TiN	–	–	–	–	–	–	–	–
–	–	TiCN	TiCN	TiCN	TICN	TICN	TiCN	AlTiN nano	AlTiN nano	TiN
–	–	TiAlN	–	–	TiN	TiN	TiN	TiSiN	TiSiN	–
–	–	TiN	–	–	–	–	AlCrN	–	–	–
–	–	TiCN	TiCN	TiCN	TICN	TICN	TiCN	AlTiN nano	–	TiN
–	–	TiAlN	–	–	TiN	TiN	TiN	TiSiN	–	–
–	–	TiN	–	–	–	–	AlCrN	–	–	–
–	–	TiCN	TiAlN	TiAlN	–	–	–	AlTiN nano	AlTiN nano	–
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
TiCN	–	–	TiAlN	TiAlN	–	–	–	TiAlSiN	–	–
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
–	–	AlTiZrN[1]/TiAlN[2]	TiCN	TiCN	TICN	TiCN	TiCN	AlTiN nano	AlTiN nano	TiN
–	–	TiN	–	–	TiN	TiN	TiN	–	–	–
–	–	–	–	–	–	–	–	–	–	–
TiAlN	TiAlN	TiAlN	TiCN	TiCN	TICN	TiCN	TiCN	TiAlSiN	TiAlSiN	TiN
TiCN	–	TiCN	–	–	TiN	TiN	TiN	–	–	–
–	–	TiN	–	–	–	–	–	–	–	–
–	–	TiCN	TiCN	TiCN	TiCN	TiCN	TiCN	AlTiN nano	–	TiN
–	–	TiAlN	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
–	–	TiCN	TiCN	TiCN	TiCN	TiCN	TiCN	ZrN	–	TiN
–	–	TiAlN	–	–	–	–	–	AlTiN nano	–	–
poli	–	poli	TiCN	TiCN	–	–	–	AlTiN nano	–	TiN
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	AlTiN nano	AlTiN nano	TiN
poli	poli	poli	poli	poli	DLC	DLC	DLC	DLC	–	–
DLC	DLC	DLC	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
TiCN	TiCN	TiCN	TiCN	TiCN	TiCN	TiCN	TiCN	DLC	DLC	–
DLC	DLC	DLC	poli	poli	DLC	DLC	DLC	–	–	–
–	–	–	–	–	–	–	–	–	–	–
TiCN	TiCN	TiCN	TiCN	TiCN	–	–	–	–	–	–
Diamant	–	–	Diamant	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
poli	poli	poli	poli	–	DLC	DLC	DLC	poli	–	–
DLC	DLC	DLC	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
poli	–	poli	poli	poli	–	–	–	–	–	–
TiCN	TiCN	–	TiCN	TiCN	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–

[1] pour trou débouchant, [2] pour trou borgne

Centrer et piloter pour les outils du système de perçage Multiplex HPC

Avant de percer avec les Multiplex HPC et pour les profondeurs de perçages supérieures à 5xD, nous recommandons généralement de centrer et de piloter.

Pour le centrage, le diamètre du foret devrait avoir une valeur correspondant aux 2/3 du diamètre du perçage nominal. Pour le perçage pilote, nous recommandons une profondeur de perçage de 1xD. En outre, les valeurs de l´angle au sommet et du diamètre de l´outil à piloter devraient être supérieures à celles de l´outil du perçage nominal.
Afin d´être sûr du processus, nous recommandons l´utilisation de la plaquette de coupe à piloter n° d´article 86721 avec un angle au sommet de 145° et une tolérance m7 sur le diamètre, prévue pour le pilotage et montée sur le support court et rigide n° d´article 86681.

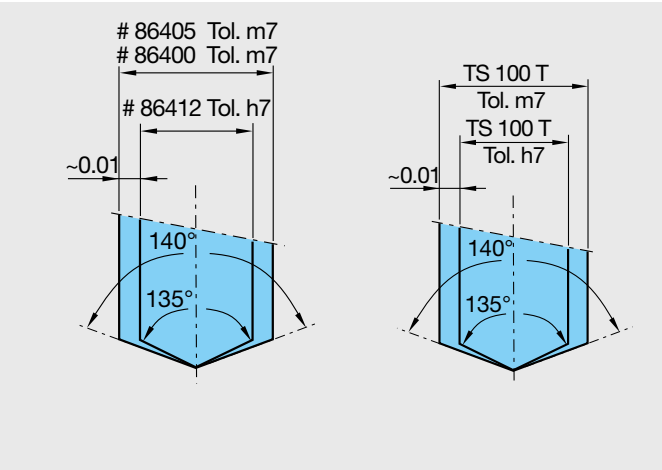


Centrer et piloter pour les forets CW monobloc

Lors de l´utilisation des forets en CW monobloc, pour les profondeurs de 7xD à 12xD, nous recommandons de réaliser un centrage ou un perçage pilote sur une profondeur de 1xD à 2xD. Pour les profondeurs supérieures à 12xD, il faut absolument réaliser un perçage pilote sur une profondeur de 1xD à 2xD.

Lors de l´utilisation des microforets 15xD, (n° d´article: 86412), nous recommandons de réaliser un perçage pilote avec les microforets 4xD sans canaux d´adduction (n° d´article: 86400) ou 5xD avec canaux d´adduction (n° d´article: 86405) qui, au niveau de la valeur de l´angle au sommet et de la tolérance du diamètre, sont parfaitement appropriés.

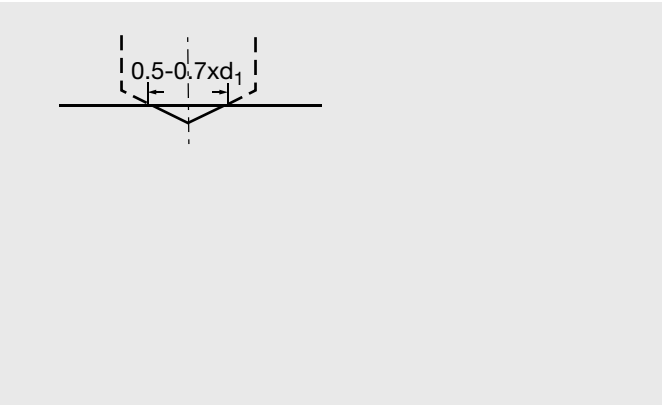
Pour les perçages pilote avant les perçages profonds avec les forets hélicoïdaux TS 100 T, il est possible, par exemple, d´utiliser le foret Ratio TS 100 U, avec canaux d´adduction, 3xD (n° d´article: 86410) qui, au niveau de la valeur de son angle au sommet et de sa tolérance au diamètre, est parfaitement approprié.



Centrer et piloter pour les forets en HSS

Centrer pour les forets de longueurs selon la norme DIN 340

Lors de l´utilisation des forets HSS / HSS-E selon la norme DIN 340, nous recommandons de réaliser un centrage avec un diamètre de 0,5 à 0,7 x D du diamètre nominal du perçage. Les forets NC en HSS / HSS-E conviennent au mieux pour la réalisation de ces centrages. Dans le chapitre Forets NC, vous trouverez des spécifications techniques plus détaillées.

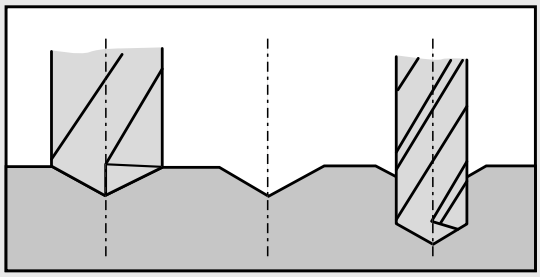


Centrer pour les forets de longueurs selon la norme DIN 1869

Lors de l´utilisation des forets HSS / HSS-E, longs et extra-longs, selon la norme DIN 1869, nous recommandons de réaliser un perçage pilote sur une profondeur de 1xD à 2xD.
Les forets extra-courts, type V selon la norme DIN 1897, conviennent au mieux pour la réalisation de ces centrages.

Forets NC

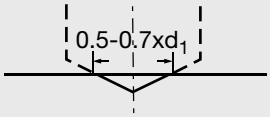
Afin de pouvoir réaliser des positionnements de perçages très précis, des perçages avec des tolérances serrées, des perçages profonds ou, en général, lorsque la forme des pièces à usiner est défavorable, rugueuse, arrondie ou en biais, nous vous recommandons de faire un centrage ou un amorçage avec un foret NC avant de percer la pièce à usiner. Cela garantit un excellent positionnement du foret et évite une déviation éventuelle du foret.
Mais aussi lorsqu´il s´agit de réaliser un chanfreinage, lamage et centrage en une seule opération, il est possible d´utiliser un foret NC à condition de choisir un diamètre avec une valeur supérieure à celle du foret de perçage.



La longueur des goujures des forets NC est très courte, le diamètre périphérique ne possède pas de listels de guidage, cela renforce leur rigidité et avantage la précision de positionnement des perçages. C´est pourquoi les forets NC sont seulement prévus pour l´amorçage et non pour le perçage en profondeur. La profondeur maximale d´amorçage est égale à la hauteur de la pointe du foret NC.

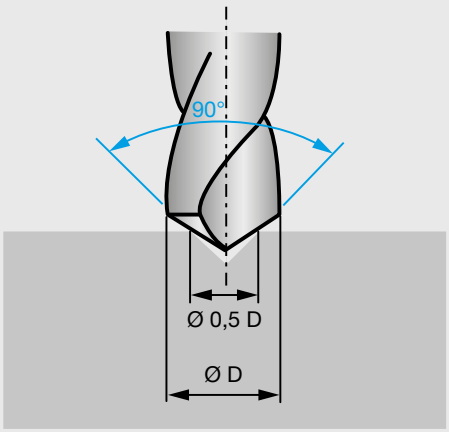
Choix du foret NC

Le diamètre optimal d´amorçage recommandé est d´une valeur de 0,5 à 0,7 x D du diamètre nominal du perçage.



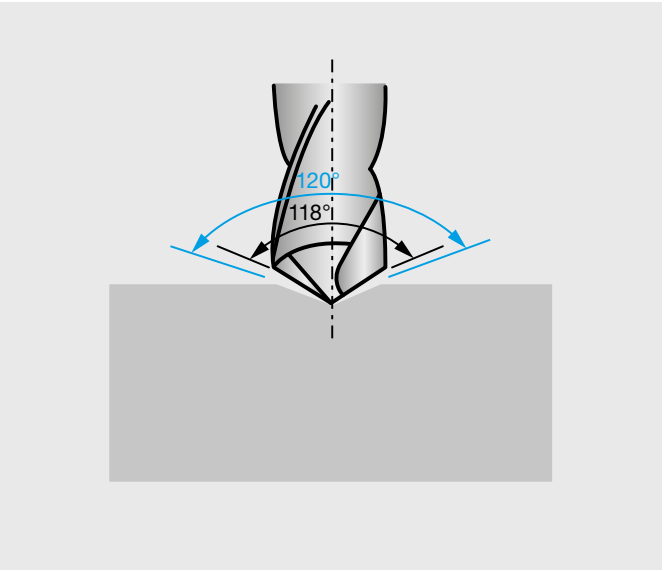
Forets NC à 90°

Les forets NC pourvus d´un angle de 90°, au sommet, sont prévus pour l´amorçage des perçages réalisés avec des forets HSS/HSS-E avec une épaisseur d´âme renforcée. Ainsi, le foret de perçage en HSS/HSS-E commence à percer avec ses arêtes de coupe principales et se guide ensuite par les becs résistants.
En outre, les forets NC avec un angle de 90° au sommet sont prévus pour réaliser l´amorçage et le chanfreinage à 90° en une seule opération, à condition de choisir un diamètre avec une valeur supérieure à celle du foret de perçage.



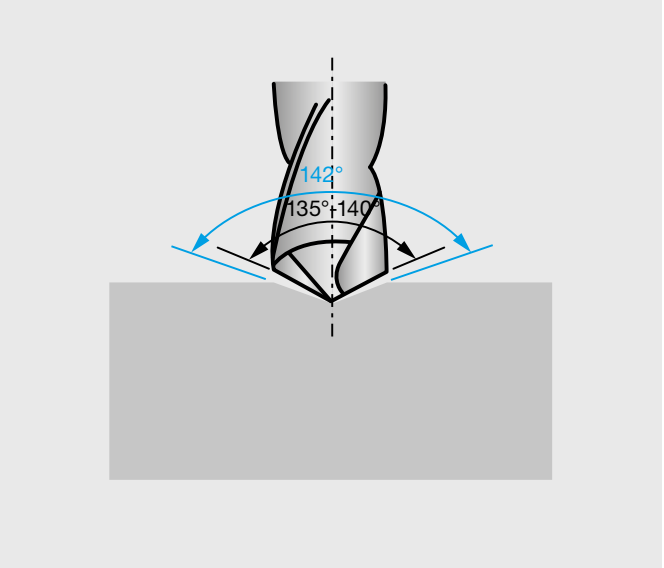
Forets NC à 120°

Les forets NC pourvus d´un angle à 120°, au sommet, sont spécialement prévus pour l´amorçage des perçages réalisés avec des forets HSS/HSS-E pourvus d´un angle au sommet de 118°. Ainsi, le foret de perçage en HSS/HSS-E commence à percer avec sa pointe, se centre et continue à se guider dans son axe.



Forets NC à 142°

Les forets NC pourvus d´un angle à 142°, au sommet, sont spécialement prévus pour l´amorçage des perçages réalisés avec des forets CW pourvus d´un angle au sommet de 135° à 140°. Ainsi, le foret de perçage en CW commence à percer avec sa pointe, se centre et continue à se guider dans son axe. Sinon, dans le cas où le foret CW commencerait à percer avec ses becs avant de percer avec sa pointe, les risques de casses au niveau des becs seraient trop élevés.



Forets NC

90°	120°	142°

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Table de conversion: pouces - millimètres de 1/64 à 11 63/64

Dimension (Pouce)	mm	Partie de Pouce (Décimal)	Dimension (Pouce)	mm	Partie de Pouce (Décimal)	Dimension (Pouce)	mm	Partie de Pouce (Décimal)	Dimension (Pouce)	mm	Partie de Pouce (Décimal)
-	0,10	0,0039	51	1,70	0,0670	4	5,31	0,2090	-	14,00	0,5512
97	0,15	0,0059		1,75	0,0689	3	5,41	0,213	9/16	14,29	0,5625
96	0,16	0,0063	50	1,78	0,0700		5,50	0,2165		14,50	0,5709
95	0,17	0,0067		1,80	0,0709	7/32	5,56	0,2188	37/64	14,68	0,5781
94	0,18	0,0071	49	1,85	0,0730	2	5,61	0,221	-	15,00	0,5906
93	0,19	0,0075		1,90	0,0748	1	5,79	0,228	19/32	15,08	0,5938
92	0,20	0,0079	48	1,93	0,0760	A	5,94	0,234	39/64	15,48	0,6094
91	0,21	0,0083		1,95	0,0768	15/64	5,95	0,2344		15,50	0,6102
90	0,22	0,0087	5/64	1,98	0,0781	-	6,00	0,2362	5/8	15,88	0,625
89	0,23	0,0091	47	1,99	0,0785	B	6,05	0,238	-	16,00	0,6299
88	0,24	0,0095	-	2,00	0,0787	C	6,15	0,242	41/64	16,27	0,6406
-	0,25	0,0098		2,05	0,0807	D	6,25	0,246		16,50	0,6496
87	0,25	0,0100	46	2,06	0,0810	1/4	6,35	0,25	21/32	16,67	0,6562
	0,26	0,0102	45	2,08	0,0820	E	6,35	0,25	-	17,00	0,6693
86	0,27	0,0105		2,15	0,0846		6,50	0,2559	43/64	17,07	0,6719
	0,27	0,0106	44	2,18	0,0860	F	6,53	0,257	11/16	17,46	0,6875
85	0,28	0,0110	43	2,26	0,0890	G	6,63	0,261		17,50	0,689
	0,29	0,0114	42	2,37	0,0935	17/64	6,75	0,2656	45/64	17,86	0,7031
84	0,29	0,0115	3/32	2,38	0,0938		6,75	0,2657	-	18,00	0,7087
-	0,30	0,0118	41	2,44	0,0960	H	6,76	0,266	23/32	18,26	0,7188
83	0,30	0,0120	40	2,50	0,0980	I	6,91	0,272		18,50	0,7283
82	0,32	0,0125	39	2,53	0,0995	-	7,00	0,2756	47/64	18,65	0,7344
	0,32	0,0126	38	2,58	0,1015	J	7,04	0,2772	-	19,00	0,748
81	0,33	0,0130	37	2,64	0,1040	K	7,14	0,281	3/4	19,05	0,75
80	0,34	0,0135	36	2,71	0,1065	9/32	7,14	0,2812	49/64	19,45	0,7656
79	0,37	0,0145	7/64	2,78	0,1094	L	7,37	0,29		19,50	0,7677
1/64	0,40	0,0156	35	2,79	0,11	M	7,49	0,2949	25/32	19,84	0,7812
78	0,41	0,0160	34	2,82	0,111		7,50	0,2953	-	20,00	0,7874
77	0,46	0,0180	33	2,87	0,113	19/64	7,54	0,2969	51/64	20,24	0,7969
-	0,50	0,0197		2,90	0,1142	N	7,67	0,3020		20,50	0,8071
76	0,51	0,0200	32	2,95	0,116		7,75	0,3051	13/16	20,64	0,8125
75	0,53	0,0210	-	3,00	0,1181	5/16	7,94	0,3125	-	21,00	0,8268
74	0,57	0,0225	31	3,05	0,12	-	8,00	0,315	53/64	21,03	0,8281
-	0,60	0,0236	1/8	3,18	0,125	O	8,03	0,316	27/32	21,43	0,8438
73	0,61	0,0240	30	3,26	0,1285	P	8,20	0,323		21,50	0,8465
72	0,64	0,0250		3,30	0,1299	21/64	8,33	0,3281	55/64	21,84	0,8594
71	0,66	0,0260	29	3,45	0,136	Q	8,43	0,332	-	22,00	0,8661
-	0,70	0,0276		3,50	0,1378		8,50	0,3346	7/8	22,23	0,875
70	0,71	0,0280	28	3,57	0,1405	R	8,61	0,339		22,50	0,8858
69	0,74	0,0292	9/64	3,57	0,1406	11/32	8,73	0,3438	57/64	22,62	0,8906
-	0,75	0,0295	27	3,66	0,144		8,75	0,3445	-	23,00	0,9055
68	0,79	0,0310	26	3,73	0,147	S	8,84	0,348	29/32	23,02	0,9062
1/32	0,79	0,0313		3,75	0,1476	-	9,00	0,3543	59/64	23,42	0,9219
-	0,80	0,0315	25	3,80	0,1495	T	9,09	0,358		23,50	0,9252
67	0,81	0,0320	24	3,86	0,152	23/64	9,13	0,3594	15/16	23,81	0,9375
66	0,84	0,0330	23	3,91	0,154	U	9,35	0,368	-	24,00	0,9449
65	0,89	0,0350	5/32	3,97	0,1562		9,50	0,374	61/64	24,21	0,9531
-	0,90	0,0354	22	3,99	0,157	3/8	9,53	0,375		24,50	0,9646
64	0,91	0,0360	-	4,00	0,1575	V	9,56	0,377	31/32	24,61	0,9688
63	0,94	0,0370	21	4,04	0,159	W	9,80	0,386	-	25,00	0,9843
62	0,97	0,0380	20	4,09	0,161	25/64	9,92	0,3906	63/64	25,00	0,9844
61	0,99	0,0390		4,20	0,1654	-	10,00	0,3937	1	25,40	1,00
-	1,00	0,0394	19	4,22	0,166	X	10,08	0,397			
60	1,02	0,0400	18	4,31	0,1695	Y	10,26	0,4040			
59	1,04	0,0410	11/64	4,37	0,1719	13/32	10,32	0,4062			
58	1,07	0,0420	17	4,39	0,173	Z	10,49	0,413			
57	1,09	0,0430	16	4,50	0,177		10,50	0,4134			
56	1,18	0,0465	15	4,57	0,18	27/64	10,72	0,4219			
3/64	1,19	0,0469	14	4,62	0,182	-	11,00	0,4331			
	1,20	0,0472	13	4,70	0,185	7/16	11,11	0,4375			
	1,25	0,0492	3/16	4,76	0,1875		11,50	0,4528			
	1,30	0,0512	12	4,80	0,189	29/64	11,51	0,4531			
55	1,32	0,0520	11	4,85	0,191	15/32	11,91	0,4688			
54	1,40	0,0550	10	4,91	0,1935	-	12,00	0,4724			
	1,45	0,0571	9	4,98	0,196	31/64	12,30	0,4844			
	1,50	0,0591	-	5,00	0,1968		12,50	0,4921			
53	1,51	0,0595	8	5,05	0,199	1/2	12,70	0,50			
	1,55	0,0610	7	5,11	0,2010	-	13,00	0,5118			
1/16	1,59	0,0625	13/64	5,16	0,2031	33/64	13,10	0,5156			
	1,60	0,0630	6	5,18	0,2040	17/32	13,49	0,5312			
52	1,61	0,0635	5	5,22	0,2055		13,50	0,5315			
	1,65	0,0650		5,25	0,2067	35/64	13,89	0,5469			

1 pouce = 25,400 0 mm, voir DIN 4890 (Edition 2 / 75)

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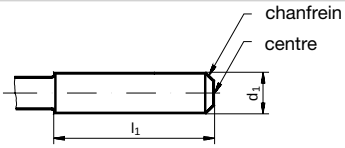
Dimensions des queues cylindriques en acier rapide
Extrait de la Norme DIN 1835

Forme A, lisse

Dimensions en mm

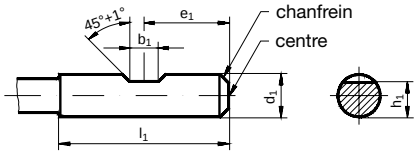


d_1 h8	l_1 +2 0	d_1 h8	l_1 +2 0	d_1 h8	l_1 +2 0
3	28	10	40	32	60
4	28	12	45	40	70
5	28	16	48	50	80
6	36	20	50	63	90
8	36	25	56		

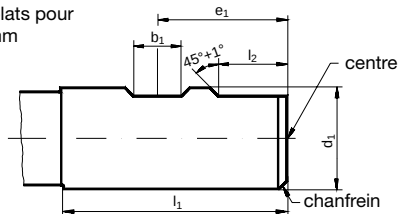
Forme B, avec méplat

Dimensions en mm

avec un méplat pour d_1 = 6 ... 20 mm



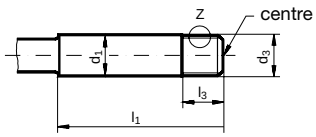
avec deux méplats pour d_1 = 25 ... 63 mm



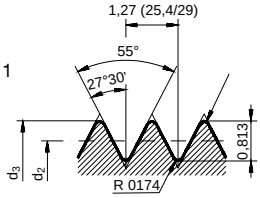
d_1 h6	b_1 +0,05 0	e_1 0 -1	h_1 h13	l_1 +2 0	l_2 +1 0	centre forme R DIN 332 partie 1
6	4,2	18	4,8	36	-	1,6x2,5
8	5,5	18	6,6	36	-	1,6x3,35
10	7	20	8,4	40	-	1,6x3,35
12	8	22,5	10,4	45	-	1,6x3,35
16	10	24	14,2	48	-	2,0x4,25
20	11	25	18,2	50	-	2,5x5,3
25	12	32	23	56	17	2,5x5,3
32	14	36	30	60	19	3,15x6,7
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

Forme D, avec queue filetée

Dimensions en mm



Détail Z
(coupe)
Profil de filetage
DIN ISO 228 partie 1



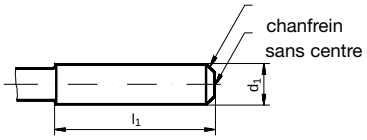
d_1 h8	d_3	zone de tolérance	d_2	zone de tolérance	l_1 +2 0	l_3 +2 0	centre forme R DIN 332 partie 1
6	5,9	0 -0,1	5,087	0 -0,1	36	10	1,6 x 2,5
10	9,9	0 -0,1	9,087	0 -0,1	40	10	1,6 x 3,35
12	11,9	0 -0,1	11,087	0 -0,1	45	10	1,6 x 3,35
16	15,9	0 -0,1	15,087	0 -0,1	48	10	2,0 x 4,25
20	19,9	0 -0,15	19,087	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

HARTNER

Dimensions des queues cylindriques en CW
Extrait de la Norme DIN 6535

Forme HA, lisse

Dimensions en mm

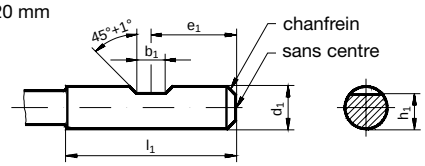


d_1 h6	l_1 +2 0	d_1 h6	l_1 +2 0	d_1 h6	l_1 +2 0
2	28	8	36	18	48
3	28	10	40	20	50
4	28	12	45	25	56
5	28	14	45	32	60
6	36	16	48		

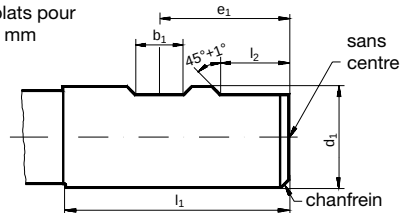
Forme HB, avec méplat

Dimensions en mm

avec un méplat pour d_1 = 6 - 20 mm



avec deux méplats pour d_1 = 25 und 32 mm

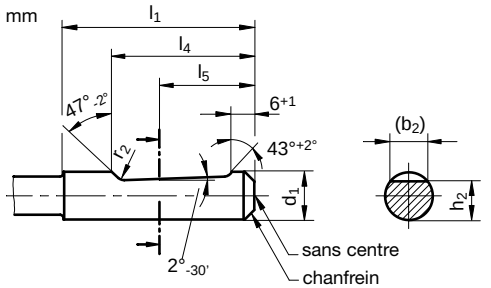


d_1 h6	b_1 +0,05 0	e_1 0 -1	h_1 h11	l_1 +2 0	l_2 +1 0
6	4,2	18	5,1	36	-
8	5,5	18	6,9	36	-
10	7	20	8,5	40	-
12	8	22,5	10,4	45	-
14	8	22,5	12,7	45	-
16	10	24	14,2	48	-
18	10	24	16,2	48	-
20	11	25	18,2	50	-
25	12	32	23	56	17
32	14	36	30	60	19

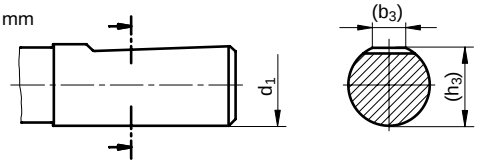
Forme HE, avec plat de serrage incliné sans trou d'huile*

*Forme: Les queues cylindriques suivant DIN 6535 sont livrables avec ou sans trou d'huile. Applications variées, dimensions et position des trous d'huile sont décrites dans les pages de prix.

pour d_1 = 6 … 20 mm



pour d_1 = 25 et 32 mm

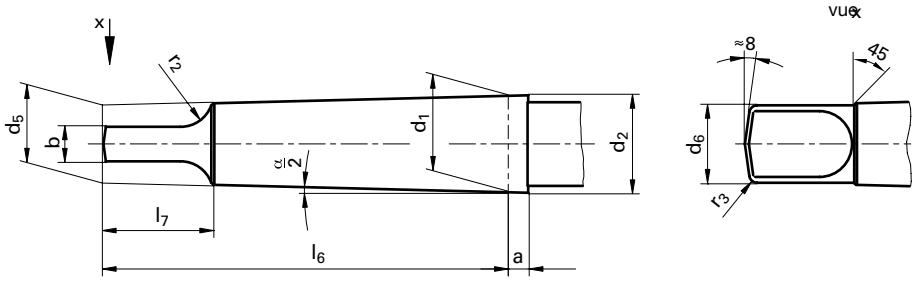


d_1 h6	(b_2) ≈	(b_3)	h_2 h13	(h_3)	l_1 +2 0	l_4 0 -1	l_5 taille nom.	r_2 min.
6	4,3	–	5,1	–	36	25	18	1,2
8	5,5	–	6,9	–	36	25	18	1,2
10	7,1	–	8,5	–	40	28	20	1,2
12	8,2	–	10,4	–	45	33	22,5	1,2
14	8,1	–	12,7	–	45	33	22,5	1,2
16	10,1	–	14,2	–	48	36	24	1,6
18	10,8	–	16,2	–	48	36	24	1,6
20	11,4	–	18,2	–	50	38	25	1,6
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

Dimensions des attachements coniques DIN 228 partie 1 (extrait)

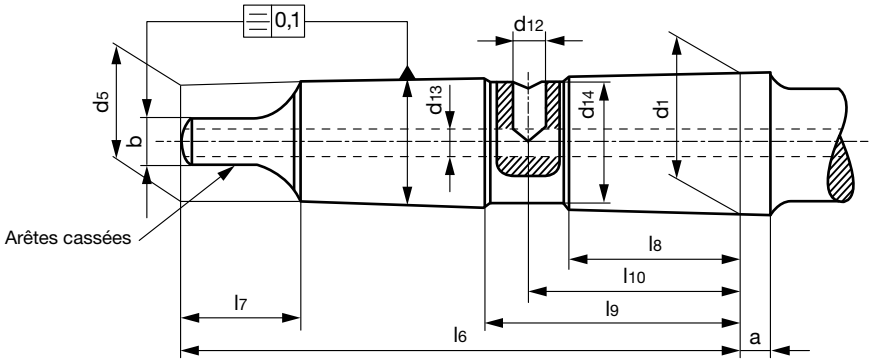
Forme B, cône Morse avec tenon d'éjection



Dimensions en mm

attachement suiv. DIN 228 forme B taille	a	dim. limit.	b h13	d_1	d_2 ≈	d_5 ≈	d_6 max.	l_6 0 -1	l_7 max.	r_2 max.	r_3 ≈	$\frac{\alpha}{2}$
MK 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″
MK 2	5,0	+1,4 0	6,3	17,780	18,0	14,0	13,5	75	16	6	1,6	1°25′50″
MK 3	5,0	+1,7 0	7,9	23,825	24,1	19,1	18,5	94	20	7	2	1°26′16″
MK 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″
MK 5	6,5	+1,9 0	15,9	44,399	44,7	36,5	35,7	149,5	29	10	3	1°30′26″

Forme BK, Cône Morse avec tenon d´éjection et adduction du produit de lubrification et de refroidissement



Dimensions en mm

attachement suiv. DIN 228 forme BK taille	a ±0,1	dim. limit.	b h13	d_1	d_5 ≈	d_{12}	d_{13}	d_{14} 0 -0,01	l_6 0 -1	l_7 max.	l_8	l_9	l_{10}
CM 1	3,5	+1,4 0	5,2	12,065	9,0	-	-	-	62	13,5	-	-	-
CM 2	5	+1,4 0	6,3	17,780	14,0	4,2	4,2	15,0	75	16	20	34	27
CM 3	5	+1,7 0	7,9	23,825	19,1	5,0	5,0	21,0	94	20	29	43	36
CM 4	6,5	+1,9 0	11,9	31,267	25,2	6,8	6,8	28,0	117,5	24	39	55	47
CM 5	6,5	+1,9 0	15,9	44,399	36,5	8,5	8,5	40,0	149,5	29	51	69	60

HARTNER

Diamètres des perçages avant le taraudage par enlèvement de copeaux

Filetages métriques ISO DIN 13

Ø nom.	pas P	Ø perçage DIN 336	Ø avant-trou filetage écrou 6H*	
			min.	max.
	mm	mm	mm	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

* M 1,1 jusqu´à M 1,4 Ø de l´avant - trou filetage écrou 5H

Filetages métriques ISO fins DIN 13

Ø nom.	x	pas P	Ø perçage DIN 336	Ø avant-trou filetage écrou 6H	
				min.	max.
		mm	mm	mm	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

Ø nom.	x	pas P	Ø perçage DIN 336	Ø avant-trou filetage écrou 6H	
				min.	max.
		mm	mm	mm	mm
M 22	x	1,00	**21,00**	20,917	21,153
M 22	x	1,50	**20,50**	20,376	20,676
M 22	x	2,00	**20,00**	19,835	20,210
M 24	x	1,00	**23,00**	22,917	23,153
M 24	x	1,50	**22,50**	22,376	22,676
M 24	x	2,00	**22,00**	21,835	22,210
M 25	x	1,00	**24,00**	23,917	24,153
M 25	x	1,50	**23,50**	23,376	23,676
M 25	x	2,00	**23,00**	22,835	23,210
M 27	x	1,00	**26,00**	25,917	26,153
M 27	x	1,50	**25,50**	25,376	25,676
M 27	x	2,00	**25,00**	24,835	25,210
M 28	x	1,00	**27,00**	26,917	27,153
M 28	x	1,50	**26,50**	26,376	26,676
M 28	x	2,00	**26,00**	25,835	26,210
M 30	x	1,00	**29,00**	28,917	29,153
M 30	x	1,50	**28,50**	28,376	28,676
M 30	x	2,00	**28,00**	27,835	28,210
M 30	x	3,00	**27,00**	26,752	27,252
M 32	x	1,50	**30,50**	30,376	30,676
M 32	x	2,00	**30,00**	29,835	30,210
M 33	x	1,50	**31,50**	31,376	31,676
M 33	x	2,00	**31,00**	30,835	31,210
M 33	x	3,00	**30,00**	29,752	30,252
M 35	x	1,50	**33,50**	33,376	33,676
M 36	x	1,50	**34,50**	34,376	34,676

Filetages UNC ASME B1.1

Ø nom.		Gang pro inch	Ø perçage DIN 336	Ø avant-trou filetage écrou 2B	
				min.	max.
			mm	mm	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

Filetages MJ DIN ISO 5855

Ø nom.	x	pas P	Ø perçage DIN 336	Ø avant-trou filetage écrou 5H*	
				min.	max.
		mm	mm	mm	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

* MJ 3 x 0,50 jusqu´à MJ 5 x 0,80 Ø de l´avant-trou filetage écrou 6H

Filetages UNJC ISO 3161

Ø nom.		filets par pouce	Ø perçage DIN 336	Ø avant-trou filetage écrou 3B	
				min.	max.
			mm	mm	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

Filetages UNJF ISO 3161

Ø nom.		filets par pouce	Ø perçage DIN 336	Ø avant-trou filetage écrou 3B	
				min.	max.
			mm	mm	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

Diamètres des perçages avant le taraudage par enlèvement de copeaux

Filetages UNF ASME B1.1

Ø nom.	filets par pouce	Ø perçage DIN 336 mm	Ø avant-trou filetage écrou 2B min. mm	Ø avant-trou filetage écrou 2B max. mm
Nr. 1 -	72	**1,55**	1,473	1,610
Nr. 2 -	64	**1,85**	1,755	1,910
Nr. 3 -	56	**2,15**	2,024	2,197
Nr. 4 -	48	**2,40**	2,271	2,459
Nr. 5 -	44	**2,70**	2,550	2,741
Nr. 6 -	40	**2,95**	2,819	3,023
Nr. 8 -	36	**3,50**	3,404	3,607
Nr. 10 -	32	**4,10**	3,962	4,166
Nr. 12 -	28	**4,60**	4,496	4,724
1/4 -	28	**5,50**	5,359	5,588
5/16 -	24	**6,90**	6,782	7,036
3/8 -	24	**8,50**	8,382	8,636
7/16 -	20	**9,90**	9,728	10,033
1/2 -	20	**11,50**	11,328	11,608
9/16 -	18	**12,90**	12,751	13,081
5/8 -	18	**14,50**	14,351	14,681
3/4 -	16	**17,50**	17,323	17,678
7/8 -	14	**20,40**	20,269	20,650
1 -	12	**23,25**	23,114	23,571
1 1/8 -	12	**26,50**	26,289	26,746
1 1/4 -	12	**29,50**	29,464	29,921
1 3/8 -	12	**32,75**	32,639	33,096
1 1/2 -	12	**36,00**	35,814	36,271

Filetages Whitworth BS84

Ø nom.	filets par pouce	Ø perçage DIN 336 mm	Ø avant-trou filetage écrou 2B min. mm	Ø avant-trou filetage écrou 2B max. mm
W 1/16	60	**1,20**	1,045	1,230
W 3/32	48	**1,80**	1,704	1,912
W 1/8	40	**2,50**	2,362	2,591
W 5/32	32	**3,20**	2,952	3,214
W 3/16	24	**3,60**	3,407	3,745
W 7/32	24	**4,50**	4,201	4,539
W 1/4	20	**5,10**	4,724	5,156
W 5/16	18	**6,50**	6,130	6,590
W 3/8	16	**7,90**	7,492	7,987
W 7/16	14	**9,20**	8,789	9,330
W 1/2	12	**10,50**	9,989	10,591
W 9/16	12	**12,00**	11,577	12,179
W 5/8	11	**13,50**	12,918	13,558
W 3/4	10	**16,25**	15,797	16,483
W 7/8	9	**19,25**	18,611	19,353
W 1	8	**22,00**	21,334	22,147
W 1 1/8	7	**24,50**	23,928	24,832
W 1 1/4	7	**27,75**	27,103	28,007
W 1 3/8	6	**30,50**	29,504	30,528
W 1 1/2	6	**33,50**	32,679	33,703
W 1 5/8	5	**35,50**	34,769	35,963
W 1 3/4	5	**39,00**	37,944	39,138
W 2	4,5	**44,50**	43,571	44,877

Filetages Whitworth BSP (selon DIN-ISO 228-1)

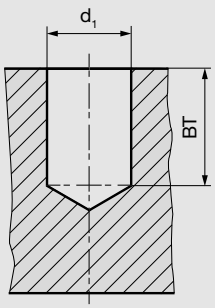
Ø nom. pouce	filets par pouce	Ø perçage DIN 336 mm	Ø avant-trou filetage écrou min. mm	Ø avant-trou filetage écrou max. mm
G 1/16	28	**6,80**	6,561	6,843
G 1/8	28	**8,80**	8,566	8,848
G 1/4	19	**11,80**	11,445	11,890
G 3/8	19	**15,25**	14,950	15,395
G 1/2	14	**19,00**	18,631	19,172
G 5/8	14	**21,00**	20,587	21,128
G 3/4	14	**24,50**	24,117	24,658
G 7/8	14	**28,25**	27,877	28,418
G 1	11	**30,75**	30,291	30,931
G 1 1/8	11	**35,50**	34,939	35,579
G 1 1/4	11	**39,50**	38,952	39,592
G 1 1/2	11	**45,25**	44,845	45,485
G 1 3/4	11	**51,00**	50,788	51,428
G 2	11	**57,00**	56,656	57,296

Filetages électriques Pg selon DIN 40430

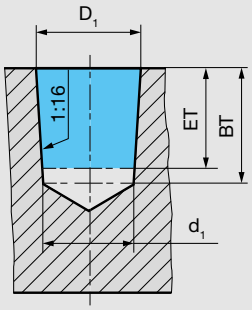
Ø nom.	filets par pouce	Ø perçage mm	Ø avant-trou filetage écrou min. mm	Ø avant-trou filetage écrou max. mm
Pg 7	20	**11,40**	11,280	11,430
Pg 9	18	**14,00**	13,860	14,010
Pg 11	18	**17,30**	17,260	17,410
Pg 13,5	18	**19,00**	19,060	19,210
Pg 16	18	**21,30**	21,160	21,310
Pg 21	16	**26,90**	26,780	27,030
Pg 29	16	**35,50**	35,480	35,730
Pg 36	16	**45,50**	45,480	45,730
Pg 42	16	**52,50**	52,480	52,730
Pg 48	16	**57,80**	57,780	58,030

Filetages coniques NPT ANSI B 2.1 cône 1:16

Version A (à proscrire)



Version B



Ø nom.	filets par pouce	Ø perçage cylindr. (A) d_1	Ø perçage conique (B) D_1	long. de filet. ET mm	prof. perç. 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

Filetages EG métr. / métr.fins (EG M 14 x 1,25) pour filets rapportés selon DIN 8140

Ø nom. x pas P mm	Ø perçage DIN 336 mm	Ø avant-trou filetage écrou min. mm	Ø avant-trou filetage écrou max. mm
EG M 4 x 0,70	**4,20**	4,152	4,292
EG M 5 x 0,80	**5,25**	5,174	5,334
EG M 6 x 1,00	**6,30**	6,217	6,407
EG M 8 x 1,25	**8,40**	8,271	8,483
EG M10 x 1,50	**10,50**	10,324	10,560
EG M12 x 1,75	**12,50**	12,379	12,644
EG M14 x 1,25	**14,40**	14,271	14,483
EG M16 x 2,00	**16,50**	16,433	16,733

Filetages EG UNC (UNC-STI) pour filets rapportés ASME B 18.29.1

Ø nom.	filets par pouce	Ø perçage mm	Ø avant-trou filetage écrou min. mm	Ø avant-trou filetage écrou 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

Filetages EG UNF (UNF-STI) pour filets rapportés ASME B 18.29.1

Ø nom.	filets par pouce	Ø perçage mm	Ø avant-trou filetage écrou min. mm	Ø avant-trou filetage écrou 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

HARTNER

Diamètres des perçages avant le taraudage par déformation

Filetages métriques ISO DIN 13

Ø nom.	pas P	Ø perçage	Ø perçage		Ø avant-trou filetage écrou 7H*	
			min.	max.	min.	max.
mm		mm	mm	mm	mm	mm
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 2 jusqu´à M 2,5 Ø de l´avant - trou filetage écrou 6H

Filetages métriques ISO fins DIN 13

Ø nom.	x	pas P	Ø perçage	Ø perçage		Ø avant-trou filetage écrou 7H*	
				min.	max.	min.	max.
mm			mm	mm	mm	mm	mm
M 2,5	x	0,35	**2,35**	2,35	2,38	2,121	2,221
M 3	x	0,35	**2,85**	2,85	2,88	2,621	2,721
M 4	x	0,35	**3,85**	3,85	3,88	3,621	3,721
M 4	x	0,50	**3,80**	3,78	3,83	3,459	3,639
M 5	x	0,50	**4,80**	4,78	4,83	4,459	4,639
M 5,5	x	0,50	**5,30**	5,28	5,33	4,959	5,139
M 6	x	0,75	**5,65**	5,62	5,70	5,188	5,424
M 7	x	0,75	**6,65**	6,62	6,70	6,188	6,424
M 8	x	0,75	**7,65**	7,62	7,70	7,188	7,424
M 8	x	1,00	**7,55**	7,52	7,62	6,917	7,217
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

Ø nom.	x	pas P	Ø perçage	Ø perçage		Ø avant-trou filetage écrou 7H*	
				min.	max.	min.	max.
mm			mm	mm	mm	mm	mm
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
M 20	x	1,50	**19,30**	19,26	19,38	18,376	19,751
M 24	x	1,00	**23,55**	23,52	23,62	22,917	23,217
M 24	x	1,50	**23,30**	23,26	23,38	22,376	22,751
M 24	x	2,00	**23,10**	23,05	23,20	21,835	22,310
M 27	x	1,50	**26,30**	26,26	26,38	25,376	25,751
M 30	x	1,50	**29,30**	29,26	29,38	28,376	28,751
M 33	x	1,50	**32,30**	32,26	32,38	31,376	31,751
M 36	x	1,50	**35,30**	35,26	35,38	34,376	34,751
M 39	x	1,50	**38,30**	38,26	38,38	37,376	37,751
M 42	x	1,50	**41,30**	41,26	41,38	42,376	42,751

* M 2,5 x 0,35 jusqu´à M 4 x 0,35 Ø de l´avant-trou filetage écrou 6H

Classe de tol. du dia. de perçage avant le taraudage par déformation (selon la Norme DIN 13, paragr. 50)

En taraudage par refoulement, il n´est pas nécessaire de respecter la classe 6 H ; la classe de tolérance 7 H suffit. La valeur du recouvrement des flancs du filetage de la vis et des flancs du filetage de l´écrou doit être au moins égale à la valeur de 0,32 x le pas du filetage. En outre, les filetages réalisés par refoulement de la matière sont plus résistants aux efforts de traction que ceux obtenus par enlèvement de copeaux puisque les tissus fibreux sont comprimés au lieu d´être interrompus.

Filetages UNC ASME B1.1

Ø nom.	filets par pouce	Ø perçage	Ø perçage		Ø avant-trou filetage écrou 2B	
			min.	max.	min.	max.
		mm	mm	mm	mm	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

Filetages UNF ASME B1.1

Ø nom.	filets par pouce	Ø perçage	Ø perçage		Ø avant-trou filetage écrou 2B	
			min.	max.	min.	max.
		mm	mm	mm	mm	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**	3,43	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	8,838	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**	15,30	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

Filetages Whitworth BSP DIN EN ISO 228-1

Ø nom.	filets par pouce	Ø perçage	Ø perçage		Ø avant-trou filetage écrou 2B	
			min.	max.	min.	max.
inch		mm	mm	mm	mm	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

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Comparaison internationale des matières

Allemagne		Grande Bretagne		Japon	USA
N° de mat.	DIN	BS	EN	JIS	AISI/SAE/ASTM
1.0711	9 S 20	220 M 07	-	SUM 21	1212
1.0715	9 SMn 28	230 M 07	-	SUM 22	1213
1.0718	9 SMnPb 28	-	-	SUM 22 L	12 L 13
1.0721	10 S 20	210 M 15	-	-	1108
1.0722	10 SPb 20	-	-	-	11 L 08
1.0723	15 S 20	210 A 15	-	SUM 32	-
1.0736	9 SMn 36	240 M 07	1B	-	1215
1.0737	9 SMnPb 36	-	-	-	12 L 14
1.0726	35 S 20	212 M 36	8M	-	1140
1.0727	45 S 20	212 M 44	-	-	1146
1.0728	60 S 20	-	-	-	-
1.0037	St 37-2	-	-	STKM 12 C	-
1.0044	St 44-2	4360-43 B	-	SM 41 B	A 570 Gr. 40
1.0116	St 37-3	4360-40 C	-	-	A 573 Gr. 58
1.0144	St 44-3	4360-43 C	-	SM 41 C	A 573 Gr. 70
1.0050	St 50-2	4360-50 B	-	SS 50	A 570 Gr. 50
1.0570	St 52-3	4360-50 B	-	SM 50 YA	-
1.0060	St 60-2	4360-SSE; SS	-	SM 58	-
1.5415	15 Mo 3	1501-240	-	-	A 204 Gr. A
1.5423	16 Mo 5	1503-245-420	-	-	4520
1.5622	14 Ni 6	-	-	-	A 350-LF 5
1.5680	12 Ni 19	-	-	-	2515
1.7335	13 CrMo 4 4	1501-620 Gr.	-	-	A 182-F11; F12
1.7337	16 CrMo 4 4	1501-620 Gr.	-	-	A 387 Gr. 12 C
1.7380	10 CrMo 9 10	1501-622 Gr.	-	-	A 182-F22
1.7709	21 CrMoV 5 7	-	-	-	-
1.7715	14 MoV 6 3	1503-660-440	-	-	-
1.7735	14 CrMoV 6 9	-	-	-	-
1.0904	55 Si 7	250 A 53	45	-	9255
1.0961	60 SiCr 7	-	-	SUP 7	9262
1.1231	CK 67	060 A 67	-	-	1070
1.1248	CK 75	060 A 78	-	-	1078; 1080
1.1274	CK 101	060 A 96	-	SUP 4	1095
1.7103	67 SiCr 5	-	-	-	-
1.7176	55 Cr 3	527 A 60	48	SUP 9 (A)	5155
1.8159	50 CrV 4	735 A 50	47	SUP 10	6150
1.0301	C 10	045 M 10	-	S 10 C	1010
1.0401	C 15	080 M 15	-	-	1015
1.1121	CK 10	045 M 10	-	S 10 C; S 9 CK	1010
1.1141	CK 15	080 M 15	32C	S 15 C; S 15 CK	1015
1.7012	13 Cr 2	-	-	-	-
1.7015	15 Cr 3	523 M 15	-	SCR 415 (H)	5015
1.5732	14 NiCr 10	-	-	SNC 415 (H)	3415
1.5752	14 NiCr 14	655 M 13	36A	SNC 815 (H)	3310; 9314
1.5860	14 NiCr 18	-	-	-	-
1.5919	15 CrNi 6	S 107	-	-	-
1.5920	18 NiCr 8	-	-	-	-
1.6523	21 NiCrMo 2	805 M 20	362	SNCM 220 (H)	8620
1.6587	17 CrNiMo 6	820 A 16	-	-	-
1.7131	16 MnCr 5	527 M 17	-	SCR 415	5115
1.7139	16 MnCrS 5	-	-	-	-
1.7147	20 MnCr 5	-	-	SMnC 420 (H)	5120
1.7149	20 MnCrS 5	-	-	-	-
1.7262	15 CrMo 5	-	-	SCM 415 (H)	-
1.7264	20 CrMo 5	-	-	SCM 421	-
1.7271	23 CrMoB 3 3	-	-	-	-
1.7311	20 CrMo 2	-	-	-	-
1.7321	20 MoCr 4	-	-	-	-
1.7323	20 MoCrS 4	-	-	-	-
1.7325	25 MoCr 4	-	-	-	-
1.7326	25 MoCrS 4	-	-	-	-
1.8504	34 CrAl 6	-	-	-	-
1.8506	34 CrAlS 5	-	-	-	-
1.8507	34 CrAlMo 5	905 M 31	-	-	A 355 Cl. D
1.0038	RSt37-2	4360 40C	1A	STKM 12A;C	A570.36

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Comparaison internationale des matières

Allemagne		Grande Bretagne		Japon	USA
N° de mat.	DIN	BS	EN	JIS	AISI/SAE/ASTM
1.0402	C22	050 A 20	2C	-	1020
1.5026	55 Si 7	250 A 53	-	-	9255
1.8509	41 CrAlMo 7	905 M 39	41B	SACM 645	A 355 Cl. A
1.8515	31 CrMo 12	722 M 24	-	-	-
1.8519	31 CrMoV 9	-	-	-	-
1.8521	15 CrMoV 5 9	-	-	-	-
1.8523	39 CrMoV 13 9	897 M 39	40C	-	-
1.8550	34 CrAlNi 7	-	-	-	-
1.0402	C 22	050 A 20	2D	-	1020
1.0406	C 25	070 M 26	-	-	1025
1.0501	C 35	060 A 35	-	-	1035
1.0503	C 45	080 M 46	-	-	1045
1.0511	C 40	-	-	-	1040
1.0528	C 30	-	-	-	-
1.1151	Ck 22	050 A 20	-	S 20 C; S 20 CK	1023
1.1158	Ck 25	070 M 26	-	S 25 C	1025
1.1178	Ck 30	-	-	-	-
1.1181	Ck 35	080 M 36	-	S 35 C	1035
1.1186	Ck 40	080 M 40	-	S 40 C	1040
1.1191	Ck 45	080 M 46	-	S 45 C	1045
1.0535	C 55	070 M 55	-	-	1055
1.0540	C 50	-	-	-	-
1.0601	C 60	080 A 62	43D	-	1060
1.1203	Ck 55	070 M 55	-	S 55 C	1055
1.1206	Ck 50	080 M 50	-	-	1050
1.1221	Ck 60	080 A 62	43D	S 58 C	1060
1.1133	20 Mn 5	120 M 19	-	-	1022; 1518
1.3505	100 Cr 6	534 A 99	31	SUJ 2	52100
1.5120	38 MnSi 4	-	-	-	-
1.5121	46 MnSi 4	-	-	-	-
1.5141	53 MnSi 4	-	-	-	-
1.5710	36 NiCr 6	640 A 35	111A	SNC 236	3135
1.6546	40 NiCrMo	311-Type7	-	SNCM 240	8740
1.6565	40 NiCrMo	311-Type6	-	SNCM 439	4340
1.7003	38 Cr 2	-	-	-	-
1.7006	46 Cr 2	-	-	-	5045
1.7020	32 Cr 2	-	-	-	-
1.7030	28 Cr 4	530 A 30	-	-	5130
1.7033	34 Cr 4	530 A 32	18B	SCr 430 (H)	5132
1.7218	25 CrMo 4	1717 CDS 110	-	SCM 420; SCM	4130
1.7220	34 CrMo 4	708 A 37	19B	SCM 432; SCCrM	4135; 4137
1.7223	41 CrMo 4	708 M 40	19A	SCM 440	4142; 4140
1.7225	42 CrMo 4	708 M 40	19A	SCM 440	4142; 4140
1.7228	50 CrMo 4	708 A 47	-	SCM 445 (H)	4150
1.1157	40 Mn 4	150 M 36	15	-	1039
1.1165	30 Mn 5	120 M 36	-	SMn 433 H; SCMn	1330
1.1167	36 Mn 5	150 M 36	-	SMn 438 H; SCMn	1335
1.1170	28 Mn 5	150 M 28	14A	SCMn 1	1330
1.3561	44 Cr 2	-	-	-	-
1.3563	43 CrMo 4	-	-	-	-
1.3565	48 CrMo 4	817 M 40	-	SNC 836	-
1.5120	38 MnSi 4	-	-	-	-
1.5121	46 MnSi 4	-	-	-	-
1.5122	37 MnSi 4	-	-	-	-
1.5131	50 MnSi4	-	-	-	-
1.5141	53 MnSi 4	-	-	-	-
1.5223	42 MnV 7	-	-	-	-
1.5710	36 NiCr 6	640 A 35	111A	SNC 236	3135
1.5736	36 NiCr 10	-	-	SNC 631 (H)	3435
1.5755	31 NiCr 14	653 M 31	-	SNC 836	-
1.6511	36 CrNiMo	816 M 40	110	SNC 836	9840
1.6513	28 NiCrMo	-	-	-	-
1.7003	38 Cr 2	-	-	-	-
1.7006	46 Cr 2	-	-	-	5045
1.7030	28 Cr 4	530 A 30	-	-	5130

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Comparaison internationale des matières

Allemagne		Grande Bretagne		Japon	USA
N° de mat.	DIN	BS	EN	JIS	AISI/SAE/ASTM
1.7033	34 Cr 4	530 A 32	18B	SCr 430 (H)	5132
1.7034	37 Cr 4	530 A 36	-	SCr 435 (H)	5135
1.7035	41 Cr 4	530 M 40	18	SCr 440 (H)	5140
1.7218	25 CrMo 4	1717 CDS 110	-	SCM 420; SCM 430	4130
1.7220	34 CrMo 4	708 A 37	19B	SCM 432; SCCrM 3	4135; 4137
1.7223	41 CrMo 4	708 M 40	19A	SCM 440	4142; 4140
1.7225	42 CrMo 4	708 M 40	19A	SCM 440	4142; 4140
1.7228	50 CrMo 4	708 A 47	-	SCM 445 (H)	4150
1.7561	42 CrV 6	-	-	-	-
1.7735	14 CrMoV 6 9	-	-	-	-
1.8159	50 CrV 4	735 A 50	47	SUP 10	6150
1.3563	43 CrMo 4	-	-	-	-
1.3565	48 CrMo 4	817 M 40	-	SNC 836	-
1.5120	38 MnSi 4	-	-	-	-
1.5121	46 MnSi 4	-	-	-	-
1.5122	37 MnSi 4	-	-	-	-
1.5223	42 MnV 7	-	-	-	-
1.5710	36 NiCr 6	640 A 35	111A	SNC 236	3135
1.5736	36 NiCr 10	-	-	SNC 631 (H)	3435
1.5864	35 NiCr 18	-	-	-	-
1.6511	36 CrNiMo 4	816 M 40	110	SNC 836	9840
1.6580	30 CrNiMo 8	823 M 30	-	SNCM 431	-
1.6582	34 CrNiMo 6	817 M 40	24	SNCM 447	4340
1.7033	34 Cr 4	530 A 32	18B	SCr 430 (H)	5132
1.7034	37 Cr 4	530 A 36	-	SCr 435 (H)	5135
1.7035	41 Cr 4	530 M 40	18	-	5140
1.7045	42 Cr 4	530 A 40	-	2245	5140
1.7218	25 CrMo 4	1717 CDS 110	-	2225	4130
1.7220	34 CrMo 4	708 A 37	19B	2234	4135; 4137
1.7223	41 CrMo 4	708 M 40	19A	2244	4142; 4140
1.7225	42 CrMo 4	708 M 40	19A	2244	4142; 4140
1.7228	50 CrMo 4	708 A 47	-	-	4150
1.7361	32 CrMo 12	722 M 24	40B	2240	-
1.7561	42 CrV 6	-	-	-	-
1.7707	30 CrMoV 9	-	-	-	-
1.7735	14 CrMoV 6 9	-	-	-	-
1.8159	50 CrV 4	735 A 50	47	2230	6150
1.8161	58 CrV 4	-	-	-	-
1.1520	C 70 W1	-	-	-	-
1.1525	C 80 W1	-	-	-	W 108
1.1545	C 105 W1	-	-	-	W 110
1.1620	C 70 W2	-	-	-	-
1.1625	C 80 W2	BW 1B	-	-	W 1
1.1645	C105 W2	-	-	-	-
1.1654	C 110 W	-	-	-	-
1.1663	C 125 W	-	-	-	W 112
1.1673	C 135 W	-	-	-	-
1.1730	C 45 W	-	-	-	-
1.1740	C 60 W	-	-	-	-
1.1744	C 67 W	-	-	-	-
1.1750	C 75 W	BW 1A	-	-	W 1
1.1820	C 55 W	-	-	-	-
1.1830	C 85 W	-	-	-	-
1.2067	100 Cr 6	BL 3	-	-	L 3
1.2101	62 SiMnCr 4	-	-	-	-
1.2103	58 SiCr 8	-	-	-	-
1.2108	90 CrSi 5	-	-	-	-
1.2162	21 MnCr 5	-	-	-	-
1.2210	115 CRV 3	-	-	-	L 2
1.2330	35 CrMo 4	708 A 37	-	2234	4135
1.2332	47 CrMo 4	709 M 40	-	2244	4142
1.2419	105 WCr 6	-	-	-	-
1.2510	100 MnCrW 4	BO 1	-	2140	O 1
1.2516	120 W 4	BF 1	-	-	-
1.2542	45 WCrV 7	BS 1	-	2710	S 1

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Comparaison internationale des matières

Allemagne		Grande Bretagne		Japon	USA
N° de mat.	DIN	BS	EN	JIS	AISI/SAE/ASTM
1.2550	60 WCrV 7	-	-	-	-
1.2721	50 NiCr 13	-	-	-	-
1.2735	15 NiCr 14	-	-	SNC 22	-
1.2762	75 CrMoNiW 6 7	-	-	-	-
1.2826	60 MnSiCr 4	-	-	-	-
1.2833	100 V 1	BW 2	-	SKS 43	W 210
1.2842	90 MnCrV 8	BO 2	-	-	O 2
1.2080	X 210 Cr 12	BD 3	-	SKD 1	D 3
1.2341	X 6 CrMo 4	-	-	-	-
1.2363	X 100 CrMoV 5 1	BA 2	-	SKD 12	A 2
1.2379	X 155 CrVMo12 1	BD 2	-	SKD 11	D 2
1.2436	X 210 CrW 12	-	-	SKD 2	-
1.2601	X 165 CrMoV 12	-	-	-	-
1.2311	40 CrMnMo 7	-	-	-	-
1.2312	40 CrMnMoS 8 6	-	-	-	-
1.2711	54 NiCrMoV 6	-	-	-	-
1.2713	55 NiCrMoV 6	-	-	SKT 4	L 6
1.2738	40 CrMnNiMo 8	-	-	-	-
1.2744	57 NiCrMoV 77	-	-	-	-
1.2764	X 19 NiCrMo 4	-	-	-	-
1.2767	X 45 NiCrMo 4	-	-	-	-
1.2083	X 42 Cr 13	-	-	SUS 420 J 2	-
1.2343	X 38 CrMoV 5 1	BH 11	-	SKD 6	H 11
1.2344	X 40 CrMoV 5 1	BH 13	-	SKD 61	H 13
1.2365	X 32 CrMoV 3 3	BH 10	-	SKD 7	H 10
1.2567	X 30 WCrV 5 3	-	-	SKD 4	-
1.2581	X 30 WCrV 9 3	BH 21	-	SKD 5	H 21
1.2885	X 32 CrMoV 3 3 3	-	-	-	-
1.2316	X 36 CrMo 17	-	-	-	-
1.0420	GS-38	-	-	-	-
1.1118	GS-24 Mn 6	-	-	-	-
1.1120	GS-20 Mn 5	-	-	-	-
1.5419	GS-22 Mo 4	-	-	-	-
1.5633	GS-24 Ni 8	-	-	-	-
1.5681	GS-10 Ni 19	-	-	-	-
1.6309	GS-20 Mn MoNi 5 5	-	-	-	-
1.6582	GS-34 CrNiMo 6	-	24	-	-
1.6748	GS-40 NiCrMo 6 5 6	-	-	-	-
1.4311	X 2 CrNiN 18 10	304 S 62	-	SUS 304 LN	304 LN
1.4401	X 5 CrNiMo 18 10	316 S 16	58J	SUS 316	316
1.4404	X 2 CrNiMo 17 13 2	316 S 11	-	SUS 316 L	316 L
1.4406	X 2 CrNiMoN 17 12 2	316 S 61	58C	SUS 316 LN	316 LN
1.4429	X 2 CrNiMoN 17 13 3	316 S 62	-	SUS 316 LN	316 LN
1.4435	X 2 CrNiMo 18 14 3	317 S 12	-	SCS 16; SUS 316	316 L
1.4436	X 5 CrNiMo 17 13 3	316 S 16	-	SUS 316	316
1.4438	X 2 CrNiMo 18 16 4	317 S 12	-	SUS 317 L	317 L
1.4460	X 8 CrNiMo 27 5	-	-	SUS 329 J 1	329
1.4462	X 2 CrNiMoN 22 5	-	-	-	-
1.4541	X 6 CrNiTi 18 10	321 S 12	58B	SUS 321	321
1.4542	X 5 CrNiCuNb 17 14	-	-	SCS 124; SUS 630	630
1.4546	X 5 CrNiNb 18 10	347 S 18	-	-	348
1.4550	X 6 CrNiNb 18 10	347 S 17	58F	SUS 347	347
1.4571	X 6 CrNiMoTi 17 12 2	320 S 31	58J	-	316 Ti
1.4580	X 6 CrNiMoNb 17 12 2	318 S 17	-	-	316 Cb
1.4301	X 5 CrNi 18 9	304 S 15	58E	SUS 304	304; 304 H
1.4303	X 5 CrNi 18 12	305 S 19	-	SUS 305	308; 305
1.4305	X 10 CrNiS 18 9	303 S 21	58M	SUS 303	303
1.4306	X 2 CrNi 19 11	304 S 12	-	SCS 19	304 L
1.4310	X 12 CrNi 17 7	301 S 21	-	SUS 301	301
1.4350	X 5 CrNi18 9	304 S 31	58E	SUS 302	304
1.4573	X 10 CrNiMoTi 18 12	320 S 33	-	-	316 Ti
1.4583	X 10 CrNiMoNb 18 12	-	-	-	318
1.4000	X 6 Cr 13	403 S 17	-	SUS 403	403
1.4002	X 6 CrAl 13	405 S 17	-	SUS 405	405
1.4016	X 6 Cr 17	430 S 15	960	SUS 430	430

Comparaison internationale des matières

Allemagne		Grande Bretagne		Japon	USA
N° de mat.	DIN	BS	EN	JIS	AISI/SAE/ASTM
1.4113	X 6 CrMo 17	434 S 17	-	SUS 434	434
1.4313	X 5 CrNi 13 4	425 C 11	-	SCS 5	CA 6-NM
1.4510	X 6 CrTi 17	-	-	SUS 430 LX	XM 8; 430 Ti
1.4512	X 5 CrTi 12	409 S 19	-	SUH 409	409
1.4005	X 12 CrS 13	416 S 21	-	SUS 416	416
1.4006	X 10 Cr 13	410 S 21	56A	SUS 410	410; CA-15
1.4021	X 20 Cr 13	420 S 37	-	SUS 420 J 1	420
1.4028	X 30 Cr 13	420 S 45	-	SUS 420 J 2	-
1.4031	X 38 Cr 13	-	-	SUS 420 J 2	-
1.4034	X 46Cr 13	420 S 45	56D	SUS 420 J 2	-
1.4057	X 20 CrNi 17 2	431 S 29	57	SUS 431	431
1.4104	X 12 CrMoS 17	-	-	SUS 430 F	430 F
1.4125	X 105 CrMo 17	-	-	SUS 440 C	440 C
1.4742	X 10 CrAl 18	430 S 15	60	SUS 430; SUH	430
1.4747	X 80 CrNiSi 20	443 S 65	59	SUH 4	HNV 6
1.4762	X 10 CrAl 24	-	-	-	446
1.4876	X 10 NiCrAlTi 33	NA 15 (H)	-	NCF 800	B 163
0.6010	GG-10	-	-	FC 10	A48-20 B
0.6015	GG-15	Grade 150	-	FC 15	A48-25 B
0.6020	GG-20	Grade 220	-	FC 20	A48-30 B
0.6025	GG-25	Grade 260	-	FC 25	A48-40 B
0.6030	GG-30	Grade 300	-	FC 30	A48-45 B
0.6035	GG-35	Grade 350	-	FC 35	A48-50 B
0.6040	GG-40	Grade 400	-	-	A48-60 B
0.6655	GGL-NiCuCr 15 6	L-NUC 15 6 2	-	-	A-436 Type 1
0.7040	GGG-40	SNG 420/12	-	FCD 40	60-40-18
0.7050	GGG-50	SNG 500/7	-	FCD 50	65-45-12
0.7060	GGG-60	SNG 600/3	-	FCD 60	80-55-06
0.7070	GGG-70	SNG 700/2	-	FCD 70	100-70-03
0.7080	GGG-80	SNG 800/2	-	-	120-90-02
0.7660	GGG-NiCr 20 2	S-NiCr 20 2	-	-	A 439 Type D-2
0.7661	GGG-NiCr 20 3	S-NiCr 20 3	-	-	A 439 Type D-2B
0.7670	GGG-Ni 22	S-Ni 22	-	-	A 439 Type D-2C
0.7673	GGG-NiMn 23 4	S-NiMn 23 4	-	-	A 439 Type D-2M
0.7676	GGG-NiCr 30 3	S-NiCr 30 3	-	-	A 439 Type D-3
0.7677	GGG-NiCr 30 1	S-NiCr 30 1	-	-	A 439 Type D-3A
0.7680	GGG-NiSiCr 30 5	S-NiSiCr 30 5 5	-	-	A 439 Type D-4
0.7683	GGG-Ni 35	S-Ni 35	-	-	A 439 Type D-5
0.7685	GGG-NiCr 35 3	S-NiCr 35 3	-	-	A 439 Type D-5B
0.8135	GTS-35	B340/12	-	-	32510
0.8145	GTS-45	P440/7	-	-	40010
0.8155	GTS-55	P510/4	-	-	50005
0.8165	GTS-65	P570/3	-	-	70003
0.8170	GTS-70	P690/2	-	-	90001
0.8035	GTW-35	W340/3	-	-	-
3.0225	Al99.5	1B	-	A1x1	-
3.0305	Al99.9	-	-	-	-
3.0505	AlMn0.5Mg0.5	N31	-	-	-
3.0515	AlMn1	N3	-	144054	-
3.0525	AlMn1Mg0.5	-	-	-	-
3.3315	AlMg1	N41	-	A2x8	-
3.3535	AlMg3	N5	-	-	-
3.1325	AlCuMg1	H14	-	-	-
3.1355	AlCuMg2	2L97	-	A3x4	-
3.2315	AlMgSi1	H30	-	-	-
3.3206	AlMgSi0.5	H9	-	A2x5	-
3.3211	AlMg1SiCu	-	-	-	-
3.4345	AlZnMgCu0.5	L86	-	-	7050
3.4365	AlZnMgCu1.5	L87	-	-	7175
-	Al1Mg1SiCrTi	-	-	-	6011
-	Al0.3Cu1Mg0.6SiCr	-	-	-	6061
-	Al1Cu1.1Mg1.4Si0.8Mn	-	-	-	6066
3.2134	G-AlSi5Cu1Mg	-	-	-	-
3.3241	G-AlMg3Si	-	-	-	-
3.3292	GD-AlMg9	-	-	-	-

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Comparaison internationale des matières

Allemagne		Grande Bretagne		Japon	USA
N° de mat.	DIN	BS	EN	JIS	AISI/SAE/ASTM
3.3541	GD-AlMg3	-	-	-	-
3.2161	G-AlSi8Cu3	-	-	-	-
3.2373	G-AlSi9Mg	-	-	-	-
3.2381	G-AlSi10Mg	LM9	-	-	-
3.2383	G-AlSi10Mg(Cu)	LM 9	-	-	A 360.2
3.2581	G-AlSi12	LM 6	-	-	A 413.2
2.2583	G-AlSi12(Cu)	LM 20	-	-	A 413.1
2.0240	CuZn15	CZ 102	-	-	C23000
2.0265	CuZn30	CZ 106	-	-	C26000
2.0321	CuZn37	CZ 108	-	-	C27200
2.0335	CuZn36	-	-	-	-
2.0360	CuZn40	-	-	-	-
2.0401	CuZn39Pb3	-	-	-	-
2.1016	CuSn4	-	-	-	-
2.1030	CuSn8	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
2.0975	G-CuAl10Ni	-	-	-	-
2.1096.01	G-CuSn5ZnPb	-	-	-	-
2.1090.01	G-CuSn7ZnPb	-	-	-	-
2.1086.01	G-CuSn10Zn	-	-	-	-
2.4360	NiCu30Fe	NA 13	-	-	Monel 400
2.4375	NiCu30Al	NA 18	-	-	Monel K-500
2.4685	G-NiMo28	-	-	-	Hastelloy B
2.4610	NiMo16Cr16Ti	-	-	-	Hastelloy C-4
2.4810	G-NiMo30	-	-	-	Hastelloy C
2.4630, 2.4951	NiCr20Ti	HR 5	-	-	Nimonic 75
2.4631	NiCr20TiAl	HR 401; 601	-	NCF 80 A	Nimonic 80 A
2.4632	NiCr20Co18Ti	-	-	-	Nimonic 90
2.4634	NiCo20Cr15MoAlTi	-	-	-	Nimonic 105
2.4662	NiCr13Mo6Ti3	-	-	-	Nimonic 901
2.4670	-	-	-	-	Nimocast 713
2.4674	-	-	-	-	Nimocast PK 24
2.6554	-	-	-	-	Waspaloy
Hardox 400	-	-	-	-	Hardox 400
Hardox 500	-	-	-	-	Hardox 500
2.4856	NiCr22Mo9Nb	NA 21	-	-	Inconel 625
2.4668	NiCr19FeNbMo	-	-	-	Inconel 718
3.7024	Ti99.5	TA 6	-	-	-
3.7064	Ti99.2	TA 7	-	-	R50400
Ti99.9	Ti99.9	TA 9	-	-	R50700
3.7112	Ti5Al2.5Sn	TA 14/17	-	-	R54520
3.7165	TiAl6V4	TA 28	-	-	R56400
1.4718	X 45 CrSi 9 3	401 S 45	52	SUH 1	HNV 3
1.4828	X 15 CrNiSi 20 12	309 S 24	-	SUH 309	309
1.4841	X 15 CrNiSi 25 20	-	-	SUH 310	314; 310
1.4845	X 12 CrNi 25 21	310 S 24	-	SUH 310; SUS 310 S	310 S
1.4864	X 12 NiCrSi 36 16	NA 17	-	SUH 330	330
1.4871	X 53 CrMnNiN 21 9	349 S 54	-	SUH 35; SUH 36	EV 8
1.4878	X 12 CrNiTi 18 9	321 S 20	-	SUS 321	321

HARTNER

Table de conversion des duretés

(N/mm²)	HRC	HB30	HV10	(N/mm²)	HRC	HB30	HV10
240		71	75	1110	35	328	345
255		76	80	1140	36	337	355
270		81	85	1170	37	346	364
285		86	90	1200	38	354	373
305		90	95	1230	39	363	382
320		95	100	1260	40	372	392
335		100	105	1300	41	383	403
350		105	110	1330	42	393	413
370		109	115	1360	43	402	423
385		114	120	1400	44	413	434
400		119	125	1440	45	424	446
415		124	130	1480	46	435	458
430		128	135	1530	47	449	473
450		133	140	1570	48	460	484
465		138	145	1620	49	472	497
480		143	150	1680	50	488	514
495		147	155	1730	51	501	527
510		152	160	1790	52	517	544
530		157	165	1845	53	532	560
545		162	170	1910	54	549	578
560		166	175	1980	55	567	596
575		171	180	2050	56	584	615
595		176	185	2140	57	607	639
610		181	190	2180	58	622	655
625		185	195		59		675
640		190	200		60		698
660		195	205		61		720
675		199	210		62		745
690		204	215		63		773
705		209	220		64		800
720		214	225		65		829
740		219	230		66		864
755		223	235		67		900
770		228	240		68		940
785		233	245				
800	22	238	250				
820	23	242	255				
835	24	247	260				
860	25	255	268				
870	26	258	272				
900	27	266	280				
920	28	273	287				
940	29	278	293				
970	30	287	302				
995	31	295	310				
1020	32	301	317				
1050	33	311	327				
1080	34	319	336				

Tolérances des diamètres

Tolérances ISO

Selon la norme DIN 1414, les forets hélicoïdaux sont réalisés avec la tolérance h8.
Pour la réalisation avec des tolérances plus serrées h7, h6 et h5.

Pour les diamètres mm		Tolérances en mm (mesurées sur les listels au niveau des becs)				
		h8	h7	h6	h5	m7
de	1,0	0	0	0		
à	3,0	–0,014	–0,010	–0,006	–0,004	
>	3,0	0	0	0	0	+0,016
à	6,0	–0,018	–0,012	–0,008	–0,005	+0,004
>	6,0	0	0	0	0	+0,021
à	10,0	–0,022	–0,015	–0,009	–0,006	+0,006
>	10,0	0	0	0	0	+0,025
à	18,0	–0,027	–0,018	–0,011	–0,008	+0,007
>	18,0	0	0	0	0	+0,029
à	30,0	–0,033	–0,021	–0,013	–0,009	+0,008
>	30,0	0	0	0	0	
à	50,0	–0,039	–0,025	–0,016	–0,011	
>	50,0	0	0	0	0	
à	80,0	–0,046	–0,030	–0,019	–0,013	
>	80,0	0	0	0	0	
à	100,0	–0,054	–0,035	–0,022	–0,015	

Tolérances des micro-forets selon DIN 1899

La précision de réalisation des micro-forets jusqu´au diamètre de 1,50 mm
correspond à la tolérance de la norme DIN 1899.

Tolérance sur le diamètre du foret = 0/ - 0,004 mm
Tolérance sur le diamètre de la queue h8 = 0/ - 0,014 mm

Tolérances selon les normes DIN – ISO 2768

Tolérances des longueurs (Valeurs en mm)

Valeur de la tol. de réalisation	Diamètres							
	0,5 à 3	> 3 à 6	> 6 à 30	> 30 à 120	> 120 à 400	> 400 à 1000	> 1000 à 2000	> 2000 à 4000
fine	± 0,05	± 0,05	± 0,1	± 0,15	± 0,2	± 0,3	± 0,5	-
moyenne	± 0,1	± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2
grande	± 0,15	± 0,2	± 0,5	± 0,8	± 1,2	± 2	± 3	± 4
très grande	–	± 0,5	± 1	± 1,5	± 2,5	± 4	± 6	± 8

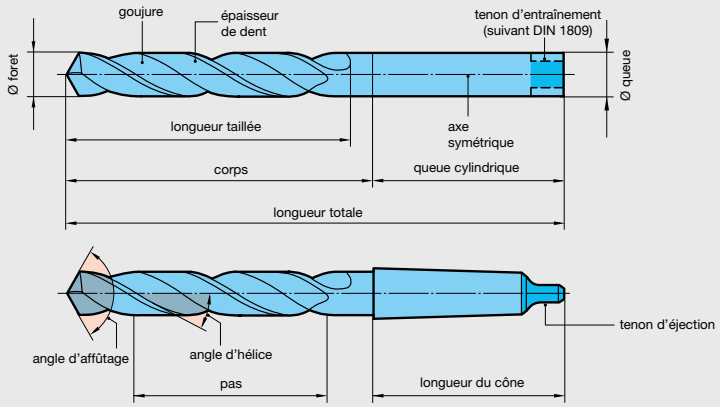
Tolérances des angles (Valeurs en degrés et minutes)

Valeur de la tol. de réalisation	Diamètres							
	à 10	> 10 à 50	> 50 à 120	> 120 à 400	> 400			
fine, moyenne	± 1°	± 0° 30'	± 0° 20'	± 0° 10'	± 0° 5'			
grande	± 1°30'	± 1°	± 0° 30'	± 0° 15'	± 0° 10'			
très grande	± 3°	± 2°	± 1°	± 0° 30'	± 0° 20'			

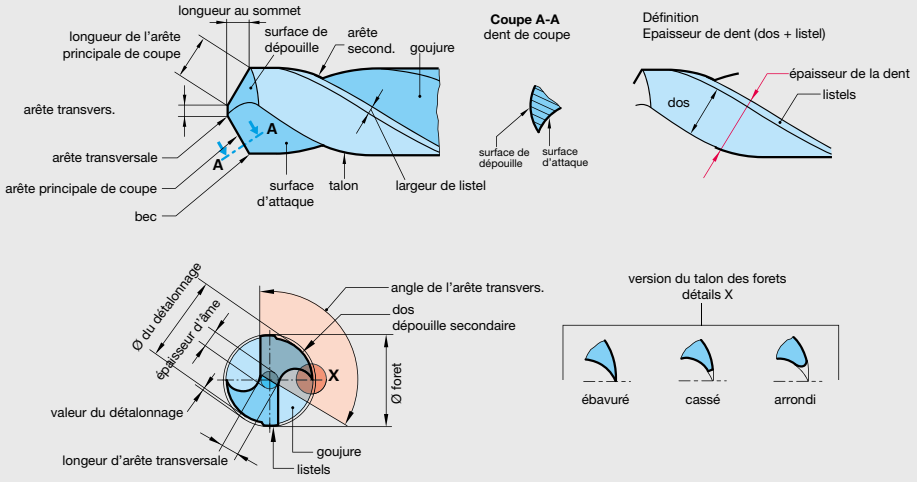
HARTNER

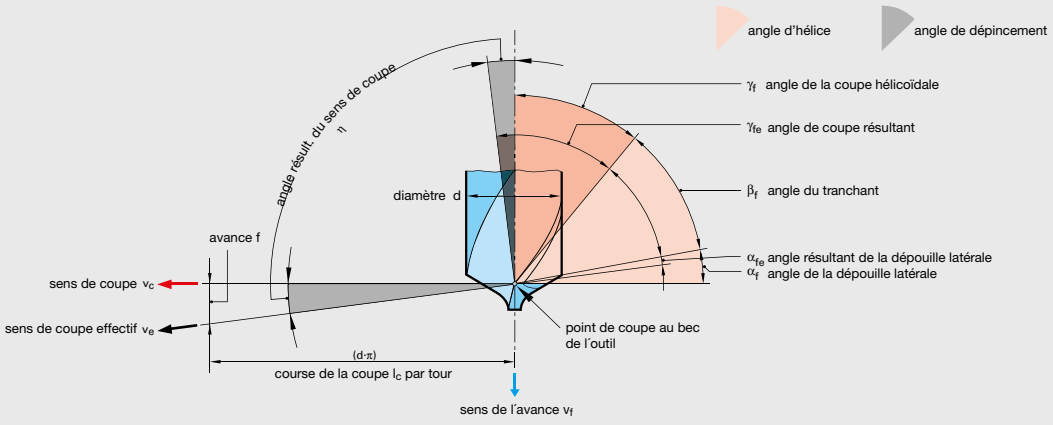
Définitions, dimensions et valeurs angulaires DIN ISO 5419 (extrait; édition 06/98)

Forets hélicoïdal à queue cyl./queue CM



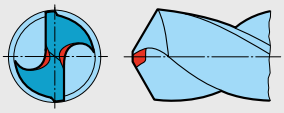
Partie taillante



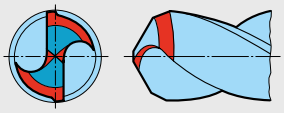


Types d’affûtages et tolérance de fabrication

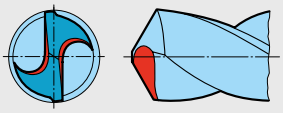
Types d’affûtages DIN 1412 (extrait; édition 03/01)



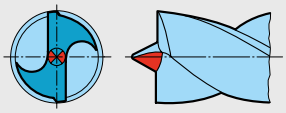
Forme A
Amincissement de l’âme



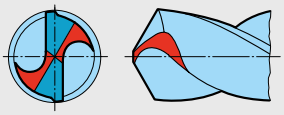
Forme D
Affûtage pour fontes



Forme B
Amincissement de l’âme et lèvres corrigées



Forme E
Pointe de centrage



Forme C
Affûtage en croix

Tolérance de fabrication des forets hélicoïdaux suivant DIN ISO 286, partie 2

diamètre (nominal) jusqu’à incl. mm	tolérance mm h8	h7
0,38 … 0,60	10	7
0,95	12	8
3,00	14	10
6,00	18	12
10,00	22	15
18,00	27	18
30,00	33	21
50,00	39	25
80,00	46	30
120,00	54	35

* Si la tolérance de fabrication des outils ISO h8 ne vous suffit pas, nous pouvons réaliser des tolérances plus serrées (voir les suppléments à la fin du chapitre „Perçage“).

Références des autres normes

DIN 228	Partie 1 cônes d’outils; cônes Morse et cônes métriques, queues coniques
DIN 1414-1	conditions de livraison pour forets héli-coïdaux en acier rapide
DIN 6580	Définitions de coupe; Mouvements en géométries des procédés de coupe
DIN 6581	Définitions de coupe; Système de référence et angles de coupe de l´outil

Ces normes sont données avec l’accord de l’institut Germanique des Normes (Deutsches Institut für Normung). La plus récente édition est livrable en format DIN A4, à cette adresse Beuth-Verlag GmbH, D-10787 Berlin.

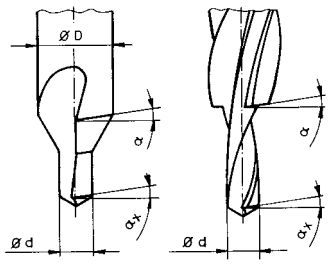
Angles de dépouille/Débourrages

Angles de coupe des forets hélicoïdaux en HSS et en HSS-E

Diamètres	Type N, Type H et sommets des forets à centrer		Type W, Type FN, Type FW, Type S, Type IS		Type V	
Ø de foret en mm au-dessus de à	Angle de dépouille α_x	Angle au sommet	Angle de dépouille α_x	Angle au sommet	Angle de dépouille α_x	Angle au sommet
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°

Angles de dépouille des angles de raccordement des forets étagés simples, des forets étagés à listels continus et des forets à centrer

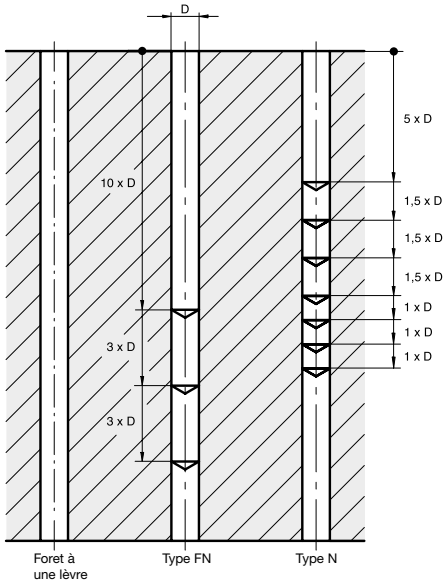
Diamètres	Type N, Type S angle de raccordement 20 - 160°	161 - 180°	Type W, Type H, angle de raccordement 20 - 160°	161 - 180°	Forets à centrer	
Ø de foret en mm au-dessus de à	Angle de dépouille α_x	Angle de dépouille α	Angle de dépouille α_x	Angle de dépouille α	En fonction du Ø D	
0,48 – 0,95	-	-	-	-	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°	–	



Débourrages lors des perçages profonds

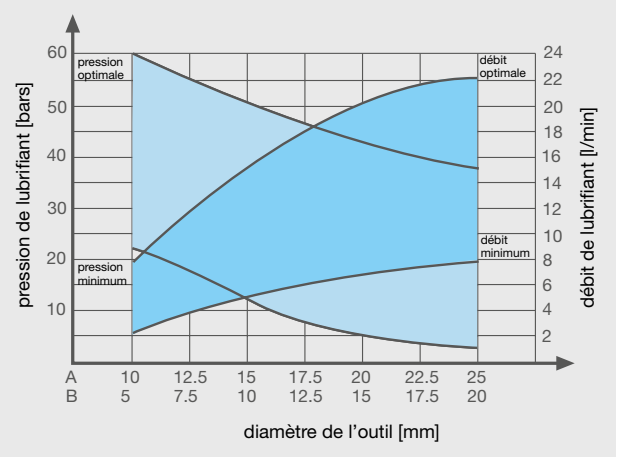
Surtout lorsqu´il s´agit de perçages profonds, les arêtes de coupe du foret doivent toujours avoir assez de liquide de refroidissement et c´est pourquoi il est nécessaire de faire un ou plusieurs débourrages. Le nombre de débourrages est dépendant de la matière à usiner, de la profondeur de perçage et du type du foret utilisé.
En utilisant des forets prévus pour les grandes profondeurs, avec un profil du type FN, le nombre de débourrages est considérablement réduit. D´autre part, une modification de la valeur de l´angle au sommet peut influencer, sur certaines matières, la forme des copeaux. Lorsque la forme des copeaux est favorable, l´évacuation est meilleure et le lubrifiant arrive plus facilement au sommet du foret. Pour les profondeurs extrêmes ou en usinage horizontal, nous recommandons les forets pourvus de canaux de lubrification intérieure.

Ces données techniques sont des valeurs moyennes conseillées.



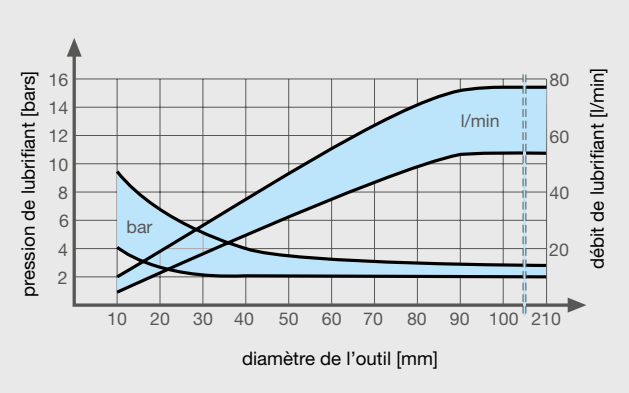
Pressions et débits des liquides de lubrification et de refroidissement

Pour les forets hélicoïdaux en CW pourvus de canaux de lubrification interne



A = diamètre de l'outil pour l'outil à canal de lubrification central
B = diamètre de l'outil pour l'outil à canaux de lubrification hélicoïdaux

Pour les forets hélicoïdaux Multiplex, à plaquettes interchangeables, pourvus de canaux de lubrification



En perçage avec des plaquettes interchangeables en HSS-E et en CW, nous recommandons, comme liquide de refroidissement et de lubrification, l´huile soluble à 5 % de concentration.

La haute performance du groupe hydraulique de lubrification est très importante. Lorsque la pression est insuffisante, avec un faible débit, l´état de surface du perçage est très mauvais et il y a des risques de casse de l´outil. La taille des particules solides du liquide filtré ne doit pas dépasser les 50 microns.

Conseils d'utilisation pour forets

N° d'article ®
N° d'article ©
Norme/DIN
Matière de coupe
Version
Type
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
© coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		● ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

HARTNER

≤3xD

81110	81120	81130	81140	84400	84501	81171	82971	81173	82972
81115			81145						
1897	1897	1897	1897	1897	1897	1897	N.U.	1897	N.U.
HSS				HSS	HSS	HSS-E			
>Ø 2,36			>Ø 2,36	T	F	>Ø 2,36			
N	H	W	FN	N	N	V	V	IS	IS
24/26	28	29	30/31	33	33	37	181	39	182

vc m/min	Gamme d'avance N°				vc m/min	Gamme d'av. N°	vc m/min	Gamme d'av. N°	vc m/min	Gamme d'avance N°			
27	**6**			6	*30*	**6**	*32*	**7**	*35*	5	5	5	5
22	**5**			5	*24*	**5**	*26*	**6**	*30*	5	5	5	5
30	**6**			**6**	*33*	**6**	*36*	**7**	*40*	5	5	5	5
30	5			5	*33*	5	*36*	6	*40*	**5**	**5**	5	5
25	**5**			**5**	*28*	**5**	*31*	**6**	*40*	5	5	5	5
25	**5**			**5**	*28*	**5**	*31*	**6**	*40*	5	5		
					25	4	*28*	5	*35*	**4**	**4**		
					22	4	*24*	5	*20*	**4**	**4**		
									16	**3**	**3**		
30	**6**			6	*33*	**6**	*36*	**7**	*36*	6	6	6	6
					20	4	*22*	5	*20*	**4**	**4**		
									15	**3**	**3**		
					14	4	*16*	5	*16*	4	**4**		
									12	3	**3**		
16	4			4	*18*	4	*20*	5	*15*	**4**	**4**		
									12	**3**	**3**		
									15	3	**3**		
									8	**2**	**2**		
									4	**1**	**1**		
									18	4	4	**4**	**4**
									14	3	3	**3**	**3**
									16	3	**3**	3	3
30	**6**			6	*33*	**6**	*36*	7	*35*	**6**	6		
30	6			6	*33*	6	*36*	**7**	*30*	**6**	**6**		
25	**6**			6	*28*	**6**	*31*	7	*30*	6	6		
20	6			6	*22*	6	*24*	**7**	*25*	**6**	**6**		
									10	3	3		
									8	1	1		
									10	2	2	2	2
									6	2	2	2	2
70			**7**	7			*85*	8	*90*			7	7
70			**7**	7			*85*	8	*90*			7	7
50	7		7	**7**			*60*	**8**	*80*			7	7
50	6			**6**			*60*	**7**	*70*			6	6
70	6	**6**		6	*80*	6	*90*	6	*70*			6	6
60	5		5	**5**	*65*	**5**	*70*	**6**	*40*			5	5
70		6			*75*	5	*80*	6	*60*			5	5
40	5		5	**5**	*45*	**5**	*50*	**6**	*40*			5	5
30	4	4		**4**	*33*	**4**	*36*	**5**	*35*	4	4	4	4
25	4			4	*27*	4	*30*	5	*30*	**4**	**4**	4	4
15	4			4	*16*	**4**	*18*	**5**	*20*	4	4	**4**	**4**
					15	4	*18*	5	*15*	4	4	**4**	**4**
18	4	4		**4**	*22*	**4**	*29*	**5**	*20*	4	4		
28	5	**5**	5	5	*36*	**5**	*47*	6	*30*			4	4

Conseils d'utilisation pour forets

N° d'article ®
N° d'article ℓ
Norme/DIN
Matière de coupe
Version
Type
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
ℓ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		● ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤3xD

81112	81000	81178	84803	84503	89253
1897	N. U.	1897	1897	1897	6539
M42	M42	HSS-E	HSS-E	HSS-E	CW mono
○	Z	S	T	F	F
N		IS	V	V	N
35	104	44	40	40	50






v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°
35	5	*42*	6	*38*	6	*38*	5	*42*	6	*104*	**5**
30	5	*36*	**5**	*33*	5	*33*	4	*36*	5	*91*	**5**
40	5	*48*	6	*44*	6	*44*	5	*48*	6	*104*	**6**
40	5	*42*	**5**	*42*	5	*38*	5	*42*	6	*91*	**5**
40	5	*44*	6	*44*	5	*44*	5	*48*	6	*104*	**5**
40	5	*44*	**5**	*44*	5	*44*	5	*48*	6	*91*	**5**
35	4	*42*	**4**			*38*	**4**	*42*	**5**	*78*	**5**
20	4	*25*	**4**			*27*	**4**	*30*	**5**	*78*	**5**
16	3	*20*	**3**			*22*	**3**	*24*	**4**		
36	6	*40*	6	*40*	6	*44*	4	*48*	5	*104*	6
20	3	*20*	**2**			*22*	**4**	*24*	**5**	*78*	5
15	3	*15*	**2**			*18*	**3**	*20*	**4**		
16		*17*	**2**			*22*	**4**	*24*	**5**	*65*	**5**
12	3	*12*	**2**			*18*	**3**	*20*	**4**		
15	3	*19*	**3**			*19*	**4**	*21*	**5**	*65*	4
12	3	*14*	**2**			*14*	**3**	*16*	**4**		
15	3	*15*	2			*14*	**3**	*17*	**4**		
8	**2**	**11**	**2**			*9*	**2**	*11*	**3**	*32*	3
4	1	6	1			*4*	1	*5*	2	*26*	4
18	3	*18*	4	*20*	4	*20*	4	*22*	5	*32*	**2**
14	3	*14*	3	*15*	**3**	*15*	**3**	*17*	**4**	*20*	**1**
16	3	*16*	**3**	*18*	**3**	*18*	**3**	*20*	**4**	*32*	**2**
35	5	*45*	**6**	*30*	6	*40*	6	*45*	7	*117*	**5**
30	5	*40*	**6**	*30*	6	*35*	**6**	*40*	**7**	*104*	**5**
30	5	*36*	6			*33*	6	*36*	7	*91*	**5**
25	5	*29*	6			*27*	6	*29*	7	*104*	**5**
10	3	*14*	**3**			*12*	3	*14*	4		
8	1	*7*	**1**	*8*	1	*6*	2	*7*	2	*20*	2
10	**2**	**9**	2	*12*	**2**	*11*	2	*12*	3	*15*	1
6	**2**	**7**	2	*8*	**2**	*7*	2	*8*	3	*15*	1
90	7			*90*	7					*260*	**8**
90	7			*90*	7					*260*	**8**
80	7	*80*	7	*80*	7					*195*	**7**
70	6	*70*	6	*70*	6					*156*	**7**
70	6	*80*	6	*70*	6					*234*	**6**
40	5	*70*	5	*70*	5					*104*	**6**
60	5	*60*	5	*60*	5					*234*	**6**
40	5	*40*	5	*40*	5					*234*	**6**
35	4	*35*	4	*35*	4	*45*	5	*50*	6	*156*	**6**
30	4	*33*	4	*33*	4	*40*	**4**	*45*	**5**	*156*	**6**
20	4	*20*	4	*20*	**4**	*23*	4	*26*	5	*91*	5
15	4	*15*	4	*15*	**4**	*17*	4	*20*	**5**	*65*	4
20		*29*	4							*65*	5
30	4	*36*	**5**	*30*	4					*52*	4
										104	4

Conseils d'utilisation pour forets

N° d'article ®
N° d'article ©
Norme/DIN
Matière de coupe
Version
Type
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
© coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		○
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		○
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		○
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		○
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		○
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		○
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		○
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		○
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		○
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		○
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		○
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		○
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		○
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		○
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		○
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		○
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		○
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		○
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤3xD

84805	84808	84806	84511	89235	89246	89301	89302	89303
N.U.	1897	1897	1897	6539	N.U.	8037	8041	8038
HSS-E-PM	HSS-E	HSS-E	HSS-E-PM	CW mono				
F	○	T	F	○	○	○	○	○
FU 500	FU 500 DZ	FU 500 DZ	FN 500	N	N	N	N	N
105	42	42	46	48	52	164	199	165









v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'avance N°			
45	**6**	35	**6**	*45*	**6**	*42*	6	*80*	4			
35	**5**	30	**5**	*35*	**5**	*37*	5	*70*	4			
50	**6**	40	**6**	*50*	**6**	*47*	**7**	*80*	**5**		4	4
40	**6**	30	**6**	*40*	**6**	*44*	6	*70*	**4**		3	3
44	**6**	32	**6**	*44*	**6**	*47*	6	*80*	4			
44	**6**	28	**6**	*44*	**6**	*47*	6	*70*	4			
40	**5**	20	**5**	*40*	**5**	*44*	**5**	*60*	4			
27	4	15	4	*27*	4	*30*	4	*60*	4			
22	3	13	3	*22*	3	*25*	**3**					
44	**6**	30	**6**	*44*	**6**	*47*	4	*80*	5			
22	4	16	4	*22*	4	*25*	**5**	*60*	4			
18	3	12	3	*18*	3	*20*	**4**					
22	4	15	4	*22*	4	*25*	**5**	*50*	4			
16	3	10	3	*16*	3	*18*	**4**					
20	4	15	4	*20*	4	*22*	**5**	*50*	3			
15	3	10	3	*15*	3	*17*	**4**					
13	3	10	3	*13*	3	*17*	**4**					
9	2			*9*	2	*12*	**2**	*25*	2		**2**	**2**
								20	3		3	3
								10			2	2
20	**4**	14	**4**	*20*	**4**	*22*	**4**	*25*	**2**			
16	**3**	10	**4**	*16*	**4**	*18*	3	*15*	1			
18	**4**	12	**4**	*18*	**4**	*20*	3	*25*	2			
45	**6**	36	**6**	*45*	**6**	*50*	**7**	*90*	**4**		4	4
40	**6**	30	**6**	*40*	**6**	*44*	**7**	*80*	**4**		4	4
40	**6**	30	**6**	*40*	**6**	*45*	**7**	*80*	**4**		4	4
30	**6**	22	**6**	*30*	**6**	*33*	**7**	*70*	**4**		4	4
						16	4	*10*			**1**	**1**
						6	2	*15*	2			
								15	1			
								15	1			
70	7	50	**7**	*70*	7			*200*	**7**			
70	7	50	**7**	*70*	7			*200*	**7**			
85	7	65	**7**	*85*	7			*150*	**6**			
70	6	60	**6**	*70*	6			*120*	**6**			
80	6	60	6	*80*	6			*180*	**6**			
80	**5**	70	**5**	*80*	**5**	*80*	5	*80*	**5**			
77	**5**	45	**5**	*77*	**5**			*180*	**5**		5	5
44	**5**	30	**5**	*44*	**5**	*60*	5	*180*	**5**		5	5
50	**4**	36	**4**	*50*	**4**	*50*	5	*120*	**5**			
40	**4**	30	**4**	*40*	**4**	*44*	5	*120*	**5**			
32	**4**	30	**4**	*32*	**4**	*33*	5	*70*	4			
28	**4**	25	**4**	*28*	**4**	*28*	5	*50*	3			
25	**4**	20	**4**	*25*	**4**	*25*	**4**	*50*	4	**4**		
27	**4**	15	**4**	*27*	**4**			*40*	3	**3**		3
								80	3	**3**		2

Conseils d'utilisation pour forets

N° d'article ®
N° d'article ©
Norme/DIN
Matière de coupe
Version
Type
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
© coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		○
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		○
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		○
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		○
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		○
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		○
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		○
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		○
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		○
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		○
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		○
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		○
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		○
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		○
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		○
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		○
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		○
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		○
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤5xD

81010	81017	82010	81020	81030	82030	81040	84406	84405	84460	84415	84502
81015			81025	81035		81045					
338	338	345	338	338	345	338	338	338	345	338	338
HSS							HSS	HSS			HSS
>Ø 2,36						>Ø 2,36	T	T	T	T	F
N	N	N	H	W	W	FN	N	N	N	FN	FN
53/57	59	173	60/62	64/66	177	67/69	73	71	176	75	75

v_c m/min	Gamme d'avance N°						v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'avance N°			v_c m/min	Gamme d'av. N°
27	**6**	**6**	**6**			6	32	**6**	30	**6**	**6**	6	32	7
22	**5**	**5**	**5**			5	26	**5**	24	**5**	**5**	5	26	6
30	**6**	**6**	**6**			**6**	36	**6**	33	**6**	**6**	**6**	36	**7**
30	5	5	5			5	36	**5**	33	5	5	5	36	6
25	**5**	**5**	**5**			5	31	**5**	28	**5**	**5**	5	31	6
25	**5**	**5**	**5**			5	31	**5**	28	**5**	**5**	5	31	6
							28	**4**	25	4	4	4	28	5
							24	4	22	4	4	4	24	5
30	6	6	6			6	36	**6**	33	**6**	**6**	6	36	7
							22	4	20	4	4	4	22	5
							16	4	14	4	4	4	16	5
16	4	4	4			4	20	4	18	4	4	4	20	5
30	**6**	**6**	**6**			6	36	**6**	33	6	6	6	36	7
30	6	6	6			6	36	**6**	33	6	6	6	36	7
25	6	6	6			6	31	**6**	28	**6**	**6**	6	31	7
25	6	6	6			6	24	**6**	22	6	6	6	24	7
80					**7**	**7**							85	8
80					**7**	**7**							85	8
70	7	7	7		7	7	**7**						60	8
70	6	6	6				**6**						60	7
50	6	6	6	6			6	90	6	80	6	6	90	7
50	5	5	5		**5**	**5**	**5**	70	**5**	65	5	5	**5**	70	6
70				**6**				80	**5**	75	5	5	5	80	6
40	5	5	5				**5**	50	**5**	45	5	5	**5**	50	**6**
30	4	4	4	4				36	**4**	33	**4**	**4**			
25	4	4	4					33	**4**	27	**4**	**4**			
15	4	4	4				4	18	**4**	16	**4**	**4**	4	18	5
								18	**4**	15	**4**	**4**	4	18	5
18	4	4	4	4			**4**	29	**4**	22	4	4	**4**	29	5
28	5	5	5	**5**	5	5		36	**5**	36	5	5			

Conseils d'utilisation pour forets

N° d'article ®
N° d'article ©
Norme/DIN
Matière de coupe
Version
Type
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
© coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		○
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		○
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		○
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		○
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		○
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		○
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		○
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		○
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		○
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		○
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		○
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		○
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		○
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		○
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		○
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		○
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		○
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		○
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤5xD

81011	82011	81041	81061	81013	82012	81012
338	345	338	338	338	345	338
HSS-E						M42
>Ø 2,36		>Ø 2,36				
N	N	FN	S	IS	IS	N
83	177	87	89	85	178	77

84800	84859	84807
338		338
HSS-E		
T	T	T
FN	N	S
91	180	95

84504	84505
338	338
HSS-E	
F	F
FN	S
91	95

Vc m/min	Gamme d'avance N°						
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
35	**4**	**4**	4				5
20	**4**	**4**	**4**				4
16	3	3	**3**	3			3
36	6	6	6	6	6	6	6
20	**4**	**4**	4				3
15	3	3	**3**	3			3
16	**4**	**4**	4				3
12	3	3	**3**	3			3
15	**4**	**4**	4				3
12	**3**	3	**3**	3			3
15	3	3	**3**	3			3
8	**2**	2		**2**			**2**
4							**1**
18	4	4	**4**	4	**4**	**4**	3
14	3	3	2	**3**	3	3	
16	3	3	3	**3**	3	3	3
35	6	6	6				5
30	**6**	**6**	6				5
30	6	6	6				5
28	**6**	**6**	6				5
10	3	3	3	3			**3**
8				1			**1**
10				**2**	2	2	2
6				**2**	2	2	2
90					**7**	**7**	7
90					**7**	**7**	7
80			7		7	7	7
70			6		6	6	6
70					6	6	6
40	**5**	5	5		5	5	5
60					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				

Vc m/min	Gamme d'avance N°		
38	6	6	
33	5	5	
44	5	5	
38	**5**	5	
44	5	5	
38	4	**4**	
27	4	**4**	
22	**3**	3	3
44	4	4	
22	4	**4**	
18	**3**	3	
22	4	**4**	
18	**3**	3	
19	**4**	**4**	
14	**3**	3	
14	**3**	3	3
9		2	**2**
20	**4**	4	4
15		3	**3**
18	3		**3**
40	6	6	
35	6	**6**	
33	6	6	
27	6	**6**	
12			**3**
6			2
11			**2**
7			**2**
88	5	5	
40		**4**	
22	4	**4**	
17	**4**	4	4
22	4	4	

Vc m/min	Gamme d'avance N°	
42	6	
36	5	
48	6	
42	**6**	
48	6	
42	5	
30	**5**	
34	**4**	4
48	6	
24	5	
20	**4**	
24	5	
20	**4**	
21	5	
16	**4**	
17	**4**	4
11	3	**2**
6	1	
22	**5**	5
17	4	**3**
20	4	**4**
45	7	
40	7	
36	7	
29	7	
14	4	**3**
7		2
12		**2**
8		**2**
85	8	
72	7	
96	6	
25	5	
20	**5**	4
24	5	

Conseils d'utilisation pour forets

N° d'article ®
N° d'article ©
Norme/DIN
Matière de coupe
Version
Type
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
© coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤5xD

81018	81019	81078	84804	84802	84801	84660
338	338	338	338	338	N.U.	345
M42	M42	HSS-E	HSS-E	HSS-E	HSS-E-PM	HSS-E
●	F	S	○	T	F	A
N	N	IS	FU 500 DZ	FU 500 DZ	FU 500	FN
79	81	97	93	93	107	176







v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°
35	6	32	7	38	6	35	**6**	45	6	45	**6**		
30	**5**	26	**6**	33	5	30	**5**	35	5	35	**5**		
40	6	36	7	44	6	40	**6**	50	6	50	**6**		
40	**5**	36	6	42	5	30	**6**	40	6	40	**5**	42	5
40	5	31	**6**	44	5	32	**6**	44	**6**	44	**6**		
40	**5**	31	**6**	44	5	28	**6**	44	**6**	44	**6**		
35	**4**	28	5			20	**5**	40	**5**	40	**5**		
20	**4**	24	5			15	4	27	4	27	4		
16	**3**					13	3	22	3	22	3		
36	6	36	**7**	40	6	30	**6**	44	**6**	44	**6**		
20	**3**	22	5			16	4	22	4	22	4		
15	**3**					12	3	18	3	18	3		
16	4	16	5			15	4	22	4	22	4		
12	3					10	3	16	3	16	3		
15	3	20	5			15	4	20	4	20	4		
12	3					10	3	15	3	15	3		
15	3					10	3	13	3	13	3		
8	2							9	2	9	2		
4	1												
18	3			20	4	14	**4**	20	**4**	20	**4**		
14	**3**			15	**3**	10	**4**	16	**4**	16	**4**		
16	**3**			18	**3**	12	**4**	18	**4**	18	**4**		
35	6	36	7	30	6	36	**6**	45	**6**	45	**6**	45	**7**
30	**6**	36	7	30	6	30	**6**	40	**6**	40	**6**	40	**7**
30	6	31	7			30	**6**	40	**6**	40	**6**	36	**7**
28	**6**	24	7			22	**6**	30	**6**	30	**6**	29	**7**
10	3												
8	**1**			8	1								
10	**2**			12	**2**								
6	**2**			8	**2**								
90	7	85	8	90	7	50	**7**	70	7	70	7		
90	**7**	85	8	90	7	50	**7**	70	7	70	7		
80	7	60	**8**	80	7	65	**7**	85	7	85	7		
70	6	60	**8**	70	6	60	**6**	70	6	70	6		
70	6	90	7	70	6	60	6	80	6	80	6	85	
70	5	70	6	70	5	70	**5**	80	**5**	88	**5**	96	
60	5	80	6	60	5	45	**5**	77	**5**	77	**5**		
40	5	50	6	40	5	30	**5**	44	**5**	44	**5**		
35	4	36	**5**	35	4	36	**4**	50	**4**	50	**4**		
33	4	33	**5**	33	4	30	**4**	40	**4**	40	**4**	25	5
20	4	18	**5**	20	**4**	30	**4**	32	**4**	32	**4**	20	5
15	4	18	**5**	15	**4**	25	**4**	28	**4**	28	**4**		
20	4	29	5			20	**4**	25	**4**	25	**4**	24	5
30	5			30	4	15	**4**	27	**4**	27	**4**		

Conseils d'utilisation pour forets

N° d'article ®
Norme/DIN
Matière de coupe
Version
Type
Lubrification
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		● ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤5xD

84811	84507	82761	84461	89244	89261
338	N.U.	N.U.	N.U.	N.U.	N.U.
HSS-E-PM	HSS-E-PM	HSS-E	HSS-E	CW mono	CW mono
T	F	○	T	○	F
FN 500 DZ	FN 500	FN	FN	N	N
		axial	axial		
99	107	120	120	100	102






v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°
40	6	42	6	48	7	60	7	80	4	100	5
32	5	37	5	38	6	48	6	70	4	90	5
45	6	47	6	48	7	60	7	80	**5**	100	**6**
40	5	44	6	38	6	48	6	70	**4**	90	**4**
42	6	47	6	48	6	60	6	80	4	100	5
40	5	47	6	48	6	60	6	70	4	90	5
28	**4**	44	**5**	45	**5**	50	**5**	60	4	80	5
25	4	30	4	30	**5**	33	**5**	60	4	80	5
20	**3**	25	**3**	28	**4**	31	**4**				
40	4	47	3	50	7	55	7	80	5	100	6
22	**4**	25	**4**	25	**5**	31	**5**	60	4	80	5
18	**3**	20	**3**	25	**4**	31	**4**				
20	**4**	25	**4**	25	**5**	30	**5**	50	4	65	5
15	**3**	18	**4**	20	**4**	24	**4**				
25	**4**	22	**5**	24	5	30	5	50	3	65	3
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	30	3
				4	**3**	5	**3**	20	2	20	2
15	4	22	4	20	**5**	25	**5**	25	**2**	30	**2**
10	3	18	3	14	**4**	18	**4**	15	1	20	**1**
12	3	20	3	16	**4**	20	**4**	25	2	30	**2**
50	**6**	50	**7**	48	7	60	7	90	**4**	115	**5**
40	**6**	40	**7**	38	**7**	48	**7**	80	**4**	100	**5**
45	**6**	44	**7**	42	7	52	7	70	**4**	90	5
32	**6**	33	**7**	35	**7**	40	**7**	80	**4**	80	5
8	3	16	4	12	**4**	15	**4**				
5	2	6	2	10	**2**	12	**2**	15	2	20	3
				14	3	18	3	15	**1**	15	**1**
				10	**3**	12	**3**	15	**1**	15	**1**
								200	**7**	260	**8**
								200	**7**	260	**8**
				95	7	120	7	150	**6**	195	**7**
				75	8	95	8	120	**6**	155	**7**
								180	**5**	235	**6**
50	5	50	5	90	6	100	6	80	**5**	100	**6**
								180	5	235	6
60	5	60	5	50	6	55	6	180	5	235	6
50	5	50	5					120	5	155	6
45	4	44	5	48	5	60	5	120	5	155	6
40	4	33	5	45	5	55	5	70	4	90	5
32	4	28	5	38	**5**	45	**5**	50	3	65	4
25	**4**	25	**4**					50	4	50	5
				38	6	48	6	40	3	65	4
								80	3	100	4

Conseils d'utilisation pour forets

N° d'article ®
N° d'article ©
Norme/DIN
Matière de coupe
Version
Type
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
© coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		○
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		○
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		○
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		○
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		○
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		○
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		○
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		○
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		○
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		○
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		○
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		○
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		○
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		○
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		○
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		○
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		○
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		○
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤10xD

81210	81317	81310	82210	81320	81330	81350	81340	84814	84812	84418	84423	84506
339	340	340	341	340	340	340	340	340	340	340	340	340
HSS								HSS-E	HSS-E	HSS		HSS
>Ø 2,36		>Ø 2,36					>Ø 2,36		T	T	T	F
N	N	N	N	H	W	FW	FN	FU500DZ	FU500DZ	N	FN	FN
122	127	124	184	128	129	133	131	143	143	135	136	95

v_c m/min	Gamme d'avance N°							v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'avance N°		v_c m/min	Gamme d'av. N°
24	6	6	6	6			**6**	29	5	32	5	28	6	**6**	30	**7**
20	5	5	5	5			**5**	22	4	25	4	22	5	**5**	24	**6**
27	6	6	6	6			**6**	32	5	35	5	30	6	**6**	33	**7**
27	5	5	5	5			5	25	5	28	5	30	5	5	33	6
22	5	5	5	5			**5**	25	5	28	5	25	5	**5**	28	**6**
22	5	5	5	5			**5**	22	5	25	5	25	5	**5**	28	**6**
								13	4	15	4	22	4	4	24	5
								12	3	13	3	18	4	4	23	5
								11	2	12	2					
27	6	6	6	6			**6**	25	5	28	5	30	6	**6**	33	**7**
								12	3	14	3	14	4	4	18	5
								11	2	12	2					
								12	3	13	3	12	4	4	15	5
								7	2	8	2					
14	4	4	4	4			4	12	3	13	9	16	4	4	19	5
								9	2	10	2	10	3	3	13	4
								9	2	10	2					
								12	3	13	3					
								7	3	8	3					
								11	3	12	3					
27	6	6	6	6			**6**	29	6	32	6	30	6	**6**	33	**7**
27	6	6	6	6			6	23	6	26	6	30	6	6	33	7
22	6	6	6	6			**6**	25	6	28	6	24	6	**6**	26	**7**
18	6	6	6	6			6	18	6	20	6	20	6	6	22	7
65					7	7		45	7	50	7					
65					7	7		45	7	50	7					
45	7	7	7	7	7		**7**	54	7	60	7	50	7	**7**	55	**8**
45	6	6	6	6			**6**	45	6	50	6	50	6	**6**	55	**7**
63	6	6	6	6	6		**6**	45	6	50	6	70	6			
54	5	5	5	5		5	**5**	60	5	70	5	60	5	**5**	65	**6**
63					**6**			40	5	50	5					
36	5	5	5	5			**5**	25	5	28	5	40	5	**5**	44	**6**
28	4	4	4	4	**4**			31	4	35	4	30	**4**			
22	4	4	4	4				22	4	25	4	25	**4**			
22	4	4	4	4			**4**	22	4	24	4	14	4	**4**	16	**5**
								18	4	20	4	12	4	4	14	5
14	4	4	4	4	4		**4**	16	4	18	4	18	4	**4**	23	**5**
22	5	5	5	5	**5**	5	5	11	4	12	4	32	5			

Conseils d'utilisation pour forets

N° d'article ®
Norme/DIN
Matière de coupe
Version
Type
Lubrification
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		● ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤10xD

81311	82211	81341	81361	81362	84508
340	341	340	340	340	340
HSS-E				HSS-E	HSS-E
>Ø 2,36		>Ø 2,36		T	F
N	N	FN	S	S	FN
138	185	139	141	141	145






v_c m/min	Gamme d'avance N°				v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°
33	5	5	5				36	**5**
27	5	5	5				30	**4**
36	5	5	5				40	**5**
32	5	5	**5**				36	5
36	5	5	5				40	**5**
36	5	5	5				40	**5**
22	4	4	**4**				26	4
18	4	4	**4**				18	4
14	3	3	**3**	3	15	3	15	3
32	5	5	5				32	**5**
18	4	4	**4**				20	4
13	3	3	**3**		13	3	18	3
14	4	4	**4**				18	4
10	3	3	**3**		10	3	12	3
13	4	4	**4**				15	4
10	3	3	**3**		10	3	12	3
12	3	3	**3**		10	3	14	**3**
6	2	2	2		8	**2**	9	**3**
4			1				5	1
12	4	4	**4**	4	15	4	14	4
8	3	3	2	**3**	10	**3**	10	**3**
10	3	3	**3**	**3**	13	**3**	12	**3**
32	6	6	6				35	**6**
27	6	6	**6**				30	6
26	6	6	6				30	**6**
24	6	6	**6**				26	6
6	3	3	3	3	6	**3**	12	3
5	1	1		1	6	1		
8				**2**	10	**2**		
5				**2**	6	**2**		
70			7				77	**7**
60			6				66	**6**
60				5				
36	5	5	5				40	**6**
54			5					
36	5	5	5				40	**6**
30	4	4	5					
24	4	4	5					
18	4	4	4				21	**5**
13	4	4	**4**	4	25	4	15	**5**
16	4	4	4				30	**5**
26				4				

Conseils d'utilisation pour forets

N° d'article ®
Norme/DIN
Matière de coupe
Version
Type
Lubrification
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		● ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤10xD

89286	82710	82521	82535	82525	82515
N.U.	N.U.	N.U.	N.U.	N.U.	N.U.
CW mono	HSS			HSS-E	HSS-E
○	○	●	●	●	●
N	FN	N	FN	FN	FN
	axial	axial	axial	axial	axial
146	121	195	196	197	198






v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'avance N°			v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°
		26	6	6	6	35	6	30	**5**
		22	5	5	5	30	5	25	**4**
		30	6	6	6	30	6	30	**5**
		30	**5**	**5**	**5**	30	5	25	**4**
		24	**5**	**5**	**5**	35	5	30	**4**
		24	**5**	**5**	**5**	29	5	25	**4**
		22	4	4	4	22	**4**	18	**3**
		20	4	4	4	18	**4**	16	**3**
		14	3	3	3	14	**3**	12	**2**
		30	**6**	**6**	**6**	35	6	30	**5**
		17	4	4	4	18	**4**	16	**3**
		12	3	3	3	14	**3**	12	**2**
		14	4	4	4	14	**4**	12	**3**
		10	3	3	3	12	**3**	10	**2**
		15	**4**	**4**	**4**	15	4	13	**3**
		10	3	3	3	11	**3**	9	**2**
		10	3	3	3	11	**3**	9	**2**
		7	2	2	2	8	**2**	6	**2**
						4	2	4	**1**
						14	**4**	12	**3**
						10	3	8	**2**
						12	**3**	12	**2**
		30	**6**	**6**	**6**	30	6	28	**5**
		30	6	6	6	24	**6**	22	**5**
		24	**6**	**6**	**6**	24	6	22	**5**
		20	6	6	6	20	**6**	18	**5**
		7	3	3	3	8	3	6	**2**
						8	**1**	6	**1**
						10	**2**	8	**2**
						8	**2**	6	**2**
		80	**6**						
		50	**7**	**7**	**7**	60	7	55	**6**
		50	**6**	**6**	**6**	50	6	44	**5**
		60	**5**	**5**	**5**	38	5	35	**4**
						55	5	50	4
		40	**5**	**5**	**5**	36	5	33	**4**
		24	**4**	**4**	**4**	24	4	22	**4**
		24	**4**	**4**	**4**	20	**4**	18	**4**
		22	4	4	4	14	**4**	12	**4**
50	**4**								
40	**3**	24	**5**	**5**	**5**	25	5	25	**4**
80	**3**								

Conseils d'utilisation pour forets

N° d'article ®

Norme/DIN

Matière de coupe

Version

Type

Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
- ○ Air
- ● Huile
- ● Huile soluble

Sens de coupe:
- ® coupe à droite
- Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		○
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		○
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		○
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		○
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		○
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		○
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		○
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		○
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		○
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		○
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		○
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		○
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
et fontes malléables	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		○
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		○
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		○
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		○
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		○
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		○
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

81410	82310	81450	81440	81740	82340	82466	84425	81441	82341
81510	82410		81540	81750	82440	82467	84426	81541	
81610			81640	81760		82468		81641	
						82469			
1869	1870	1869	1869	N.U.	1870	N.U.	1869	1869	1870
HSS							HSS	HSS-E	HSS-E
>Ø 2,36			>Ø 2,36		>Ø 16,0	>Ø 16,0	T		
N	N	FW	FN	FN	FN	FN	FN	FN	FN
147/152/156	186/189	149	148/153/157	159-161	187/190	191-194	150/154	151/155/158	188
①	⑤	③	②	④	④	④	⑥	②	④

v_c m/min	Gamme d'avance N°							v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°
22	5	5		5	5	5	5	28	5	30	4	30	4
18	4	4		4	4	4	4	22	4	25	4	25	4
20 22	5	5		5	5	5	5	28	5	33	4	33	4
20 18	4	4		4	4	4	4	22	4	30	4	30	4
25 22	4	4		4	4	4	4	28	4	33	4	33	4
25 18	4	4		4	4	4	4	22	4	33	4	33	4
								16	3	20	3	20	3
12	3	3								14	3	14	3
										10	2	10	2
22	5	5		5	5	5	5	28	5	29	4	29	4
10	3	3								14	3	14	3
										10	2	10	2
8	3	3								10	3	10	3
										8	2	8	2
12	3	3		3	3	3	3	12	3	11	3	11	3
6	2	2		2	2	2	2	8	2	8	2	8	2
6	2	2								8	2	8	2
										5	1	5	1
										3	1	3	1
										10	3	10	3
										8	2	8	2
										10	2	10	2
22	5	5		5	5	5	5	28	5				
18	5	5		5	5	5	5	22	5	20	5	20	5
20	5	5		5	5	5	5	25	5				
14	5	5		5	5	5	5	18	5	16	5	16	5
										5	2	5	2
								6	1	5	1	5	1
										6	1	6	1
										5	1	5	1
55			6					70	6				
55			6					70	6				
45	6	6		6	6	6	6	55	6	50	6	50	6
36	5	5		5	5	5	5	45	5	40	5	70	5
55	5	5	5	5	5	5	5	70	5				
22	4	4		4	4	4	4	28	4	30	4	30	4
45	4	4								45	4	45	4
28	4	4		4	4	4	4	36	4	30	4	30	4
22	3	3		3	3	3	3	28	3	25	4	25	4
20	3	3		3	3	3	3	25	3	20	4	20	4
18	3	3		3	3	3	3	22	3	16	3	16	3
								18	3	10	3	10	3
12	3	3		3	3	3	3	15	3	14	3	14	3
18	4	4	4	4	4	4	4	22	4	20	3	20	3

Conseils d'utilisation pour micro forets

N° d'article Ⓡ
N° d'article Ⓛ
Norme/DIN
Matière de coupe
Nuance carbure
Version
Type
Lubrification
Prix/dim. page

Ø outil mm	Gamme d'avance n°								
	101	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**
	f (mm/rév.)								
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

Ø outil mm	Gamme d'avance n° N° d'article 6400/6401/6408/6412												
	56	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**
	f (mm/rév.)												
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
Ⓡ coupe à droite
Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		○
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		○
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		○
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		○
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		○
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		○
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		○
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		○
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		○
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		○
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		○
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		○
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
et fontes malléables	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		○
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		○
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		○
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		○
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		○
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		○
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

				≤4xD	≤7xD	≤5xD	≤8xD	≤15xD
87011 87016	84810	89281	86402	86400	86401	86405	86408	86412
1899	1899	N. Usine	N. Usine	N. Usine	N. Usine	N. Usine	N. Usine	N. Usine
HSS-E-PM	HSS-E-PM	CW mono	CW mono	CW mono	CW mono	CW mono	CW mono	CW mono
		K10/K20	K/P	K/P	K/P	K/P	K/P	K/P
○	T	○	A	A	A	A	A	A
N	N	N	N	N	N	N	N	N
						axial	axial	axial
329/331	332	335	333	334	336	337	338	339









v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'avance N°		v_c m/min	Gamme d'avance N°		
21	106	*27*	106	*50*	105	*100*	**62**	*100*	**64**	**62**	*105*	**62**	**58**	**58**
18	105	*23*	105	*35*	104	*100*	**62**	*100*	**64**	**62**	*100*	**62**	**58**	**58**
18	106	*23*	106	*50*	**105**	*100*	**62**	*100*	**64**	**62**	*105*	**62**	**59**	**59**
16	105	*21*	105	*45*	**104**	*90*	**61**	*90*	**63**	**61**	*90*	**61**	**59**	**59**
20	105	*26*	105	*45*	104	*90*	**62**	*90*	**64**	**62**	*95*	**62**	**58**	**58**
18	105	*23*	105	*35*	104	*90*	**62**	*90*	**64**	**62**	*95*	**62**	**58**	**58**
14	**104**	*18*	**104**	*30*	103	*90*	**61**	*90*	**63**	**61**	*90*	**61**	**58**	**58**
14	**104**	*18*	**104**	*30*	103	*90*	**61**	*90*	**63**	**61**	*90*	**61**	**58**	**58**
12	103	*16*	103			*70*	**60**	*70*	**62**	**60**	*70*	**60**	**58**	**58**
18	106	*23*	106	*50*	103	*100*	**61**	*100*	**63**	**61**	*100*	**61**	**57**	**57**
14	**104**	*18*	**104**	*40*	103	*85*	**61**	*85*	**63**	**61**	*85*	**61**	**58**	**58**
12	103	*16*	103			*70*	**60**	*70*	**62**	**60**	*70*	**60**	**58**	**58**
14	**104**	*18*	**104**	*25*	103	*70*	**60**	*70*	**62**	**60**	*70*	**60**	**57**	**57**
12	103	*16*	103			*60*	**60**	*60*	**62**	**60**	*60*	**60**	**57**	**57**
16	**104**	*20*	**104**	*25*	103	*50*	**60**	*50*	**62**	**60**	*50*	**60**	**58**	**58**
14	103	*18*	103			*60*	**60**	*60*	**62**	**60**	*50*	**60**	**58**	**58**
14	103	*18*	103					*60*	**57**	**57**	*50*	**57**	**57**	**57**
8	102	*10*	102	*20*	102			*60*	**57**	**57**	*50*	*57*	57	57
				15	104									
18	104	*20*	104	*25*	**103**			*30*	57	57	*70*	**57**	**57**	**57**
14	103	*16*	103	*25*	**102**			*15*	56	56	*60*	**56**	**56**	**56**
16	103	*18*	103	*25*	**102**			*30*	57	57	*70*	**57**	**57**	**57**
26	106	*33*	106	*80*	**105**	*130*	**66**	*130*	**68**	**66**	*150*	**60**	**60**	**60**
22	**106**	*28*	**106**	*60*	**105**	*130*	**66**	*130*	**68**	**66**	*140*	**60**	**60**	**60**
18	106	*23*	106	*60*	105	*130*	**66**	*130*	**68**	**66**	*140*	**60**	**60**	**60**
22	**106**	*28*	**106**	*50*	**105**	*120*	**65**	*120*	**67**	**65**	*130*	**60**	**60**	**60**
				15	**103**			*10*	56	56	*25*	*56*	56	56
				45	**104**			*15*	56	56	*35*	*56*	56	56
				25	**104**			*15*	56	56	*35*	*56*	56	56
				160	**107**			*70*	68	68	*70*	*68*	68	68
				150	**106**			*70*	68	68	*70*	*68*	68	68
26	107			*100*	**106**			*135*	59	59	*135*	*59*	59	59
18	106			*60*	**106**			*135*	59	59	*135*	*59*	59	59
75	106	*80*	106	*150*	**105**									
42	105	*53*	105	*50*	**105**									
				67	106									
22	105	*28*	105	*44*	104									
22	104	*28*	104	*68*	103									
18	104	*23*	104	*49*	103									
13	104	*16*	104	*53*	103									
		14	104	*36*	103									
16	104	*20*	104	*50*	103									
18	104	*23*	104	*36*	103									
				60	104									

Conseils d'utilisation pour TS-Drills

N° d'article Ⓡ
Norme/DIN
Matière de coupe
Nuance carbure
Version
Type
Schaftform
Lubrification
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n° 1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
Ⓡ coupe à droite
Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
et fontes malléables	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		● ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤3xD

89306	89264	89237	89422	89413	89402	89401	89450	89550	89266
6538K	6537K	6539	6537K	6537K	6537K	6539	6537K	6537K	6537K
Carbure	CWmono		CWmono	CWmono			CWmono	CWmono	CWmono
	K/P	K/P		K/P	K/P	K/P	K/P	K/P	K/P
T	T	T	Y	F	F	F	a	a	T
TS80U	TS100U	TS100U	TS100H	TS100U	TS100U	TS100U	TS100 INOX		TS100U
HE	HE	DZ	HA	HA	HE	DZ	HA	HE	HE
							axial	axial	axial
221	210	216	214	212	212	216	227	227	222






v_c m/min	Gamme d'av. N°
95	6
80	5
95	7
75	6
80	6
75	6
70	6
75	6
60	5
90	7
75	6
60	5
75	6
60	5
45	5
35	5
40	4
40	2
35	2
35	2
150	7
110	7
110	7
90	6
200	8
200	8
170	8
140	7

v_c m/min	Gamme d'avance N°
100	6
85	5
110	7
85	6
90	6
85	6
80	6
80	6
75	5
100	7
90	6
65	4
75	5
70	4
50	5
40	4
35	2
35	1
20	1
40	2
15	1
35	2
160	7
120	7
120	6
95	6
25	2
20	3
15	1
15	1
200	8
200	8
170	8
140	7
200	7
80	6
210	7
140	6
80	5
65	5
60	4
45	4

v_c m/min	Gamme d'av. N°
130	7
110	6
145	8
110	7
120	7
110	7
105	7
105	7
100	6
130	8
120	7
85	5
100	6
90	5
65	6
55	5
55	4
45	3
40	1
20	1
40	2
15	1
35	2
25	4
15	1
15	1

v_c m/min	Gamme d'avance N°		
130	7	7	7
110	6	6	6
145	8	8	8
110	7	7	7
120	7	7	7
110	7	7	7
105	7	7	7
105	7	7	7
100	6	6	6
130	8	8	8
120	7	7	7
85	5	5	5
100	6	6	6
90	5	5	5
65	6	6	6
55	5	5	5
45	3	3	3
40	1	1	1
20	1	1	1
40	2	2	2
15	1	1	1
35	2	2	2
210	8	8	8
155	8	8	8
155	7	7	7
125	7	7	7
35	3	3	3
25	4	4	4
15	1	1	1
15	1	1	1
260	9	9	9
260	9	9	9
220	8	8	8
180	8	8	8
260	8	8	8
105	7	7	7
270	8	8	8
180	7	7	7
105	6	6	6
85	6	6	6
80	5	5	5
60	5	5	5

v_c m/min	Gamme d'avance N°	
80	5	5
60	2-3	2-3
80	5	5
30	4	4
45	4	4
40	3	3

v_c m/min	Gamme d'av. N°
110	6
90	5
130	7
110	7
100	7
95	6
90	6
90	6
80	6
110	7
90	6
65	4
85	6
80	5
60	5
50	4
45	3
45	2
40	2
20	1
45	4
40	2
35	4
160	8
120	8
100	8
95	7
30	2
25	3
35	3
30	2
240	8
240	8
200	8
170	8
230	7
95	6
250	7
170	6
95	6
80	5
70	5
60	5

Conseils d'utilisation pour TS-Drills

N° d'article Ⓡ
Norme/DIN
Matière de coupe
Nuance carbure
Version
Type
Forme d'attachement
Lubrification
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n° 1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
◍ Huile soluble

Sens de coupe:
Ⓡ coupe à droite
Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	◍ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	◍ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	◍
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	◍
Fontes dures	–		≤350 HB	◍
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

HARTNER

≤3xD

89410	89415
6537K	6537K
CWmono	
K/P	K/P
F	F
TS 100 U	TS 100 U
HA	HE
axial	axial
223	223

89423	89424
6537K	6537K
CWmono	
Y	Y
TS 100 H	TS 100 H
HA	HE
axial	axial
225	225

≤4xD

89292
WN
CWmono
K
○
TS 150 GG
HA
axial
229

≤5xD

89307
6538M
Carbure
P
T
TS 80 U
HE
axial
230

89420
6537L
CWmono
K/P
F
TS 100 R
HA
axial
234

89451	89551
6537L	6537L
CWmono	
K/P	K/P
a	a
TS 100 INOX	
HA	HE
axial	axial
238	238





v_c m/min	Gamme d'avance N°	
145	7	7
120	6	6
170	8	8
145	8	8
130	8	8
125	7	7
120	7	7
120	7	7
105	7	7
145	8	8
120	7	7
85	5	5
110	**7**	**7**
105	**5**	**5**
80	**6**	**6**
65	**5**	**5**
60	**4**	**4**
60	**3**	**3**
55	**3**	**3**
35	**2**	**2**
60	**5**	**5**
55	**2**	**2**
45	**5**	**5**
210	9	9
160	9	9
140	9	9
130	8	8
40	3	3
35	**4**	**4**
45	**4**	**4**
40	**3**	**3**
310	9	9
310	9	9
260	9	9
220	9	9
280	8	8
125	**7**	**7**
325	**8**	**8**
220	7	7
125	7	7
105	6	6
90	6	6
80	6	6

v_c m/min	Gamme d'avance N°	
145	**7**	**7**
120	**6**	**6**
170	**8**	**8**
145	**8**	**8**
130	**8**	**8**
125	**7**	**7**
120	**7**	**7**
120	**7**	**7**
105	**7**	**7**
145	**8**	**8**
120	**7**	**7**
85	**5**	**5**
110	**7**	**7**
105	**5**	**5**
80	**6**	**6**
65	**5**	**5**
60	**4**	**4**
60	**3**	**3**
55	**3**	**3**
35	2	2
35	**4**	**4**
45	4	4
40	3	3

v_c m/min	Gamme d'av. N°
120	7
100	7
90	7
80	7
40	2
410	**9**
410	**9**
380	**9**
330	**9**
280	9
110	6
80	5

v_c m/min	Gamme d'av. N°
95	5
80	4
95	6
75	5
80	5
75	5
75	5
75	5
55	4
90	6
75	5
55	4
70	5
55	4
40	4
35	4
40	3
40	2
35	2
35	2
150	6
110	6
110	6
90	5
200	7
200	7
170	7
140	6

v_c m/min	Gamme d'av. N°
210	**9**
160	**9**
160	**9**
130	**8**
130	**8**
100	**8**
80	**8**
60	**8**

v_c m/min	Gamme d'avance N°	
80	**5**	**5**
60	**2-3**	**2-3**
80	**5**	**5**
30	4	4
45	4	4
40	3	3

Conseils d'utilisation pour TS-Drills

N° d'article ®
Norme/DIN
Matière de coupe
Nuance carbure
Version
Type
Forme d'attachement
Lubrification
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n° 1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
et fontes malléables	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		● ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤5xD

89275	89414	89417	89272	89411	89408	89425	89426
WN	6537L	6537L	6537L	6537L	6537L	6537L	6537L
CWmono	CWmono	CWmono	CWmono	CWmono	CWmono	CWmono	CWmono
K/P	K/P	K/P	K/P	K/P	K/P		
T	F	F	T	F	F	Y	Y
TS100U	TS100U	TS100U	TS100U	TS100U	TS100U	TS100H	TS100H
DZ	HA	HE	HE	HA	HE	HA	HE
			axial	axial	axial	axial	axial
220	218	218	231	232	232	236	236








v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'avance N°		v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'avance N°		v_c m/min	Gamme d'avance N°	
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			

Conseils d'utilisation pour TS-Drills

N° d'article Ⓡ
Norme/DIN
Matière de coupe
Nuance carbure
Version
Type
Forme d'attachement
Lubrification
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
Ⓡ coupe à droite
Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		○
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		○
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		○
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		○
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		○
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		○
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		○
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		○
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		○
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		○
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		○
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		○
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
et fontes malléables	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		○
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		○
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		○
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		○
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		○
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		○
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤5xD

89560	89460	89239	89247
6537L	6537L	6539	6537L
CW mono	CW mono	CW mono	
K	K/P	K	K
○	F	○	○
TS 100 ALU	TS 100 HPC	TS 3 G	TS 3 G
HA	HA	DZ	HA
	axial		
240	242	263	262



v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	
		200	8			
		200	7			
		200	8			
		200	8			
		180	8			
		160	8			
		130	8			
		120	8			
		120	7			
		180	8			
		120	8			
		110	7			
		110	7			
		100	5			
		90	7			
		65	6			
		60	5			
		60	5			
		55	3			
		80	5			
		60	5			
		180	9	100	6	6
		160	9	80	6	6
		140	9	80	6	6
		140	8	70	6	6
		140	8			
		140	8			
		80	7			
		80	7			
		30	4			
		40	4			
		35	3			
350	9			180	7	7
350	9			160	7	7
320	8			150	7	7
280	7			120	6	6
320	7			180	6	6
190	7					
160	6			180	6	6
160	6					
160	6					
160	6					
150	6					
150	6					
100	3					
100	3					
100	2					

≤7xD

89308	89294	89421
6538L	WN	WN
CW mono	CW mono	CW mono
P	K	K/P
T	○	F
TS 80 U	TS 150 GG	TS 100 R
HE	HA	HA
	axial	axial
244	245	248



v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°
95	4				
75	3				
90	5				
75	4				
80	4				
75	4				
60	4				
75	4				
60	3				
90	5				
75	4				
55	3				
75	4				
55	3				
40	3				
35	3				
40	2				
35	1				
33	1				
25	1				
150	5	120	6	210	8
110	5	100	6	160	8
110	5	90	6	160	8
90	4	80	6	130	7
		40	2		
				130	7
				100	7
				80	7
				60	7
180	6	410	8		
180	6	410	8		
160	6	380	8		
130	5	330	8		
		280	7		
		110	6		
		80	5		

Conseils d'utilisation pour TS-Drills

N° d'article ®
Norme/DIN
Matière de coupe
Nuance carbure
Version
Type
Forme d'attachement
Lubrification
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Sens de coupe:
® coupe à droite
Ⓛ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		○
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		○
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		○
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		○
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		○
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		○
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		○
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		○
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		○
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		○
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		○
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		○
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
et fontes malléables	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		○
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		○
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		○
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		○
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		○
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		○
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

HARTNER

≤7xD ≤10xD ≤12xD

	89461		89412	89416		89427		89293	89295		89418
	6537L		WN	WN		WN		WN	WN		WN
	CW mono		CW mono			CW mono		CW mono			CW mono
	K/P		K/P	K/P				K	K		K/P
	F		F	F		Y		○	○		F
	TS 100 HPC		TS 100 U	TS 100 U		TS 100 H		TS 150 GG	TS 150 GG		TS 100 U
	HA		HA	HE		HA		HA	HA		HA
	axial		axial	axial		axial		axial	axial		axial
	251		246	246		250		253	253		255

v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°		v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°		v_c m/min	Gamme d'avance N°
180	8	145	6	6	145	6				110	6
180	7	120	5	5	120	5				110	5
180	8	170	7	7	170	7				110	7
180	8	145	7	7	145	7				100	7
160	8	130	7	7	130	7				110	7
140	8	125	6	6	125	6				110	6
120	8	120	6	6	120	6				100	6
110	8	120	6	6	120	6				110	6
110	7	105	6	6	105	6				105	6
160	8	145	7	7	145	7				110	7
110	8	120	6	6	120	6				110	6
100	7	85	4	4	85	4				85	4
100	7	110	6	6	110	6				100	6
90	5	105	4	4	105	4				80	4
80	7	80	5	5	80	5				80	5
60	6	65	4	4	65	4				65	4
55	5	60	4	4	60	3				50	4
55	5	60	2	2	60	2				50	2
45	3	55	2	2	55	2					
		35	1	1	35	1					
70	5	60	4	4						60	4
		55	2	2						55	2
50	5	45	4	4						45	4
165	9	195	8	8			120	6	6	120	8
145	9	160	8	8			100	6	6	120	8
130	9	140	8	8			90	6	6	100	8
130	8	130	7	7			80	6	6	90	7
		40	2	2			40	1	2		
130	8										
130	8										
70	7										
70	7										
25	4	35	3	3	35	3					
35	4	40	3	3	45	3					
30	3	40	2	2	40	4					
		310	8	8			410	8	6	150	8
		310	8	8			410	8	6	150	8
		260	8	8			380	8	6	150	8
		220	8	8			330	8	6	120	8
		280	7	7						150	7
		125	6	6						80	6
		325	7	7			280	7	7	120	7
		220	6	6						120	6
		125	6	6			110	6	6	40	6
		105	5	5			80	5	5		
		90	5	5							
		80	5	5						40	5

Conseils d'utilisation pour TS-Drills

N° d'article ®
Norme/DIN
Matière de coupe
Nuance carbure
Type
Version
Lubrification
Prix/dim. page

Processus:
- Surfaçage de la pièce. Elle doit être à angle droit du perçage à réaliser.
- Faire un pilote (tolérance F9) profondeur environ 1xD
- Entrer dans le pilote à 300Tr/min avec avance de 500mm/min
- Mettre la pression et la vitesse
- Percer en continu sans brise copeaux
- Pour trou débouchant avec sortie oblique, réduire l'avance de 40% à environ 1mm de la sortie.
- Une fois le trou réalisé, stopper la rotation de l'outil et la lubrification et retirer à grande vitesse.

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/tr.)								
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

Produits de refroidissement:
- ○ Air
- ● Huile
- ● Huile soluble

Sens de coupe:
- ® coupe à droite
- ↺ coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
et fontes malléables	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

HARTNER

≤15xD

86509
Norme usine
CW mono.
K/P
TS 100 T
A
40 bars MQL
257

v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°
110	8		
110	8		
120	8		
120	8		
110	6		
110	8		
100	7		
110	7	80	7
110	6	80	7
110	8		
110	7	80	6-7
110	6	80	6-7
100	5		
80	5		
100	6-7		
80	5		
50	5		
50	5		
50	4		
100	5		
70	2-3		
100	5		
140	8		
100	8		
140	8		
100	8		
100	6		
100	6		
90	8	90	8
30	2		
120	1		
120	8		

≤20xD

86511
Norme usine
CW mono.
K/P
TS 100 T
A
40 bars MQL
258

v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°
110	8		
110	8		
120	8		
120	8		
110	6		
110	8		
100	7		
110	7	80	7
110	6	80	7
110	8		
110	7	80	6-7
110	6	80	6-7
100	5		
80	5		
100	6		
80	5		
50	5		
50	5		
50	4		
100	5		
60	3		
100	5		
140	8		
100	8		
140	8		
100	8		
100	6		
100	6		
90	8	90	8
30	2		
120	1		
120	8		

≤25xD

86512
Norme usine
CW mono.
K/P
TS 100 T
A
40 bars MQL
259

v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°
100	8		
100	8		
120	8		
100	8		
110	6		
100	8		
100	7		
100	7	70	7
100	6	70	7
100	8		
100	7	70	6-7
100	6	70	6-7
80	5		
60	5		
90	6		
70	4		
50	4		
50	4		
50	4		
100	5		
60	3		
100	5		
130	8		
90	8		
130	8		
90	8		
90	6		
90	6		
80	8	80	8
30	2		
120	1		
110	8		

≤30xD

86513
Norme usine
CW mono.
K/P
TS 100 T
A
40 bars MQL
260

v_c m/min	Gamme d'av. N°	v_c m/min	Gamme d'av. N°
80	7		
80	7		
100	8		
100	8		
110	6		
80	7		
80	7		
80	7	60	7
80	6	60	7
80	7		
80	6	60	6-7
80	6	60	6-7
80	5		
60	5		
80	6		
70	4		
50	4		
50	4		
50	4		
80	5		
60	3		
80	5		
120	8		
80	8		
120	8		
80	8	65	8
80	6		
80	6		
70	8	70	8
30	2		
120	1		
100	8		

≤40xD

86514
Norme usine
CW mono.
K/P
TS 100 T
A
40 bars
261

v_c m/min	Gamme d'av. N°
80	7
80	7
100	8
100	8
110	6
80	7
80	7
80	6-7
80	6
80	7
80	6
80	6
80	5
60	5
80	6-7
70	4
50	4
50	4
50	4
80	5
70	2-3
80	5
120	8
80	8
120	8
80	8
80	6
80	6
70	8
30	2
120	1
100	8

HARTNER

Conseils d'utilisation pour Outils de forage

Conditions d'utilisation des outils de forage

- Réaliser un perçage pilote (L = 1,5 × D / Alu L ≈ 3 x D, tol. H8)
- Avancer à env. 500 mm/mn à faible vit. de rot., env. à 200 Tr./mn afin d'entrer dans le pré-perçage. Pour les profondeurs supérieures à 40 x D, faire avancer les outils en tournant à gauche.
- Mettre la lub. sous pression et programmer la vitesse de rotation d'usinage.
- Forer continuellement sans débourrage. Lors de l´utilisation des forets à une lèvre de très grandes longueurs et petits diamètres nous vous conseillons de réduire les paramètres de coupe sur une prof. de forage d´environ 25 mm (à peu près à 75% des valeurs de coupe optimales).
- En fin de forage, stopper la lubrification
- Retirer l'outil de forage, sans rotation, en avance rapide

Ø foret mm	Gamme d'avance N°									
	20	19	18	17	16	15	14	13	12	11
	f (mm/tr.)									
1,0	0,050	0,030	0,022	0,015	0,010	0,006	0,004	0,003	0,002	0,001
1,5	0,075	0,050	0,045	0,032	0,020	0,012	0,008	0,006	0,004	0,002
2,0	0,100	0,060	0,055	0,046	0,028	0,016	0,010	0,007	0,005	0,003
2,5	0,125	0,075	0,070	0,054	0,030	0,018	0,012	0,008	0,006	0,004
4,0	0,240	0,120	0,085	0,065	0,043	0,025	0,016	0,010	0,007	0,005
6,0	0,360	0,180	0,120	0,085	0,061	0,035	0,024	0,013	0,009	0,007
8,0	0,480	0,240	0,150	0,100	0,068	0,045	0,032	0,022	0,014	0,010
10,0	0,600	0,300	0,160	0,120	0,075	0,055	0,040	0,028	0,016	0,012
14,0	0,700	0,350	0,180	0,130	0,085	0,065	0,050	0,035	0,025	0,020
20,0	0,800	0,400	0,250	0,180	0,110	0,080	0,060	0,045	0,035	0,026
24,0	0,900	0,450	0,300	0,185	0,130	0,085	0,065	0,047	0,036	0,027
30,0	1,050	0,500	0,400	0,200	0,150	0,100	0,070	0,050	0,040	0,030
35,0	1,100	0,600	0,450	0,250	0,180	0,120	0,075	0,055	0,045	0,035
40,0	1,200	0,700	0,500	0,300	0,200	0,150	0,080	0,060	0,050	0,040
52,0	1,300	0,800	0,550	0,350	0,230	0,180	0,100	0,070	0,060	0,050

*Les avances se basent toujours sur des outils avec un revêtement approprié. Pour certains matériaux, un revêtement s'avère obligatoire.

Liquide de refroidissement en fonction des matériaux à forer :

- ○ air
- ● huile
- ◍ huile soluble

E100

Foret une lèvre

CW monobloc

0,9 ... 16,0

Prix/dim. page 271

Matières	Exemples Caractères gras = No de matière suiv. DIN EN 10027	Résist. Dureté N/mm²	Prod. de ref.	Revêt. recom.*	≤35xD v_c m/min	≤35xD Gamme av. N°	>35xD v_c m/min	>35xD Gamme av. N°
Aciers de construction	**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
Aciers de décolletage	**1.0718** 11SMnPb30, **1.0736** 11SMn37	≤850	◍	a A	*90*	15	*90*	15
	1.0727 46S20, **1.0728** 60S20, **1.0757** 46SPb20	≤1000	◍		*80*	15	*80*	15
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E	≤700	◍		*80*	14	*80*	14
	1.0503 C45, **1.1191** C45E	≤850	◍	a A	*75*	14	*75*	14
	1.0601 C60, **1.1221** C60E	≤1000	◍		*75*	14	*75*	14
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000	◍	a A	*75*	14	*75*	14
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400	◍		*65*	14	*65*	14
Aciers de cément. non-alliés	**1.0301**, **1.1121** C10E	≤850	◍	a A	*80*	15	*80*	15
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000	●	a A	*75*	14	*75*	14
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400	●		*65*	14	*65*	14
Aciers de nitruration	**1.8504** 34CrAl6	≤1000	◍	a A	*75*	14	*75*	14
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400	●		*65*	14	*65*	14
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850	◍	a A	*75*	13	*75*	13
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419**, **1.2767**	≤1400	●		*65*	13	*65*	13
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400	●	a A	*55*	12	*55*	12
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4	≤350 HB	●	a A	*65*	13	*65*	13
Aciers trempés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105**	≤48 HRC	●	○	*30*	13	*30*	13
	1.4301 X5CrNi18-10, **1.4541** X6CrNiTi18-10, **1.4571**	≤66 HRC	●		*25*	10	*25*	14
Aciers inoxyd., sulfurés	**1.4057** X20CrNi172, **1.4122** X39CrMo17-1, **1.4521**	≤900	●		*40*	14	*40*	14
austénitiques	–	≤1100	●	a A	*35*	14	*35*	14
martensitiques		≤1500	●		*35*	14	*35*	14
Fontes	Nimonic, Inconel, Monel, Hastelloy	≤240 HB	◍ ◍	a A	*85*	16	*85*	16
	0.6010 EN-GJL-100, **0.6020** EN-GJL-200	≤350 HB	◍ ◍		*80*	16	*85*	16
Fontes à graphite sphéroïdal	**0.6025** EN-GJL-250, **0.6035** EN-GJL-350	≤240 HB	◍	a A	*80*	15	*80*	15
et fontes malléables	**0.7050** EN-GJS-500-7, **0.8035** EN-GJMW-350-4	≤350 HB	◍		*70*	15	*70*	15
Fontes dures	**0.7070** EN-GJS-700-2, **0.8170** EN-GJMB-700-2	≤350 HB	◍	a A	*55*	14	*55*	14
Nouvelles fontes GGV	–	≤220 HB	◍ ◍	a A				
	3.7024 Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤300 HB	◍ ◍					
Nouvelles fontes ADI	**3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184**	≤1000	◍ ◍	a A				
	3.0255 Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤1400	◍ ◍					
Alliages spéciaux	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245**, **3.4365**	≤2000	●	a	*20*	12	*20*	12
Titane et alliages de Titane	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤850	●	A	*35*	12	*35*	12
	3.2581 G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤1400	●	○	*30*	12	*30*	12
Aluminium et ses alliages	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05**	≤400	◍	○	*150*	17	*150*	17
Alliages malléables d'Al	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤650	◍	○	*120*	19	*120*	19
Alliages d'Al d'inject. ≤ 10 % Si	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410**	≤600	◍	○	*120*	20	*120*	20
≤ 24 % Si	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600	◍		*130*	18	*130*	18
Alliages de Magnésium	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176**	≤400	○	○	*110*	17	*110*	17
Cuivres, faiblement alliés	**2.0790** CuNi18Zn19Pb	≤500	◍	○	*75*	15	*75*	15
Laiton à copeaux courts,	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤600	◍	○	*120*	18	*120*	18
à copeaux longs	**2.0980** CuAl11Ni, **2.1247** CuBe2	≤600	◍		*90*	18	*90*	18
Bronze, à copeaux courts	Résine époxy, Resopal, Pertinax, Moltopren	≤600	◍ ●	○	*95*	17	*95*	17
	Plexiglas, Hostalen, Novodur, Makralon	≤850	●		*75*	17	*75*	17
Bronze, à copeaux longs	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)	≤850	●	○	*70*	17	*70*	17
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6	≤1000	●		*60*	17	*60*	17
Thermodurcissables	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤150	○	○	*75*	15	*75*	15
Thermoplastiques	**EN-GJS-1200-2** (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤100	◍ ○		*70*	15	*70*	15
renf. de fibres d'aramides	Kevlar	≤1000	○	○	*60*	14	*60*	14
renf. de fibres de verre/carbone	GFK/CFK	≤1000	○		*50*	14	*50*	14

Recommandations utiles
- Pour les profondeurs supérieures à 40 x D, nous conseillons l´utilisation de deux ou plusieurs outils de forage, par ex. Ø 10 x 400 et 9,95 x 800 mm.
- Pour les profondeurs supérieures à 40 x D, faire avancer les outils de forage dans le perçage pilote, en tournant à gauche.
- Lors du montage des outils de forage de longueurs supérieures à 40 x D, il est recommandé de mettre la lubrification intérieure du foret pendant une seconde sous pression afin de le tranquilliser.
- Pour l´usinage des matériaux à copeaux longs, nous vous conseillons de commander des outils de forage pourvus de goujures polies.
- En ce qui concerne la concentration des matières grasses des huiles solubles, nous conseillons un taux minimum de 10 %.
- Pour l´AL à copeaux longs, nous vous conseillons de commander des outils de forage affûtés à 180° avec volume de lubrification décalé.
- Lorsqu´il s´agit de forer l´alliage d´aluminium avec moins de 1 % de Si, donc avec des vitesses de coupe supérieures à 160 m/mn, il est recommandé d´augmenter progressivement la vitesse de rotation. En outre, la profondeur du perçage pilote doit être augmentée à environ 3 x D.

Lorsqu'ils commencent à forer, les outils de forage doivent toujours être guidés! Il ne faut jamais les laisser tourner avec une vitesse de rotation élevée lorsqu'ils sont libres (hors de la pièce).

E80

Foret une lèvre
Embout CW
2,0 ... 40,0
280/284

Z80

Foret deux lèvres
Embout CW
6,0 ... 30,0
295

E800

Foret une lèvre
avec plaquettes interch.
12,0 ... 52,0
292

Revêt. recom.*	≤35xD v_c m/min	≤35xD Gamme av. N°	>35xD v_c m/min	>35xD Gamme av. N°
○	100	14	95	13
	85	14	80	13
T	90	14	85	13
	80	14	75	13
	90	13	85	12
T	80	13	75	12
	75	13	70	12
	75	13	70	12
T	65	13	60	12
T	80	14	75	13
	75	13	70	12
T	65	13	60	12
	75	13	70	12
C	65	13	60	12
	75	12	70	11
C	65	12	60	11
C	55	11	50	11
C	65	12	60	12
	30	12	25	11
C	25	11	20	11
	55	13	50	12
	45	13	40	12
	35	13	35	12
T	85	15	80	14
	80	15	75	14
T	80	14	75	13
	70	14	65	13
T	55	13	50	12
T				
T				
C	20	11	20	11
○	35	11	30	11
	30	11	25	11
C	150	16	140	15
○	120	15	115	14
	150	16	140	15
○	130	16	120	15
○	110	16	100	15
C	75	14	70	13
	120	17	115	16
○	90	17	85	16
	95	16	90	15
○	75	16	70	15
	70	16	65	15
○	60	16	55	15
	75	14	70	13
○	70	14	65	13
	60	13	55	12
○	50	13	45	12

Revêt. recom.*	≤35xD v_c m/min	≤35xD Gamme av. N°	>35xD v_c m/min	>35xD Gamme av. N°
○	85	18	80	17
○	80	18	75	17
○	75	17	70	16
○	70	17	65	16
○	65	16	60	15
○				
○				
○	120	18	115	17
○	110	18	105	17
○	135	18	130	17
	120	17	115	16
○	130	18	125	17
○	120	18	115	17
○	110	17	105	16
○	110	17	105	16
○	95	17	90	16
	95	17	90	16

Revêt. recom.*	≤35xD v_c m/min	≤35xD Gamme av. N°	>35xD v_c m/min	>35xD Gamme av. N°
T	90	15	85	15
	80	15	75	15
T	85	16	80	16
	75	16	70	16
	85	15	80	15
T	80	15	75	15
	75	15	70	15
F	75	15	70	15
	65	15	60	15
F	80	15	75	15
Y	75	15	70	15
	70	15	65	15
F	70	15	65	15
	60	15	55	15
F	65	14	60	14
	60	14	55	14
Y	55	14	50	14
Y	65	15	60	15
Y	30	13	25	13
	25	12	20	12
	50	14	45	14
a	45	14	40	14
	40	14	35	14
Y	85	16	80	16
	80	16	75	16
Y	75	16	70	16
	70	16	65	16
Y	55	15	50	15
Y				
Y				
a	25	13	20	13
a	35	13	30	13
	30	12	25	12
T	140	16	135	16
T	125	16	120	16
T	170	17	165	17
	140	17	135	17
T	115	16	110	16
T	75	15	70	15
T	120	17	115	17
	90	17	85	17
T	95	17	90	17
	75	17	70	17
T	70	17	65	17
	60	17	55	17
T	75	16	70	16
	70	16	65	16
T	60	15	55	15
	50	15	45	15

HARTNER

Conseils d'utilisation pour fraises à chanfreiner

N° d'article ®
Norme/DIN
Matière de coupe
Version
Angle de chanfrein
Forme de queue
Prix/dim. page

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Outil Ø mm	Gamme d'avance n°					
	81	82	83	84	85	86
	f (mm/tr.)					
2,00	0,03	0,04	0,06	0,08	0,10	0,13
2,50	0,03	0,05	0,07	0,10	0,13	0,16
3,15	0,03	0,05	0,08	0,11	0,15	0,20
4,00	0,04	0,06	0,09	0,13	0,17	0,22
5,00	0,04	0,07	0,10	0,14	0,18	0,23
6,30	0,04	0,07	0,12	0,15	0,19	0,24
8,00	0,05	0,08	0,13	0,16	0,20	0,25
10,00	0,06	0,09	0,14	0,17	0,22	0,26
12,50	0,06	0,10	0,15	0,19	0,23	0,28
16,00	0,07	0,11	0,17	0,21	0,26	0,31
20,00	0,08	0,13	0,18	0,23	0,28	0,33
25,00	0,09	0,15	0,21	0,26	0,30	0,38
31,50	0,12	0,17	0,24	0,30	0,36	0,42
40,00	0,14	0,21	0,28	0,34	0,40	0,46

Note importante sur les fraises hélicoïdales:

Plus petit diamètre de perçage pour le chanfreinage, compatibilité avec les vis à tête fraisée

d1	plus petit Ø de perçage pour chanfreinage	pour les vis à tête fraisée ISO 2009, 2010, 7046, 7047	pour les vis à tête fraisée DIN 7991
6,30	2,00	-	M3
8,00	2,50	M4	-
8,30	2,50	-	M4
10,00	3,00	M5	-
10,40	3,00	-	M5
11,50	3,30	M6	-
12,40	3,30	-	M6
15,00	3,70	M8	-
16,50	3,70	-	M8
19,00	4,50	M10	-
20,50	4,50	-	M10
23,00	4,80	M12	-
25,00	4,80	-	M12
31,00	5,20	-	M16

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	○
et fontes malléables	**0.7070** EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	○
Fontes dures	–		≤350 HB	○
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		○
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		○
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		○
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		○
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		○
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		○
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

88200	88021
335	335
HSS	HSS
◯	◯
90°	90°
cyl.	cyl.
382	384

88201	88022
335	335
HSS-E	HSS-E
A	A
90°	90°
cyl.	cyl.
383	385

v_c m/min	Gamme d'avance N°		v_c m/min	Gamme d'avance N°	
32	85	85	41	**83**	**83**
30	85	85	39	**82**	**82**
32	85	85	41	**83**	**83**
30	85	85	39	**82**	**82**
32	85	85	41	**83**	**83**
30	85	85	39	**83**	**83**
20	84	84	25	**82**	**82**
15	84	84	19	**83**	**83**
12	**84**	**84**	15	**82**	**82**
25	85	85	32	**83**	**83**
15	84	84	19	**83**	**83**
10	**84**	**84**	13	**82**	**82**
15	85	85	19	**82**	**82**
12	**84**	**84**	15	**81**	**81**
17	84	84	22	**82**	**82**
15	84	84	19	**81**	**81**
15	84	84	19	**81**	**81**
10	84	84	13	**81**	**81**
16	84	84	20	**82**	**82**
12	84	84	15	**81**	**81**
14	84	84	18	**81**	**81**
25	85	85	32	**83**	**83**
16	84	84	20	**83**	**83**
22	84	84	28	**83**	**83**
20	84	84	25	**83**	**83**
8	**84**	**84**	10	**81**	**81**
25	**84**	**84**	28	**83**	**83**
16	**84**	**84**	18	**83**	**83**
8	84	84	10	**81**	**81**
15	85	85	19	**82**	**82**
10	85	85	13	**81**	**81**
90	85	85	114	**84**	**84**
70	86	86	89	**84**	**84**
40	85	85	51	**83**	**83**
30	85	85	39	**83**	**83**
100	86	86	127	**84**	**84**
60	84	84	76	**84**	**84**
80	85	85	101	**84**	**84**
50	85	85	64	**84**	**84**
30	86	86	39	**84**	**84**
26	86	86	33	**84**	**84**
24	86	86	31	**84**	**84**
20	86	86	25	**84**	**84**
30	84	84	39	**84**	**84**
40	85	85	51	**84**	**84**
70	84	84			

Conseils d'utilisation pour Multiplex

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n° 1	2	3	4	5	6
	f (mm/U)					
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	0,85	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

Produits de refroidissement:
- ○ Air
- ● Huile
- ◍ Huile soluble

Sens de coupe:
- coupe à droite
- coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	◍ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	◍ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	◍
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	◍
Fontes dures	–		≤350 HB	◍
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

86602	86608	86605	86609	86611
10…25	10…25	25…102	10…102	10…65
HSS-E-PM	HSS-E-PM	HSS-E	HSS-E-PM	HSS-E-PM
T	F	T	A	A
411	413	412	414	415





v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°
40	4	48	4	40	4	48	4	25	3
35	4	42	4	35	4	42	4	25	3
50	5	60	5	50	5	60	5	30	3
40	5	50	5	40	5	50	5	25	3
40	4	45	4	40	4	45	4	22	3
35	4	40	4	35	4	40	4	20	3
30	4	35	4	30	4	35	4	20	3
25	3	28	3	25	3	28	3	15	2
22	2	25	2	22	2	25	2	15	2
35	3	40	3	35	3	40	3	20	2
25	3	28	3	25	3	28	3	15	2
22	2	25	2	22	2	25	2	15	2
22	3	25	3	22	3	25	3	15	2
15	2	18	2	15	2	18	2	12	1
26	3	28	3	26	3	28	3	15	2
22	2	25	2	22	2	25	2	15	2
12	2	18	2	12	2	18	2	10	1
10	2	13	2	10	2	13	2	8	1
20	2	23	2	20	2	23	2	10	1
15	2	17	2	15	2	17	2	10	1
15	2	20	2	15	2	20	2	10	1
35	4	40	4	35	4	40	4	20	3
35	4	40	4	35	4	40	4	20	3
35	4	40	4	35	4	40	4	20	3
28	4	33	4	28	4	33	4	15	3
60	5	65	5	60	5	65	5	32	4
80	5	85	5	80	5	85	5	42	4
85	5	85	5	85	5	85	5	42	4
70	5	70	5	70	5	70	5	35	4
45	4	50	4	45	4	50	4	25	3
45	4	50	4	45	4	50	4	25	3
60	5	65	5	60	5	65	5	32	4
45	4	50	4	45	4	50	4	25	3
32	5	35	5	32	5	35	5	20	4
40	3	45	3	40	3	45	3	22	2
36	3	40	3	36	3	40	3	20	2
28	3	32	3	28	3	32	3	15	2
22	3	27	3	22	3	27	3	15	2

Conseils d'utilisation pour Multiplex

Il est conseillé de choisir des outils dont les avances sont en caractères gras.

Ø outil mm	Gamme d'avance n°					
	1	2	3	4	5	6
	f (mm/U)					
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	0,85	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

Produits de refroidissement:
○ Air
● Huile
◍ Huile soluble

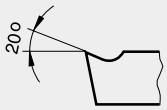
Sens de coupe:
coupe à droite
coupe à gauche

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	◍ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	◍ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	◍
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	◍
Fontes dures	–		≤350 HB	◍
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

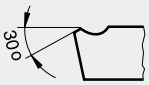
HARTNER

86708	86709	86701	86702	86711
10…35	10…35	10…35	10…35	10…65
CW mono	CW mono	CW mono	CW mono	CW mono
H22	H22	H22	H22	H22
K20/K40	K20/K40	K20/K40	K20/K40	K20/K40
T	T	F	F	○
419	420	417	418	421

N° d'article 86709/86701
sans chanfrein
Pour materiaux supérieur à 600 N/mm².



N° d'article 86708/86702
avec chanfrein
Pour materiaux supérieur sur 600 N/mm².







v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°	v_c m/min	Gamme d'avance N°
60	5	70	5		
55	4	65	4		
100	**4**	115	**4**		
95	**4**	105	**4**		
80	**4**	90	**4**		
80	**4**	90	**4**		
75	**3**	85	**3**		
70	**4**	80	**4**		
60	**3**	70	**3**		
85	4	95	4		
70	**4**	80	**4**		
55	**3**	65	**3**		
60	**3**	65	**3**		
50	**2**	55	**2**		
40	**3**	45	**3**		
35	**2**	40	**2**		
40	**2**	45	**2**		
35	**2**	40	**2**		
25	**1**	30	**1**		
40	**2**	45	**2**		
25	2	30	2		
100	**5**	120	**5**		
90	**4**	105	**4**		
80	**4**	90	**4**		
65	**3**	75	**3**		
25	**1**	30	**1**		
180	**5**	200	**5**	180	**5**
160	5	180	5	160	**5**
140	**5**	160	**5**	140	**5**
130	**5**	150	**5**	130	**5**
150	**5**	160	**5**	150	**4**
70	4	80	4	70	**5**
160	**5**	180	**5**	160	**4**
110	4	120	4	110	**5**
80	**5**	90	**5**	80	**4**
65	**4**	75	**4**	65	**4**
45	4	50	4	45	**4**
35	4	40	4	35	**4**
70	**3**	85	**3**	70	**3**
70	**3**	85	**3**	70	**3**
70	**3**	85	**3**	70	**3**
70	**3**	85	**3**	70	**3**

HARTNER

Conseils d'utilisation pour Multiplex HPC

N° d'article
Norme/DIN
Matière de coupe
Nuance carbure
Profondeurs
Version
Type
Prix/dim. page

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Les valeurs données le sont à titre indicatif. Les vitesses de coupe et avance effectivement atteintes dépendent de chaque condition réelle d'usinage.
Nous vous conseillons les essais préalables correspondants.

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		● ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

HARTNER

≤1,5×D

86722	86725	86723	86724
N. U.	N. U.	N. U.	N. U.
CW mono	CW mono	CW mono	CW mono
K/P	K/P	K/P	K/P
1,5xD	1,5xD	1,5xD	1,5xD
F	a	Y	○
aciers	aciers inox	fontes	Al/ses all.
446	455	449	452




v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°
130	6						
110	5						
130	7						
110	6						
130	6						
125	6						
110	5						
110	6						
90	5						
130	7						
110	6						
70	4						
105	5						
70	4						
60	5						
55	4						
55	3						
50	2						
		25	2				
		55	3				
		40	3				
		35	3				
				100	6		
				90	6		
				120	7		
				100	6		
		90	6				
				80	5		
				80	5		
				80	5		
				80	5		
		25	2				
		40	3				
		35	2				
						200	7
						180	7
						150	7
						120	7
						180	7
						70	6
						180	7
						120	6
						70	6
						50	6
						45	6
						35	5

≤3×D

86722	86725	86723	86724
N. U.	N. U.	N. U.	N. U.
CW mono	CW mono	CW mono	CW mono
K/P	K/P	K/P	K/P
3xD	3xD	3xD	3xD
F	a	Y	○
aciers	aciers inox	fontes	Al/ses all.
446	455	449	452




v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°
130	6						
110	5						
130	7						
110	6						
130	6						
125	6						
110	5						
110	6						
90	5						
130	7						
110	6						
70	4						
105	5						
70	4						
60	5						
55	4						
55	3						
50	2						
		25	2				
		55	3				
		40	3				
		35	3				
				100	6		
				90	6		
				120	7		
				100	6		
		90	6				
				80	5		
				80	5		
				80	5		
				80	5		
		25	2				
		40	3				
		35	2				
						200	7
						180	7
						150	7
						120	7
						180	7
						70	6
						180	7
						120	6
						70	6
						50	6
						45	6
						35	5

HARTNER

Conseils d'utilisation pour Multiplex HPC

N° d'article
Norme/DIN
Matière de coupe
Nuance carbure
Profondeurs
Version
Type
Prix/dim. page

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Les valeurs données le sont à titre indicatif. Les vitesses de coupe et avance effectivement atteintes dépendent de chaque condition réelle d'usinage.
Nous vous conseillons les essais préalables correspondants.

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		○ ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

≤5×D

86722	86725	86723	86724
N. U.	N. U.	N. U.	N. U.
CW mono	CW mono	CW mono	CW mono
K/P	K/P	K/P	K/P
1,5xD	1,5xD	1,5xD	1,5xD
F	a	Y	○
aciers	aciers inox	fontes	Al/ses all.
446	455	449	452

≤7×D

86722	86725	86723	86724
N. U.	N. U.	N. U.	N. U.
CW mono	CW mono	CW mono	CW mono
K/P	K/P	K/P	K/P
3xD	3xD	3xD	3xD
F	a	Y	○
aciers	aciers inox	fontes	Al/ses all.
446	455	449	452








v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°
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

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Conseils d'utilisation pour Multiplex HPC

N° d'article
Norme/DIN
Matière de coupe
Nuance carbure
Profondeurs
Version
Type
Prix/dim. page

Ø outil mm	Gamme d'avance n°								
	1	2	3	4	5	6	7	8	9
	f (mm/U)								
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

Produits de refroidissement:
○ Air
● Huile
● Huile soluble

Les valeurs données le sont à titre indicatif. Les vitesses de coupe et avance effectivement atteintes dépendent de chaque condition réelle d'usinage.
Nous vous conseillons les essais préalables correspondants.

Matières	Exemples, nouvelle désignation (Ancienne désignation entre parenthèses) Caractères gras = N° de matières suivant DIN EN	Résistance MPa (N/mm²)	Dureté	Prod. de réfr.
Aciers de construction	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		●
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		●
Aciers de décolletage	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		●
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		●
Aciers d'amélioration non-alliés	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		●
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		●
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		●
Aciers d'amélioration alliés	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		●
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		●
Aciers de cémentation non-alliés	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		●
Aciers de cémentation alliés	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Aciers de nitruration	**1.8504** 34CrAl6	≤1000		●
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Aciers à outils	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		●
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Aciers rapides	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Aciers à ressort	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Aciers trempés	–		≤48 HRC	●
			≤66 HRC	●
Aciers inoxydables, sulfurés	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austénitiques	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitiques	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Fontes	**0.6010** EN-GJL-100 (GG10), **0.6020** EN-GJL-200 (GG20)		≤240 HB	○ ○
	0.6025 EN-GJL-250 (GG25), **0.6035** EN-GJL-350 (GG35)		≤350 HB	○ ○
Fontes à graphite sphéroïdal et fontes malléables	**0.7050** EN-GJS-500-7 (GGG50), **0.8035** EN-GJMW-350-4 (GTW35)		≤240 HB	●
	0.7070 EN-GJS-700-2 (GGG70), **0.8170** EN-GJMB-700-2 (GTS70)		≤350 HB	●
Fontes dures	–		≤350 HB	●
Nouvelles fontes GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	○ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	○ ○
Nouvelles fontes ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		○ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		○ ○
Alliages spéciaux	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titane et alliages de Titane	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Aluminium et ses alliages	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		●
Alliages malléables d'Al	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		●
Alliages d'Al d'inject. ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		●
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		●
Alliages de Magnésium	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Cuivres, faiblement alliés	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		●
Laiton à copeaux courts,	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		●
à copeaux longs	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		●
Bronze, à copeaux courts	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		○ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronze, à copeaux longs	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Thermodurcissables	Résine époxy, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastiques	Plexiglas, Hostalen, Novodur, Makralon	≤100		● ○
renf. de fibres d'aramides	Kevlar	≤1000		○
renf. de fibres de verre ou carbone	GFK/CFK	≤1000		○

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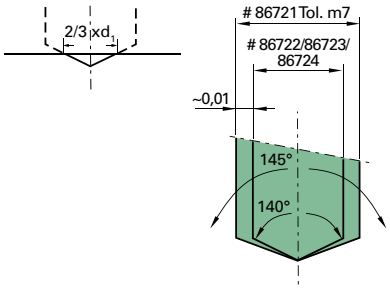
≤10×D

≤1×D perç. pil., lam. et chanfrein.

86722	86725	86723	86724	86721
N. U.	N. U.	N. U.	N. U.	N. U.
CW mono	CW mono	CW mono	CW mono	CW mono
K/P	K/P	K/P	K/P	K/P
1,5xD	1,5xD	1,5xD	1,5xD	1xD
F	a	Y	○	a
aciers	aciers inox	fontes	Al/ses all.	pil./lam. ch.
446	455	449	452	443



- Lors de la réalisation de perçages débouchants, il faut veiller à ce que les listels de guidage de la plaquette de coupe restent toujours en contact dans le perçage réalisé. En outre, avant que la plaquette de coupe ne traverse les derniers millimètres à percer, nous recommandons de réduire l´avance.
- En principe, lorsqu´il faut réaliser des centrages ou des perçages pilotes avec des profondeurs de perçages au–dessus de 5 x D, nous recommandons l´utilisation du porte - outils n° d´article 86681 et de la plaquette de coupe n° d´article 86721 pour les perçages pilotes.
- Lors du perçage direct, sans centrage, nous recommandons de réduire l´avance pendant l´opération de centrage.
- Lorsqu´il s´agit d´usinages à coupe interrompue (rainures, perçages transversaux), avant d´utiliser ces outils, il faut réaliser quelques essais de perçage et, lors de la coupe interrompue de (max. : 0,2 x D), il est aussi recommandé de réduire l´avance.
- Contrairement aux outils classiques à plaquettes réversibles, les outils Multiplex peuvent percer les tôles empilées.
- Lors de l´utilisation sur les tours où l´outil de perçage est fixe, il faut s´assurer du bon centrage et de l´alignement parfait de l´outil.
- Afin d´obtenir un résultat d´usinage optimal, il faut s´assurer d´une parfaite alimentation des liquides de lubrification et de refroidissement, huiles de coupe, entières ou solubles.
- Ce système d´outils n´est que partiellement approprié à l´usinage MQL, voire, à sec. Lors de l´usinage MQL, il est recommandé d´utiliser les attachements avec géométrie conique MQL à leur extrémité et les accessoires MQL adéquats. Les techniciens de notre service clients vous renseignent volontiers.





v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°	v_c m/min	Gamme d'av. n°
100	5							130	6
95	4							110	5
100	6							130	7
95	5							110	6
100	5							130	6
95	5							125	6
90	4							110	5
90	5							110	6
85	4							90	5
100	6							130	7
90	5							110	6
70	4							70	4
95	4							105	5
70	3							70	4
55	4							60	5
50	3							55	4
55	2							55	3
50	2							50	2
		25	1					25	2
		55	2					55	3
		40	2					40	3
		35	2					35	3
				80	6			100	6
				70	6			90	6
				100	7			120	7
				80	6			100	6
		70	6					90	6
				60	5			80	5
				60	5			80	5
				60	5			80	5
				60	5			80	5
		25	1					25	2
		40	2					40	3
		35	1					35	2
						150	6	200	7
						150	6	180	7
						130	6	150	7
						105	6	120	7
						150	6	180	7
						70	5	70	6
						150	6	180	7
						110	5	120	6
						70	5	70	6
						50	5	50	6
						45	5	45	6
						35	4	35	5

Remarques

Remarques

Remarques

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