HARTNER

Precision Cutting Tools

UTENSILI A **FORARE**

MECCANOTECNICA

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HARTNER

Precision Cutting Tools

Descrizione

Tipo	Applicazioni	Angolo di spoglia superiore	Angolo di affilatura	Affilatura	
N	per materiali a normale truciolabilità (es. acciaio, ghisa acciaiosa, ghisa grigia)	20°-30°	118°	Spoglia sul cono tagliente Affilatura normale	Punte in acciaio HSS
H	per materiali duri a truciolo corto (es. ottone, bronzo, elektron)	12°-16°	118°	Spoglia sul cono tagliente Affilatura normale	
W	per materiali teneri a truciolo lungo (es. leghe di Al, rame)	35°-40°	130°	Spoglia sul cono tagliente Affilatura normale	
FN	per materiali a normale truciolabilità per fori profondi	35°	130°	Spoglia sul cono tagliente Affilatura normale	
FN 500	per materiali aggressivi a truciolo lungo (es. acciai altamente legati, da bonifica e da cementazione)	20°-30°	130°	Spoglia sul cono tagliente Affilatura normale	
FU 500 FU 500 DZ	per uso universale (es. acciai legati e non legati fino a 800 N/mm²) DZ = attacco cilindrico passante	35°	118°	2 piani Affilatura speciale	
FW	per materiali teneri a truciolo lungo per fori profondi	35°-40°	130°	Spoglia sul cono tagliente Affilatura normale	
S	per materiali a difficile truciolabilità (es. acciai inossidabili e resistenti al calore)	35°	130°	Spoglia sul cono tagliente Affilatura normale	
IS	per acciai aggressivi, inox, resistenti agli acidi e al calore)	40°	130°	Spoglia sul cono tagliente Affilatura normale	
HX500	per materiali di diffcile lavorazione come l'Hardox	22°	135°	Speciale affilatura a due pianetti	
V	per materiali a difficile truciolabilità (es. acciai per molle)	20°-30°	130°	Spoglia sul cono tagliente Affilatura normale	
TS 3 G	per fori precisi dal pieno	28°	150°	Affilatura speciale	Punte in metallo duro
TS 80 U	per uso universale (es. ghisa grigia e acciai fino a 1000 N/mm²)	20°-30°	140°	Spoglia sul cono tagliente Speciale riuzione tipo U	
TS 100 U	per acciai fino a ca. 1000 N/mm², per uso universale	25°-35°	140°	Affilatura su piani	
TS 100 HPC	per lavorazioni ad alte prestazioni in acciai da costr. e cementazione fino a 1400 N/mm², acciai inossidabili, titanio e leghe speciali	25°-30°	140°	Affilatura a piani ottimizzata	
TS 150 GG	per ghise a truciolo corto, Alluminio e lghe di Al con alto tenore in Si	0° (taglienti diritti)	120°	Affilatura su piani Speciale riuzione tipo GG	
TS 100 R	per nuove ghise GGV e ADI, ghisa sferoidale/ghisa malleabile	30°	–	Affilatura radiale	
TS 100 T	per fori profondi in acciaio e ghisa	30°	135°	Spoglia sul cono tagliente	
TS 100 INOX	per acciai inossidabili	30°	140°	Affilatura su piani	
TS 100 H	per acciai altamente legati e temprati, così come leghe speciali	30°	140°	Spoglia sul cono tagliente	
TS 100 EG	Utensili sbavatori				Sbavatori
TS 100 VR	Sbavatori a 90° ad avanzamento ed estrazione				
TLB E80	Punte a cannone ad 1 tagliente con testa in MD				Punte a cannone
TLB E100	Punte a cannone ad 1 tagliente in MD integrale				
TLB E800	Punte a cannone ad 1 tagliente con placchette intercambiabili				
TLB Z80	Punte a cannone a 2 taglienti con testa in MD				

Codice ISO

P	Acciaio, acciaio altamente legato
M	Acciaio inossidabile
K	Ghisa grigia, ghisa sferoidale e ghisa malleabile
N	Alluminio ed altri metalli non ferrosi
S	Leghe speciali, superleghe e leghe di titanio
H	Acciaio temprato e ghisa temprata

Pittogrammi

Materiale tagliente

HSS, HSS-E, M42, HSS-E-PM — Acciai super rapidi

VHM — Metallo duro integrale

HM — con riporti in MD

Trattam. di superficie

lucido; trattati a vapore; fasi nitrurate; Bronze-Oxid; A TiAlN; a AlTiN nano; A AlTiN; C TiCN; F FIRE

T TiN; M MolyGlide; Y TiAlSiN; Ni nichelato; B brunito

Tipo

Per dettagli sul tipo si veda pagina precedente

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

Forma

R, A, B, C

Profondità di foro

3xD, 5xD, ..., ~3xD, ~5xD, ...

SPL 45,00 mm, SPL 80,00 mm, ...

Norma

DIN 333, DIN 338, DIN 339, DIN 340, DIN 343, DIN 344, DIN 345, DIN 1869, DIN 1897, ...

DIN 8374, DIN 8375, DIN 8376, DIN 8377, DIN 8378, DIN 8379, DIN 6537 K, DIN 6537 L, DIN 6527 K — secondo DIN

WN — secondo standard Hartner

Angolo di affilatura

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

Tolleranza del Ø

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

Direzione di taglio

R — destra; L — sinistra

Forma del gambo

HA, HB, HE — secondo DIN 6535

Cyl — cilindrico

MK — cono morse

SK — cono ISO

Assott. del nocc.

Assott. del nocc.

Refrigerazione interna

con RI; senza RI

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Modalità per ordinare

Specificare assieme al vs. nr. d‘ordine anche
il nr. articolo e il Ø, es: „Punta elicoidale corta,
per Ø 0,20 mm“ **= 81010 0,200**

Articolo n.

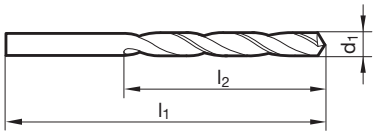
Punte elicoidali, corte

Articolo n. 81010

P	M	K	N	S	H
●		●	○		

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

Assott. del nocciolo ≥ Ø 1,000 • spoglia sul cono tagliente
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

Diametro nominale

Nelle pagine successive, contenenti programma, trovate per ciascun utensile consigli sull‘idoneità in base ai seguenti gruppi di impiego:
● Idoneità ottima
○ Idoneità limitata

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Indicazione importanti

Condizioni di fornitura generali

Gli articoli forniti sono soggetti alle nostre condizioni di vendita, disponibili su richiesta.

Quando si ordinano utensili speciali, la quantità ordinata può variare in più o in meno di ca. il 10%, come minimo comunque di 2 pezzi. Sarà fatturata la quantità consegnata.

Condizioni di fornitura per piccoli quantitativi

Ci riserviamo di applicare una maggiorazione di prezzo nel caso di ordini con valore netto inferiore a Euro 100,00.

Gruppi di utensili	Norma	Unità di confezionamento
Punte elicoidali con codolo cilindrico in acciaio super rapido	DIN 338 DIN 1897 e simile norma di fabbrica	≤ Ø 7,50 mm in confezione di 10 pezzi > Ø 7,50 ... Ø 10,60 mm in confezione di 5 pezzi > Ø 10,60 mm in confezione singola
	DIN 339 DIN 340 e simile norma di fabbrica	≤ Ø 6,70 mm in confezione di 10 pezzi > Ø 6,70 ... Ø 10,60 mm in confezione di 5 pezzi > Ø 10,60 mm in confezione singola
	DIN 1869	≤ Ø 7,50 mm in confezione di 10 pezzi > Ø 7,50 ... Ø 10,60 mm in confezione di 5 pezzi > Ø 10,60 mm in confezione singola
Punte elicoidali con codolo conico Morse in acciaio super rapido	tutte le norme DIN e le norme di fabbrica	tutte le misure in confezione singola
Punte elicoidali in metallo duro ed utensili con riporti in MD	tutte le norme DIN e le norme di fabbrica	tutte le misure in confezione singola
Micropunte	DIN 1899	tutte le misure in confezione di 10 pezzi
Punte a centrare	DIN 333 forma A, forma R	≤ Ø 4,00 mm in confezione di 10 pezzi > Ø 4,00 mm in confezione singola
	DIN 333 forma B	≤ Ø 2,50 mm in confezione di 10 pezzi > Ø 2,50 mm in confezione singola

Dati bancari

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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Sommario

PUNTE ELICOIDALI CON CODOLO CILINDRICO

in HSS, HSS-E, HSS-E-PM, metallo duro
lucide e ricoperte

PUNTE ELICOIDALI CON CODOLO CONO MORSE

in HSS, HSS-E, metallo duro
lucide e ricoperte

TS-DRILLS

Utensili high-tech in metallo duro
lucide e ricoperte

PUNTE A CANNONE AD 1 TAGLIENTE / A 2 TAGLIENTI

in metallo duro, con testa in MD o con inserti intercambiabili
lucide e ricoperte

MICROPUNTE

in metallo duro e HSS-E-PM
lucide e ricoperte

PUNTE A CENTRARE / PUNTE A GRADINO

in HSS, HSS-E, metallo duro
lucide e ricoperte

UTENSILI PER SVASARE E SBAVATORI

in HSS, HSS-E, metallo duro
lucide e ricoperte

MULTIPLEX / MULTIPLEX HPC

Punte elicoidali con inserti intercambiabili con refrigerazione
Inserti intercambiabili in HSS-E, HSS-E PM, metallo duro
ricoperte

PARTE TECNICA

Misure, Definizioni, Valori indicativi

Articolo n.	Pagina	Profondità di foro	Norma	Superficie	Descrizione	Materiale da taglio	Tipo
80495	388		Norma di fab.	AlTiN nano	Sbavatori a 90° in spinta e trazione	MDI	TS 100 VR
81000	104	3xD	Norma di fab.	TiAlZrN	Punte a elica ridotta per Hardox HX 500	M42	HX 500
81010	53	~5xD	DIN 338	vaporizzato	Punte elicoidali, corte	HSS	N
81011	83	~5xD	DIN 338	vaporizzato	Punte elicoidali, corte	HSS-E	N
81012	77	~5xD	DIN 338	lucido	Punte elicoidali, corte	M42	N
81013	85	~5xD	DIN 338	lucido	Punte elicoidali, corte	HSS-E	IS
81015	57	~5xD	DIN 338	vaporizzato	Punte elicoidali, corte	HSS	N
81017	59	~5xD	DIN 338	vaporizzato	Punte elicoidali, corte	HSS	N
81018	79	~5xD	DIN 338	Bronze-Oxid	Punte elicoidali, corte	M42	N
81019	81	~5xD	DIN 338	nanoFIRE	Punte elicoidali, corte	M42	N
81020	60	~5xD	DIN 338	lucido	Punte elicoidali, corte	HSS	H
81025	62	~5xD	DIN 338	lucido	Punte elicoidali, corte	HSS	H
81030	64	~5xD	DIN 338	lucido	Punte elicoidali, corte	HSS	W
81035	66	~5xD	DIN 338	lucido	Punte elicoidali, corte	HSS	W
81040	67	~5xD	DIN 338	fasi nitrurate	Punte elicoidali, corte	HSS	FN
81041	87	~5xD	DIN 338	fasi nitrurate	Punte elicoidali, corte	HSS-E	FN
81045	69	~5xD	DIN 338	fasi nitrurate	Punte elicoidali, corte	HSS	FN
81061	89	~5xD	DIN 338	lucido	Punte elicoidali, corte	HSS-E	S
81078	97	~5xD	DIN 338	AlTiZrN	Punte elicoidali, corte	HSS-E	IS
81110	24	~3xD	DIN 1897	vaporizzato	Punte elicoidali, extra corte	HSS	N
81112	35	~3xD	DIN 1897	lucido	Punte elicoidali, extra corte	M42	N
81115	26	~3xD	DIN 1897	lucido	Punte elicoidali, extra corte	HSS	N
81120	28	~3xD	DIN 1897	lucido	Punte elicoidali, extra corte	HSS	H
81130	29	~3xD	DIN 1897	lucido	Punte elicoidali, extra corte	HSS	W
81140	30	~3xD	DIN 1897	fasi nitrurate	Punte elicoidali, extra corte	HSS	FN
81145	31	~3xD	DIN 1897	fasi nitrurate	Punte elicoidali, extra corte	HSS	FN
81171	37	~3xD	DIN 1897	vaporizzato	Punte elicoidali, extra corte	HSS-E	V
81173	39	~3xD	DIN 1897	lucido	Punte elicoidali, extra corte	HSS-E	IS
81178	44	~3xD	DIN 1897	AlTiZrN	Punte elicoidali, extra corte	HSS-E	IS
81190	119		Norma di fab.	vaporizzato	Punte doppie per carrozzeria	HSS	N
81191	115		Norma di fab.	lucido	Punte cilindriche per centri CN	HSS	N
81192	116		Norma di fab.	lucido	Punte cilindriche per centri CN	HSS	N
81210	122	~10xD	DIN 339	vaporizzato	Punte per foratura con bussola di guida	HSS	N
81310	124	~10xD	DIN 340	vaporizzato	Punte elicoidali, lunghe	HSS	N
81311	138	~10xD	DIN 340	vaporizzato	Punte elicoidali, lunghe	HSS-E	N
81315	126	~10xD	DIN 340	vaporizzato	Punte elicoidali, lunghe	HSS	N
81317	127	~10xD	DIN 340	vaporizzato	Punte elicoidali, lunghe	HSS	N
81320	128	~10xD	DIN 340	lucido	Punte elicoidali, lunghe	HSS	H
81330	129	~10xD	DIN 340	lucido	Punte elicoidali, lunghe	HSS	W
81340	131	~10xD	DIN 340	fasi nitrurate	Punte elicoidali, lunghe	HSS	FN
81341	139	~10xD	DIN 340	fasi nitrurate	Punte elicoidali, lunghe	HSS-E	FN
81350	133	~10xD	DIN 340	lucido	Punte elicoidali, lunghe	HSS	FW
81361	141	~10xD	DIN 340	lucido	Punte elicoidali, lunghe	HSS-E	S
81362	141	~10xD	DIN 340	TiN	Punte elicoidali, lunghe	HSS-E	S
81410	147	~15xD	DIN 1869	vaporizzato	Punte elicoidali in lunghezze speciali, grandezza 1	HSS	N
81440	148	~15xD	DIN 1869	fasi nitrurate	Punte elicoidali in lunghezze speciali, grandezza 1	HSS	FN
81441	151	~15xD	DIN 1869	fasi nitrurate	Punte elicoidali in lunghezze speciali, grandezza 1	HSS-E	FN
81450	149	~15xD	DIN 1869	lucido	Punte elicoidali in lunghezze speciali, grandezza 1	HSS	FW
81510	152	~20xD	DIN 1869	vaporizzato	Punte elicoidali in lunghezze speciali, grandezza 2	HSS	N
81540	153	~20xD	DIN 1869	fasi nitrurate	Punte elicoidali in lunghezze speciali, grandezza 2	HSS	FN
81541	155	~20xD	DIN 1869	fasi nitrurate	Punte elicoidali in lunghezze speciali, grandezza 2	HSS-E	FN
81610	156	~25xD	DIN 1869	vaporizzato	Punte elicoidali in lunghezze speciali, grandezza 3	HSS	N
81640	157	~25xD	DIN 1869	fasi nitrurate	Punte elicoidali in lunghezze speciali, grandezza 3	HSS	FN
81641	158	~25xD	DIN 1869	fasi nitrurate	Punte elicoidali in lunghezze speciali, grandezza 3	HSS-E	FN
81740	159	>25xD	Norma di fab.	fasi nitrurate	Punte elicoidali, extra lunghe	HSS	FN
81750	160	>25xD	Norma di fab.	lucido	Punte elicoidali, extra lunghe	HSS	FN
81760	161	>25xD	Norma di fab.	lucido	Punte elicoidali, extra lunghe	HSS	FN
81810	162		DIN 1898	vaporizzato	Punte per fori conici	HSS	N
82010	173	~5xD	DIN 345	vaporizzato	Punte elicoidali	HSS	N
82011	177	~5xD	DIN 345	vaporizzato	Punte elicoidali	HSS-E	N
82012	178	~5xD	DIN 345	lucido	Punte con codolo conico Morse	HSS-E	IS
82030	175	~5xD	DIN 345	lucido	Punte elicoidali	HSS	W
82191	183		Norma di fab.	vaporizzato	Punte cilindriche per centri CN	HSS	N
82192	183		Norma di fab.	vaporizzato	Punte cilindriche per centri CN	HSS	N
82210	184	~10xD	DIN 341	vaporizzato	Punte elicoidali, lunghe	HSS	N
82211	185	~10xD	DIN 341	vaporizzato	Punte elicoidali, lunghe	HSS-E	N

Articolo n.	Pagina	Profondità di foro	Norma	Superficie	Descrizione	Materiale da taglio	Tipo
82310	186	~15xD	DIN 1870	vaporizzato	Punte elicoidali in lunghezze speciali, grandezza 1	HSS	N
82340	187	~15xD	DIN 1870	fasi nitrurate	Punte elicoidali in lunghezze speciali, grandezza 1	HSS	FN
82341	188	~15xD	DIN 1870	fasi nitrurate	Punte elicoidali in lunghezze speciali, grandezza 1	HSS-E	FN
82410	189	~20xD	DIN 1870	vaporizzato	Punte elicoidali in lunghezze speciali, grandezza 2	HSS	N
82440	190	~20xD	DIN 1870	fasi nitrurate	Punte elicoidali in lunghezze speciali, grandezza 2	HSS	FN
82466	191	>20xD	Norma di fab.	fasi nitrurate	Punte elicoidali, extra lunghe	HSS	FN
82467	192	20xD	Norma di fab.	fasi nitrurate	Punte elicoidali, extra lunghe	HSS	FN
82468	193	>20xD	Norma di fab.	lucido	Punte elicoidali, extra lunghe	HSS	FN
82469	194	>20xD	Norma di fab.	lucido	Punte elicoidali, extra lunghe	HSS	FN
82515	198	~15xD	Norma di fab.	vaporizzato	Punte con fori di refrigerazione, tipo extra-lungo	HSS-E	FN
82521	195	~10xD	Norma di fab.	vaporizzato	Punte con fori di refrigerazione, tipo lungo	HSS	N
82525	197	~10xD	Norma di fab.	vaporizzato	Punte con fori di refrigerazione, tipo lungo	HSS-E	FN
82535	196	~10xD	Norma di fab.	vaporizzato	Punte con fori di refrigerazione, tipo lungo	HSS	FN
82571	423		Norma di fab.	vaporizzato	Tubi di adduzione		
82578	424		Norma di fab.		Attacco rapido		
82710	121	~10xD	Norma di fab.	lucido	Punte con canali di refrigerazione	HSS	FN
82761	120	~5xD	Norma di fab.	lucido	Punte con canali di refrigerazione	HSS-E	FN
82810	202		DIN 1898	vaporizzato	Punte per fori conici	HSS	N
82971	181	~3xD	Norma di fab.	vaporizzato	Punte elicoidali, corte	HSS-E	V
82972	182	~3xD	Norma di fab.	lucido	Punte con codolo conico Morse	HSS-E	IS
83000	368		DIN 333	lucido	Punte a centrare senza piano	HSS	N
83005	371		DIN 333	lucido	Punte a centrare senza piano	HSS	N
83100	366		DIN 333	lucido	Punte a centrare senza piano	HSS	N
83101	373		DIN 333	lucido	Punte a centrare senza piano	HSS-E	N
83102	374		DIN 333	nanoFIRE	Punte a centrare senza piano	HSS-E	N
83105	367		DIN 333	lucido	Punte a centrare senza piano	HSS	N
83110	372		Norma di fab.	lucido	Punte a centrare senza piano	HSS	N
83200	370		DIN 333	lucido	Punte a centrare senza piano	HSS	N
83300	369		DIN 333	lucido	Punte a centrare senza piano	HSS	N
83370	375		Norma di fab.	lucido	Punte a centrare senza piano	MDI	N
83500	376		DIN 333	lucido	Punte a centrare con piano	HSS	N
83600	376		DIN 333	lucido	Punte a centrare con piano	HSS	N
83700	377		DIN 333	lucido	Punte a centrare con piano	HSS	N
84100	386		Norma di fab.	lucido	Sbavatore a forcella	MDI	TS 100 EG
84101	387		Norma di fab.	lucido	Sbavatore a forcella	MDI	TS 100 EG
84400	33	~3xD	DIN 1897	TiN	Punte elicoidali, extra corte	HSS	N
84405	71	~5xD	DIN 338	TiN	Punte elicoidali, corte	HSS	N
84406	73	~5xD	DIN 338	TiN - testa	Punte elicoidali, corte	HSS	N
84415	75	~5xD	DIN 338	TiN	Punte elicoidali, corte	HSS	FN
84418	135	~10xD	DIN 340	TiN	Punte elicoidali, lunghe	HSS	N
84423	136	~10xD	DIN 340	TiN	Punte elicoidali, lunghe	HSS	FN
84425	150	~15xD	DIN 1869	TiN	Punte elicoidali in lunghezze speciali, grandezza 1	HSS	FN
84426	154	~20xD	DIN 1869	TiN	Punte elicoidali in lunghezze speciali, grandezza 2	HSS	FN
84434	115		Norma di fab.	TiN	Punte cilindriche per centri CN	HSS	N
84435	116		Norma di fab.	TiN	Punte cilindriche per centri CN	HSS	N
84445	348		Norma di fab.	TiN	Punte a gradino corte, cil.	HSS	N
84448	368		DIN 333	TiN	Punte a centrare senza piano	HSS	N
84450	366		DIN 333	TiN	Punte a centrare senza piano	HSS	N
84460	176	~5xD	DIN 345	TiN	Punte elicoidali	HSS	N
84461	120	~5xD	Norma di fab.	TiN	Punte con canali di refrigerazione	HSS-E	FN
84501	33	~3xD	DIN 1897	nanoFIRE	Punte elicoidali, extra corte	HSS	N
84502	75	~5xD	DIN 338	nanoFIRE	Punte elicoidali, corte	HSS	FN
84503	40	~3xD	DIN 1897	nanoFIRE	Punte elicoidali, extra corte	HSS-E	V
84504	91	~5xD	DIN 338	nanoFIRE	Punte elicoidali, corte	HSS-E	FN
84505	95	~5xD	DIN 338	nanoFIRE	Punte elicoidali, corte	HSS-E	S
84506	136	~10xD	DIN 340	nanoFIRE	Punte elicoidali, lunghe	HSS	FN
84507	109	~5xD	Norma di fab.	nanoFIRE	Punte con codolo rinforzato	HSS-E-PM	FN 500
84508	145	~10xD	DIN 340	nanoFIRE	Punte elicoidali, lunghe	HSS-E	FN
84511	46	~3xD	DIN 1897	nanoFIRE	Punte elicoidali, extra corte	HSS-E-PM	FN 500
84660	179	~5xD	DIN 345	TiAlN	Punte elicoidali	HSS-E	FN
84800	91	~5xD	DIN 338	TiN	Punte elicoidali, corte	HSS-E	FN
84801	107	~5xD	Norma di fab.	nanoFIRE	Punte con codolo rinforzato	HSS-E-PM	FU 500
84802	93	~5xD	DIN 338	TiN	Punte elicoidali, corte	HSS-E	FU 500 DZ
84803	40	~3xD	DIN 1897	TiN	Punte elicoidali, extra corte	HSS-E	V
84804	93	~5xD	DIN 338	lucido	Punte elicoidali, corte	HSS-E	FU 500 DZ
84805	105	~3xD	Norma di fab.	nanoFIRE	Punte con codolo rinforzato	HSS-E-PM	FU 500

Articolo n.	Pagina	Profondità di foro	Norma	Superficie	Descrizione	Materiale da taglio	Tipo
84806	42	~3xD	DIN 1897	TiN	Punte elicoidali, extra corte	HSS-E	FU 500 DZ
84807	95	~5xD	DIN 338	TiN	Punte elicoidali, corte	HSS-E	S
84808	42	~3xD	DIN 1897	lucido	Punte elicoidali, extra corte	HSS-E	FU 500 DZ
84810	332	~5xD	DIN 1899	TiN	Micropunte senza canali di refrigerazione	HSS-E-PM	N
84811	99	~5xD	DIN 338	TiN	Punte elicoidali, corte	HSS-E-PM	FN 500 DZ
84812	143	~10xD	DIN 340	TiN	Punte elicoidali, lunghe	HSS-E	FU 500 DZ
84814	143	~10xD	DIN 340	lucido	Punte elicoidali, lunghe	HSS-E	FU 500 DZ
84859	180	~5xD	DIN 345	TiN	Punte elicoidali	HSS-E	N
85010	354		DIN 8374	vaporizzato	Punte a gradini ad eliche indipendenti, cil.	HSS	N
85110	358		Norma di fab.	vaporizzato	Punte a gradini ad eliche indipendenti, cil.	HSS	N
85210	356		DIN 8376	vaporizzato	Punte a gradini ad eliche indipendenti, cil.	HSS	N
85216	359		Norma di fab.	vaporizzato	Punte a gradini ad eliche indipendenti, cil.	HSS	N
85218	355		DIN 8374	vaporizzato	Punte a gradini ad eliche indipendenti, cil.	HSS	N
85310	357		DIN 8378	vaporizzato	Punte a gradini ad eliche indipendenti, cil.	HSS	N
85510	364		Norma di fab.	vaporizzato	Punte a gradino ad eliche indipendenti, CM	HSS	N
85610	362		DIN 8377	vaporizzato	Punte a gradino ad eliche indipendenti, CM	HSS	N
85616	365		Norma di fab.	vaporizzato	Punte a gradino ad eliche indipendenti, CM	HSS	N
85619	361		DIN 8375	vaporizzato	Punte a gradino ad eliche indipendenti, CM	HSS	N
85710	363		DIN 8379	vaporizzato	Punte a gradino ad eliche indipendenti, CM	HSS	N
85910	345		Norma di fab.	vaporizzato	Punte a gradino per fori centraggio a DIN 332	HSS	N
85911	345		Norma di fab.	vaporizzato	Punte a gradino per fori centraggio a DIN 332	HSS	N
85912	346		Norma di fab.	vaporizzato	Punte a gradino per fori centraggio a DIN 332	HSS	N
85914	347		Norma di fab.	vaporizzato	Punte a gradino per fori centraggio a DIN 332	HSS	N
85916	349		Norma di fab.	lucido	Punte a gradino corte, cil.	HSS	N
85917	350		Norma di fab.	lucido	Punte a gradino corte, cil.	HSS	N
85918	351		Norma di fab.	lucido	Punte a gradino corte, cil.	HSS	N
85920	352		Norma di fab.	lucido	Punte a gradino corte, cil.	HSS	N
86010	165		DIN 344	vaporizzato	Allargatori cilindrici	HSS	N
86110	200		DIN 343	vaporizzato	Allargatori con attacco cono morse	HSS	N
86111	201		DIN 343	vaporizzato	Allargatori con attacco cono morse	HSS-E	N
86400	334	4xD	Norma di fab.	AlTiN	Micropunte senza canali di refrigerazione	MDI	N
86401	336	7xD	Norma di fab.	AlTiN	Micropunte senza canali di refrigerazione	MDI	N
86402	333		Norma di fab.	TiAlN	Micropunte senza canali di refrigerazione	MDI	N
86405	337	5xD	Norma di fab.	TiAlN	Micropunte con canali di refrigerazione	MDI	N
86408	338	8xD	Norma di fab.	TiAlN	Micropunte con canali di refrigerazione	MDI	N
86412	339	15xD	Norma di fab.	TiAlN - testa	Micropunte con canali di refrigerazione	MDI	N
86509	257	15xD	Norma di fab.	TiAlN	TS-Drills con refrigerazione interna	MDI	TS 100 T
86511	258	20xD	Norma di fab.	TiAlN - testa	TS-Drills con refrigerazione interna	MDI	TS 100 T
86512	259	25xD	Norma di fab.	TiAlN - testa	TS-Drills con refrigerazione interna	MDI	TS 100 T
86513	260	30xD	Norma di fab.	TiAlN - testa	TS-Drills con refrigerazione interna	MDI	TS 100 T
86514	261	40xD	Norma di fab.	TiAlN - testa	TS-Drills con refrigerazione interna	MDI	TS 100 T
86602	411		Norma di fab.	TiN	Inserti intercambiabili	HSS-E-PM	
86605	412		Norma di fab.	TiN	Inserti intercambiabili	HSS-E	
86608	413		Norma di fab.	FIRE	Inserti intercambiabili	HSS-E-PM	
86609	414		Norma di fab.	AlTiN	Inserti intercambiabili	HSS-E-PM	
86611	415		Norma di fab.	AlTiN	Inserti intercambiabili	HSS-E-PM	
86612	399	3xD	Norma di fab.	nichelato	Corpo portaplacchette con attacco cilindrico		
86622	400	5xD	Norma di fab.	nichelato	Corpo portaplacchette con attacco cilindrico		
86624	401	7xD	Norma di fab.	nichelato	Corpo portaplacchette con attacco cilindrico		
86628	402		Norma di fab.	nichelato	Corpo portaplacchette con attacco cilindrico		
86630	404		Norma di fab.	nichelato	Corpo portaplacchette con attacco cono morse		
86650	405		Norma di fab.	nichelato	Corpo portaplacchette con attacco cono morse		
86670	406		Norma di fab.	brunito	Corpo portaplacchette con attacco cono morse		
86678	408		Norma di fab.	nichelato	Corpo portaplacchette con attacco cono morse		
86680	407		Norma di fab.	brunito	Corpo portaplacchette con attacco cono morse		
86681	432	1xD	Norma di fab.	nichelato	Corpo portaplacchette Multiplex-HPC		
86682	433	1,5xD	Norma di fab.	nichelato	Corpo portaplacchette Multiplex-HPC		HPC
86683	435	3xD	Norma di fab.	nichelato	Corpo portaplacchette Multiplex-HPC		HPC
86684	437	5xD	Norma di fab.	nichelato	Corpo portaplacchette Multiplex-HPC		HPC
86685	439	7xD	Norma di fab.	nichelato	Corpo portaplacchette Multiplex-HPC		HPC
86686	441	10xD	Norma di fab.	nichelato	Corpo portaplacchette Multiplex-HPC		HPC
86690	422		Norma di fab.		Alimentatori per punte con fori di refrigerazione		
86691	426		Norma di fab.	brunito	Mandrino di adduzione refrigerante per Multiplex		
86692	427		Norma di fab.	brunito	Mandrino di adduzione refrigerante per Multiplex		
86693	428		Norma di fab.	brunito	Mandrino di adduzione refrigerante per Multiplex		
86694	429		Norma di fab.	brunito	Mandrino di adduzione refrigerante per Multiplex		

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86699	430		Norma di fab.	brunito	Bussole di riduzione per attacchi cilindrici		
86701	417		Norma di fab.	FIRE	Inserti intercambiabili	MDI	
86702	418		Norma di fab.	FIRE	Inserti intercambiabili	MDI	
86708	419		Norma di fab.	TiN	Inserti intercambiabili	MDI	
86709	420		Norma di fab.	TiN	Inserti intercambiabili	MDI	
86711	421		Norma di fab.	lucido	Inserti intercambiabili	MDI	
86721	443		Norma di fab.	AlTiN nano	Inserti intercambiabili per Multiplex HPC	MDI	HPC
86722	446		Norma di fab.	nanoFIRE	Inserti intercambiabili per Multiplex HPC	MDI	HPC
86723	449		Norma di fab.	TiAlSiN	Inserti intercambiabili per Multiplex HPC	MDI	HPC
86724	452		Norma di fab.	lucido	Inserti intercambiabili per Multiplex HPC	MDI	HPC
86725	455		Norma di fab.	AlTiN nano	Inserti intercambiabili per Multiplex HPC	MDI	HPC
86726	459		Norma di fab.	TiAlN	Inserti a svasare Multiplex HPC	MDI	
86727	459		Norma di fab.	lucido	Inserti a svasare Multiplex HPC	MDI	
86728	460		Norma di fab.	TiN	Inserti a svasare Multiplex HPC	MDI	
86729	458		Norma di fab.	nanoFIRE	Inserti intercambiabili per Multiplex HPC	MDI	
86842	425		Norma di fab.		Giravite Torx		
86843	461		Norma di fab.		Viti di serraggio per placchette 1.5-10xD		
86844	462		Norma di fab.		Giraviti dinamometrici		
86845	463		Norma di fab.		Inserti Torx		
86846	464		Norma di fab.		Viti di serraggio per svasatori Multiplex HPC		
87011	329	~5xD	DIN 1899	lucido	Micropunte senza canali di refrigerazione	HSS-E-PM	N
87016	331	~5xD	DIN 1899	lucido	Micropunte senza canali di refrigerazione	HSS-E-PM	N
88013	112	~5xD	DIN 338	vaporizzato	Serie di punte	HSS	N
88014	113	~5xD	DIN 338	lucido	Serie di punte	HSS-E	S
88015	112	~3xD	DIN 1897	MolyGlide	Serie di punte	HSS-E	P2000
88016	113	~5xD	DIN 338	TiN - testa	Serie di punte	HSS	N
88018	114	~5xD	DIN 338	Bronze-Oxid	Serie di punte	M42	N
88021	384		DIN 335	lucido	Kit svasatori cilindrici a 90°	HSS	
88022	385		DIN 335	TiAlN	Kit svasatori cilindrici a 90°, taglienti elicoidali	HSS-E	
88026	114	~5xD	DIN 338	vaporizzato	Serie di punte	HSS-E	N
88200	382		DIN 335	lucido	Svasatori cilindrici 90°	HSS	
88201	383		DIN 335	TiAlN	Svasatori cilindrici 90°, taglienti elicoidali	HSS-E	
88303	111		Norma di fab.		Serie di punte		
89235	48	~3xD	DIN 6539	lucido	Punte elicoidali, extra corte	MDI	N
89237	216	3xD	DIN 6539	TiN	TS-Drills senza refrigerazione interna	MDI	TS 100 U
89239	263	5xD	DIN 6539	lucido	Punte TS a 3 taglienti	MDI	TS 3 G
89242	117		Norma di fab.	lucido	Punte cilindriche per centri CN	MDI	N
89243	118		Norma di fab.	lucido	Punte cilindriche per centri CN	MDI	N
89244	100	~5xD	Norma di fab.	lucido	Punte elicoidali, corte	MDI	N
89246	52	~3xD	Norma di fab.	lucido	Punte elicoidali, extra corte	MDI	N
89247	262	5xD	DIN 6537L	lucido	Punte TS a 3 taglienti	MDI	TS 3 G
89249	117		Norma di fab.	lucido	Punte cilindriche per centri CN	MDI	N
89252	360			lucido	Punte a gradini ad eliche indipendenti, cil.	MDI	N
89253	50	~3xD	Norma di fab.	nanoFIRE	Punte elicoidali, extra corte	MDI	N
89254	353		Norma di fab.	lucido	Punte a gradino corte, cil.	MDI	N
89261	102	~5xD	Norma di fab.	nanoFIRE	Punte elicoidali, corte	MDI	N
89264	210	3xD	DIN 6537K	TiN	TS-Drills senza refrigerazione interna	MDI	TS 100 U
89266	222	3xD	DIN 6537K	TiN	TS-Drills con refrigerazione interna	MDI	TS 100 U
89272	231	5xD	DIN 6537L	TiN	TS-Drills con refrigerazione interna	MDI	TS 100 U
89275	220	5xD	Norma di fab.	TiN	TS-Drills senza refrigerazione interna	MDI	TS 100 U
89281	335	~5xD	Norma di fab.	lucido	Micropunte senza canali di refrigerazione	MDI	N
89286	146	~10xD	Norma di fab.	lucido	Punte elicoidali, lunghe	MDI	N
89292	229	4xD	Norma di fab.	lucido	TS-Drills con refrigerazione interna	MDI	TS 150 GG
89293	253	10xD	Norma di fab.	lucido	TS-Drills con refrigerazione interna	MDI	TS 150 GG
89294	245	7xD	Norma di fab.	lucido	TS-Drills con refrigerazione interna	MDI	TS 150 GG
89295	253	10xD	Norma di fab.	lucido	TS-Drills con refrigerazione interna	MDI	TS 150 GG
89301	163		DIN 8037	lucido	Punte speciali, con taglienti in MD	Metallo duro	N
89302	199		DIN 8041	lucido	Punte speciali, con taglienti in MD	Metallo duro	N
89303	164		DIN 8038	lucido	Punte speciali, con taglienti in MD	Metallo duro	N
89306	221	3xD	DIN 6538K	TiN	TS-Drills con refrigerazione interna	Metallo duro	TS 80 U
89307	230	5xD	DIN 6538M	TiN	TS-Drills con refrigerazione interna	Metallo duro	TS 80 U
89308	244	7xD	DIN 6538L	TiN	TS-Drills con refrigerazione interna	Metallo duro	TS 80 U
89401	216	3xD	DIN 6539	nanoFIRE	TS-Drills senza refrigerazione interna	MDI	TS 100 U
89402	212	3xD	DIN 6537K	nanoFIRE	TS-Drills senza refrigerazione interna	MDI	TS 100 U
89408	232	5xD	DIN 6537L	nanoFIRE	TS-Drills con refrigerazione interna	MDI	TS 100 U
89410	223	3xD	DIN 6537K	nanoFIRE	TS-Drills con refrigerazione interna	MDI	TS 100 U

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89411	232	5xD	DIN 6537L	nanoFIRE	TS-Drills con refrigerazione interna	MDI	TS 100 U
89412	246	7xD	Norma di fab.	nanoFIRE	TS-Drills con refrigerazione interna	MDI	TS 100 U
89413	212	3xD	DIN 6537K	nanoFIRE	TS-Drills senza refrigerazione interna	MDI	TS 100 U
89414	218	5xD	DIN 6537L	nanoFIRE	TS-Drills senza refrigerazione interna	MDI	TS 100 U
89415	223	3xD	DIN 6537K	nanoFIRE	TS-Drills con refrigerazione interna	MDI	TS 100 U
89416	246	7xD	Norma di fab.	nanoFIRE	TS-Drills con refrigerazione interna	MDI	TS 100 U
89417	218	5xD	DIN 6537L	nanoFIRE	TS-Drills senza refrigerazione interna	MDI	TS 100 U
89418	255	12xD	Norma di fab.	nanoFIRE - testa	TS-Drills con refrigerazione interna	MDI	TS 100 U
89420	234	5xD	DIN 6537L	FIRE	TS-Drills con refrigerazione interna	MDI	TS 100 R
89421	248	7xD	Norma di fab.	FIRE	TS-Drills con refrigerazione interna	MDI	TS 100 R
89422	214	3xD	DIN 6537K	TiAlSiN	TS-Drills senza refrigerazione interna	MDI	TS 100 H
89423	225	3xD	DIN 6537K	TiAlSiN	TS-Drills con refrigerazione interna	MDI	TS 100 H
89424	225	3xD	DIN 6537K	TiAlSiN	TS-Drills con refrigerazione interna	MDI	TS 100 H
89425	236	5xD	DIN 6537L	TiAlSiN	TS-Drills con refrigerazione interna	MDI	TS 100 H
89426	236	5xD	DIN 6537L	TiAlSiN	TS-Drills con refrigerazione interna	MDI	TS 100 H
89427	250	7xD	Norma di fab.	TiAlSiN	TS-Drills con refrigerazione interna	MDI	TS 100 H
89450	227	3xD	DIN 6537K	AlTiN nano	TS-Drills con refrigerazione interna	MDI	TS 100 INOX
89451	238	5xD	DIN 6537L	AlTiN nano	TS-Drills con refrigerazione interna	MDI	TS 100 INOX
89460	242	5xD	DIN 6537L	nanoFIRE	TS 100 HPC	MDI	TS 100 HPC
89461	251	7xD	Norma di fab.	nanoFIRE	TS 100 HPC	MDI	TS 100 HPC
89501	277	80.000	Norma di fab.	lucido	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89502	279	160.000	Norma di fab.	lucido	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89503	276	45.000	Norma di fab.	lucido	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89504	278	120.000	Norma di fab.	lucido	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89505	280	20xD	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80	Metallo duro	TLB E 80
89506	282	40xD	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80	Metallo duro	TLB E 80
89507	283	80xD	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80	Metallo duro	TLB E 80
89508	295	30xD	Norma di fab.	lucido	Punte a cannone a 2 taglienti Z 80	Metallo duro	TLB Z 80
89509	281	30xD	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80	Metallo duro	TLB E 80
89510	276	45.000	Norma di fab.	AlTiN	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89511	277	80.000	Norma di fab.	AlTiN	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89512	278	120.000	Norma di fab.	AlTiN	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89513	279	160.000	Norma di fab.	AlTiN	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89514	280	20xD	Norma di fab.	TiCN	Punte a cannone ad 1 tagliente E 80	Metallo duro	TLB E 80
89515	281	30xD	Norma di fab.	TiCN	Punte a cannone ad 1 tagliente E 80	Metallo duro	TLB E 80
89516	282	40xD	Norma di fab.	TiCN	Punte a cannone ad 1 tagliente E 80	Metallo duro	TLB E 80
89517	283	80xD	Norma di fab.	TiCN	Punte a cannone ad 1 tagliente E 80	Metallo duro	TLB E 80
89518	295	30xD	Norma di fab.	lucido	Punte a cannone a 2 taglienti Z 80	Metallo duro	TLB Z 80
89520	271	25xD	Norma di fab.	AlTiN nano	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89521	273	50xD	Norma di fab.	AlTiN nano	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89522	275	75xD	Norma di fab.	AlTiN nano	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89523	271	25xD	Norma di fab.	lucido	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89524	273	50xD	Norma di fab.	lucido	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89525	275	75xD	Norma di fab.	lucido	Punte a cannone ad 1 tagliente E 100	MDI	TLB E 100
89530	292	30xD	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 800 con inserti intercambiabili	Metallo duro	TLB E 800
89535	293		Norma di fab.	TiN	Inserti per punte a cannone ad 1 tagliente E 800	MDI	
89536	294		Norma di fab.	TiN	Pattini di guida per punte a cannone ad 1 tagliente E 800	MDI	
89539	284	GL 600	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80 XXL	Metallo duro	TLB E 80
89540	285	GL 800	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80 XXL	Metallo duro	TLB E 80
89541	287	GL1200	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80 XXL	Metallo duro	TLB E 80
89542	289	GL1600	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80 XXL	Metallo duro	TLB E 80
89543	291	GL2000	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80 XXL	Metallo duro	TLB E 80
89544	286	GL1000	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80 XXL	Metallo duro	TLB E 80
89545	288	GL1400	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80 XXL	Metallo duro	TLB E 80
89546	290	GL1800	Norma di fab.	TiN	Punte a cannone ad 1 tagliente E 80 XXL	Metallo duro	TLB E 80
89550	227	3xD	DIN 6537K	AlTiN nano	TS-Drills con refrigerazione interna	MDI	TS 100 INOX
89551	238	5xD	DIN 6537L	AlTiN nano	TS-Drills con refrigerazione interna	MDI	TS 100 INOX
89560	240	5xD	DIN 6537L	lucido	TS-Drills con refrigerazione interna	MDI	TS 100 ALU

I SISTEMI DI DISTRIBUZIONE UTENSILI HARTNER

Distributori automatici e armadi

Soluzioni personalizzate per lo stoccaggio e la gestione efficienti degli attrezzi.

I quattro sistemi di distribuzione utensili TM 326, TM 426, TM 526 e TM 626 offrono opzioni flessibili per lo stoccaggio su misura degli utensili. A seconda delle esigenze e delle dimensioni dell'azienda, è possibile scegliere tra diversi gradi di automazione. Sono disponibili opzioni di distribuzione personalizzate, come cassetti o sistemi a spirale.

I sistemi di distribuzione utensili Hartner possono essere adattati in modo del tutto personalizzato ai vostri desideri e alle esigenze della vostra azienda. In questo modo, potete sfruttare al meglio le varie opzioni disponibili. Lo confermano anche numerosi clienti soddisfatti.

HARTNER TOOL MANAGEMENT SOFTWARE

Intelligenza integrata

Tutti i sistemi di distribuzione utensili Hartner sono controllati dal software TM di facile utilizzo. Il touch-screen integrato consente un funzionamento semplice, rapido e intuitivo.
Il software offre al cliente possibilità di applicazione e impostazioni personalizzate in tutti i settori della produzione.
Grazie alla struttura modulare, è possibile rappresentare con precisione i processi nella produzione e tutti i sottosettori del circuito utensili vengono mostrati in modo trasparente, dallo stoccaggio alla preparazione, fino allo smaltimento.

Il software documenta tutti i dati di movimento delle giacenze a magazzino, attiva le proposte d'ordine e consente analisi sulla base di diversi criteri.

Questo reporting completo e dettagliato offre alla vostra azienda un vasto potenziale di ottimizzazione nel ciclo degli utensili.

Le interfacce consentono inoltre il collegamento a diversi sistemi di gestione delle merci e la connessione online dei fornitori tramite processi di ordine automatizzati.

HARTNER TOOL MANAGEMENT SOFTWARE

Prestazioni e vantaggi per il cliente

- Interfaccia utente e guida del menu semplici e intuitive
- Creazione di una dashboard personale
- Creazione di elenchi di utensili
- Richiamo diretto di sistemi CAD e programmi di grafica per la lavorazione e la rappresentazione di raffigurazioni di utensili
- Ampie funzioni di gestione del magazzino che consentono di gestire anche i distributori automatici di utensili TM di Hartner
- Rappresentazione dell'organizzazione clienti per l'assegnazione univoca dei costi di prelievo degli utensili
- Analisi precisa dei consumi in base ai criteri più diversi, ad es. consumo di utensili per componente, macchina o settore di produzione
- Le soluzioni personalizzate possono essere programmate secondo le esigenze del cliente
- Collegamento a tutti i comuni sistemi ERP/PPS, sistemi di gestione degli utensili e ai sistemi di sollevamento Paternoster tramite programmazione delle rispettive interfacce
- Software multilingue
- Creazione di moduli personalizzati per i clienti

Adesso con una nuova interfaccia utente ottimizzata.

HARTNER

Precision Cutting Tools

PUNTE ELICOIDALI CON CODOLO CILINDRICO

in HSS, HSS-E, HSS-E-PM, metallo duro
lucide e ricoperte

Punte elicoidali, extra corte

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
●		●	○			DIN 1897	N	HSS	>Ø 2,36	destra	cil.	~3xD	0,500 - 39,500	**81110**	24
●		●	○			DIN 1897	N	HSS	>Ø 5,00	sinistro	cil.	~3xD	0,500 - 36,500	**81115**	26
			●			DIN 1897	H	HSS	○	destra	cil.	~3xD	1,200 - 16,000	**81120**	28
			●			DIN 1897	W	HSS	○	destra	cil.	~3xD	1,500 - 16,000	**81130**	29
●	○	○	●			DIN 1897	FN	HSS	<Ø 2,36 >Ø 16,0	destra	cil.	~3xD	1,500 - 15,500	**81140**	30
●	○	○	●			DIN 1897	FN	HSS	<Ø 2,36 >Ø 16,0	sinistro	cil.	~3xD	1,000 - 12,500	**81145**	31
●		●	○			DIN 1897	N	HSS	T	destra	cil.	~3xD	1,000 - 25,000	**84400**	33
●		●	●			DIN 1897	N	HSS	F	destra	cil.	~3xD	1,000 - 25,000	**84501**	33
●	○	○	●	●	○	DIN 1897	N	M42	○	destra	cil.	~3xD	1,000 - 15,000	**81112**	35
●	●	●	○	●	○	DIN 1897	V	HSS-E	>Ø 2,36	destra	cil.	~3xD	0,400 - 25,000	**81171**	37
○	●		○	○		DIN 1897	IS	HSS-E	○	destra	cil.	~3xD	1,000 - 12,000	**81173**	39
●	●	●	○	●	○	DIN 1897	V	HSS-E	F	destra	cil.	~3xD	0,500 - 15,000	**84503**	40
●	●	●	○	●	○	DIN 1897	V	HSS-E	T	destra	cil.	~3xD	0,500 - 15,000	**84803**	40
●	●	●	●			DIN 1897	FU 500 DZ	HSS-E	T	destra	cil.	~3xD	1,000 - 14,000	**84806**	42

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte elicoidali, extra corte															
●	●	●	●			DIN 1897	FU 500 DZ	**HSS-E**	○	destra	cil.	~3xD	1,000 - 14,000	**84808**	42
○	●	○	○	●		DIN 1897	IS	**HSS-E**	S	destra	cil.	~3xD	1,000 - 13,000	**81178**	44
●	○	●	○	○	○	DIN 1897	FN 500	**HSS-E-PM**	F	destra	cil.	~3xD	1,000 - 13,500	**84511**	46
○	○	○	●	○		DIN 6539	N	**MDI**	○	destra	cil.	~3xD	0,800 - 16,000	**89235**	48
○	○	○	●	○		Norma di fab.	N	**MDI**	F	destra	cil.	~3xD	1,000 - 16,000	**89253**	50
○	○	○	○	○	○	Norma di fab.	N	**MDI**	○	destra	cil.	~3xD	0,500 - 6,100	**89246**	52
Punte elicoidali, corte															
●		●	○			DIN 338	N	**HSS**	>Ø 2,36	destra	cil.	~5xD	0,200 - 20,000	**81010**	53
●		●	○			DIN 338	N	**HSS**	>Ø 6,00	sinistro	cil.	~5xD	0,250 - 17,000	**81015**	57
●		●	○			DIN 338	N	**HSS**	●	destra	cil.	~5xD	3,000 - 13,000	**81017**	59
			●			DIN 338	H	**HSS**	○	destra	cil.	~5xD	0,300 - 20,000	**81020**	60
			●			DIN 338	H	**HSS**	○	sinistro	cil.	~5xD	0,500 - 16,000	**81025**	62
			●			DIN 338	W	**HSS**	○	destra	cil.	~5xD	0,250 - 16,500	**81030**	64
			●			DIN 338	W	**HSS**	○	sinistro	cil.	~5xD	0,500 - 15,000	**81035**	66

Punte elicoidali, corte

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
●		●	●			DIN 338	FN	HSS	>Ø 2,36	destra	cil.	~5xD	0,800 - 16,000	**81040**	67
●		●	●			DIN 338	FN	HSS	>Ø 2,36	sinistro	cil.	~5xD	1,400 - 16,000	**81045**	69
●		●	●			DIN 338	N	HSS	T	destra	cil.	~5xD	0,400 - 19,500	**84405**	71
●		●	○			DIN 338	N	HSS	T	destra	cil.	~5xD	1,000 - 16,000	**84406**	73
●		●	●			DIN 338	FN	HSS	T	destra	cil.	~5xD	1,000 - 16,000	**84415**	75
●		●	●			DIN 338	FN	HSS	F	destra	cil.	~5xD	1,000 - 16,000	**84502**	75
●	○	○	●	●	○	DIN 338	N	M42	○	destra	cil.	~5xD	1,000 - 14,000	**81012**	77
●	●	●	●	●	○	DIN 338	N	M42	●	destra	cil.	~5xD	1,000 - 13,000	**81018**	79
●	●	●	○	●	○	DIN 338	N	M42	F	destra	cil.	~5xD	1,000 - 16,000	**81019**	81
●	○	●	○			DIN 338	N	HSS-E	>Ø 2,36	destra	cil.	~5xD	0,200 - 20,000	**81011**	83
○	●		○	○		DIN 338	IS	HSS-E	○	destra	cil.	~5xD	1,000 - 13,000	**81013**	85
●	○	●	●			DIN 338	FN	HSS-E	>Ø 2,36	destra	cil.	~5xD	1,000 - 13,000	**81041**	87
○	●			●		DIN 338	S	HSS-E	○	destra	cil.	~5xD	0,200 - 17,500	**81061**	89
●	○	●	○			DIN 338	FN	HSS-E	T	destra	cil.	~5xD	1,000 - 13,000	**84800**	91

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte elicoidali, corte															
●	○	●	●		○	DIN 338	FN	HSS-E	F	destra	cil.	~5xD	1,000 - 13,000	**84504**	91
●	●	●	●			DIN 338	FU 500 DZ	HSS-E	○	destra	cil.	~5xD	1,000 - 14,000	**84804**	93
●	●	●	●			DIN 338	FU 500 DZ	HSS-E	T	destra	cil.	~5xD	1,000 - 14,000	**84802**	93
○	●			●		DIN 338	S	HSS-E	T	destra	cil.	~5xD	0,500 - 13,000	**84807**	95
○	●			●		DIN 338	S	HSS-E	F	destra	cil.	~5xD	0,500 - 13,000	**84505**	95
○	●	○	○	○		DIN 338	IS	HSS-E	S	destra	cil.	~5xD	1,000 - 13,000	**81078**	97
●	○	●	○	○	○	DIN 338	FN 500 DZ	HSS-E-PM	T	destra	cil.	~5xD	1,000 - 14,000	**84811**	99
○	○	○	●	○		Norma di fab.	N	MDI	○	destra	cil.	~5xD	1,000 - 12,000	**89244**	100
○	○	○	●	○		Norma di fab.	N	MDI	F	destra	cil.	~5xD	1,000 - 12,000	**89261**	102
Punte a elica ridotta per Hardox HX 500															
●	○	●	○	●	○	Norma di fab.	HX 500	M42	Z	destra	cil.	3xD	1,000 - 13,000	**81000**	104
Punte con codolo rinforzato															
●	●	●	●			Norma di fab.	FU 500	HSS-E-PM	F	destra	HA	~3xD	1,000 - 20,000	**84805**	105
●	●	●	●			Norma di fab.	FU 500	HSS-E-PM	F	destra	HA	~5xD	2,000 - 20,000	**84801**	107

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina

Punte con codolo rinforzato

●	○	●	○	○	○	Norma di fab.	FN 500	HSS-E-PM	F	destra	HA	~5xD	2,000 - 13,000	84507	109

Serie di punte

						Norma di fab.								88303	111

●	○	○	○			DIN 1897	P2000	HSS-E	M	destra	cil.	~3xD		88015	112

●		●	○			DIN 338	N	HSS		destra	cil.	~5xD		88013	112

●		●	○			DIN 338	N	HSS	T	destra	cil.	~5xD		88016	113

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Serie di punte															
○	●			●		DIN 338	S	HSS-E	◯	destra	cil.	~5xD		88014	113
●		●	○			DIN 338	N	HSS-E	●	destra	cil.	~5xD		88026	114
●	●	●	●	●	○	DIN 338	N	M42	●	destra	cil.	~5xD		88018	114
Punte cilindriche per centri CN															
●	○	●	●	○		Norma di fab.	N	HSS	◯	destra	cil.		3,000 - 25,000	81191	115
●	○	●	●	○		Norma di fab.	N	HSS	(T)	destra	cil.		3,000 - 25,000	84434	115
●	○	●	●	●		Norma di fab.	N	HSS	◯	destra	cil.		3,000 - 25,000	81192	116
●	○	●	●	○		Norma di fab.	N	HSS	(T)	destra	cil.		3,000 - 25,000	84435	116
○	○	○	○	○	○	Norma di fab.	N	MDI	◯	destra	cil.		4,000 - 20,000	89242	117

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte cilindriche per centri CN															
○	○	○	○	○	○	Norma di fab.	N	MDI	◯	destra	HB		4,000 - 20,000	**89249**	117
○	○	○	○	○	○	Norma di fab.	N	MDI	◯	destra	HA		4,000 - 20,000	**89243**	118
Punte doppie per carrozzeria															
●	○	●	●	●		Norma di fab.	N	HSS	>Ø 2,36	destra	cil.		2,000 - 10,000	**81190**	119
Punte con canali di refrigerazione															
●	●	●	●	●		Norma di fab.	FN	HSS-E	◯	destra	HE	~5xD	5,000 - 20,000	**82761**	120
●	●	●	●	●	○	Norma di fab.	FN	HSS-E	T	destra	HE	~5xD	5,000 - 20,000	**84461**	120
●	○	●	●	○		Norma di fab.	FN	HSS	◯	destra	cil.	~10xD	3,000 - 13,000	**82710**	121
Punte per foratura con bussola di guida															
●		●	○			DIN 339	N	HSS	>Ø 2,36	destra	cil.	~10xD	0,800 - 19,000	**81210**	122
Punte elicoidali, lunghe															
●		●	○			DIN 340	N	HSS	>Ø 2,36	destra	cil.	~10xD	0,400 - 22,000	**81310**	124
●		●	○			DIN 340	N	HSS	>Ø 6,00	sinistro	cil.	~10xD	0,900 - 12,000	**81315**	126
●		●	○			DIN 340	N	HSS	●	destra	cil.	~10xD	3,100 - 12,200	**81317**	127

Punte elicoidali, lunghe

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
			●			DIN 340	H	HSS	○	destra	cil.	~10xD	0,500 - 14,500	**81320**	128
			●			DIN 340	W	HSS	○	destra	cil.	~10xD	0,500 - 17,000	**81330**	129
●		●	●			DIN 340	FN	HSS	>Ø 2,36	destra	cil.	~10xD	0,900 - 14,000	**81340**	131
○			●			DIN 340	FW	HSS	○	destra	cil.	~10xD	1,000 - 14,000	**81350**	133
●		●	○			DIN 340	N	HSS	T	destra	cil.	~10xD	0,500 - 16,000	**84418**	135
●		●	●			DIN 340	FN	HSS	T	destra	cil.	~10xD	1,000 - 14,000	**84423**	136
●		●	●			DIN 340	FN	HSS	F	destra	cil.	~10xD	1,000 - 14,000	**84506**	136
●	○	●	●	○		DIN 340	N	HSS-E	>Ø 2,36	destra	cil.	~10xD	0,500 - 12,500	**81311**	138
●	●	●	●		○	DIN 340	FN	HSS-E	>Ø 2,36	destra	cil.	~10xD	1,000 - 16,000	**81341**	139
○	●			●		DIN 340	S	HSS-E	○	destra	cil.	~10xD	1,000 - 13,000	**81361**	141
○	●			●		DIN 340	S	HSS-E	T	destra	cil.	~10xD	1,000 - 13,000	**81362**	141
●	●	●	●			DIN 340	FU 500 DZ	HSS-E	○	destra	cil.	~10xD	1,000 - 14,000	**84814**	143
●	●	●	●			DIN 340	FU 500 DZ	HSS-E	T	destra	cil.	~10xD	1,000 - 14,000	**84812**	143
●	●	●	●		○	DIN 340	FN	HSS-E	F	destra	cil.	~10xD	1,000 - 12,000	**84508**	145

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte elicoidali, lunghe															
○		○			○	Norma di fab.	N	MDI	○	destra	cil.	~10xD	0,500 - 1,500	**89286**	146
Punte elicoidali in lunghezze speciali, grandezza 1															
●		●	○			DIN 1869	N	HSS	>Ø 2,36	destra	cil.	~15xD	1,600 - 13,000	**81410**	147
●		●	●			DIN 1869	FN	HSS	>Ø 2,36	destra	cil.	~15xD	2,000 - 13,000	**81440**	148
○			●			DIN 1869	FW	HSS	○	destra	cil.	~15xD	2,000 - 9,500	**81450**	149
●		●	●			DIN 1869	FN	HSS	T	destra	cil.	~15xD	2,000 - 12,000	**84425**	150
●	●	●	●	●	○	DIN 1869	FN	HSS-E	◓	destra	cil.	~15xD	3,000 - 10,000	**81441**	151
Punte elicoidali in lunghezze speciali, grandezza 2															
●		●	○			DIN 1869	N	HSS	●	destra	cil.	~20xD	3,000 - 12,000	**81510**	152
●		●	●			DIN 1869	FN	HSS	>Ø 2,36	destra	cil.	~20xD	2,000 - 13,000	**81540**	153
●		●	●	○		DIN 1869	FN	HSS	T	destra	cil.	~20xD	3,000 - 8,500	**84426**	154
●	●	●	●		○	DIN 1869	FN	HSS-E	◓	destra	cil.	~20xD	3,000 - 10,000	**81541**	155
Punte elicoidali in lunghezze speciali, grandezza 3															
●		●	○			DIN 1869	N	HSS	●	destra	cil.	~25xD	3,500 - 12,000	**81610**	156

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte elicoidali in lunghezze speciali, grandezza 3															
●		●	●			DIN 1869	FN	HSS	◓	destra	cil.	~25xD	2,500 - 13,000	**81640**	157
●	●		●	●		DIN 1869	FN	HSS-E	◓	destra	cil.	~25xD	2,500 - 13,000	**81641**	158
Punte elicoidali, extra lunghe															
●		●	●			Norma di fab.	FN	HSS	◓	destra	cil.	>25xD	6,000 - 12,000	**81740**	159
●		●	●			Norma di fab.	FN	HSS	○	destra	cil.	>25xD	8,000 - 12,000	**81750**	160
●		●	●			Norma di fab.	FN	HSS	○	destra	cil.	>25xD	10,000 - 12,000	**81760**	161
Punte per fori conici															
●	○	●	○			DIN 1898	N	HSS	◯ >Ø 2,36	destra	cil.		2,000 - 12,000	**81810**	162
Punte speciali, con taglienti in MD															
○		○			○	DIN 8037	N	con riporto in MD	○	destra	cil.		2,600 - 20,000	**89301**	163
○		○			○	DIN 8038	N	con riporto in MD	○	destra	cil.		3,100 - 19,000	**89303**	164
Allargatori cilindrici															
●	○	●	○			DIN 344	N	HSS	●	destra	cil.		3,800 - 15,000	**86010**	165

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Punte elicoidali, extra corte

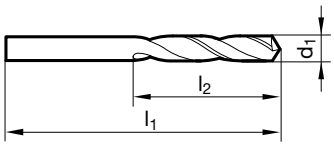
Articolo n. 81110

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • per torni automatici/revolver • anche per trapani a mano

materiale a spessore sottile • acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

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Punte elicoidali, extra corte

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

d1 mm	inch	l1 mm	l2 mm
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

Punte elicoidali, extra corte

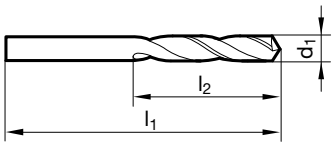
Articolo n. 81115

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 14,200 • spoglia sul cono tagliente • per torni automatici/revolver

materiale a spessore sottile • acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

Punte elicoidali, extra corte

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				

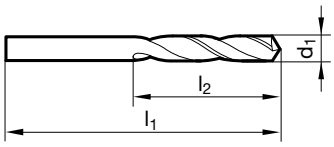
Punte elicoidali, extra corte

Articolo n. 81120

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 15,000 • spoglia sul cono tagliente
materiali duri e secchi • ottone, leghe di magnesio • bronzo, bronzo fosforoso • ardesia, 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

Punte elicoidali, extra corte

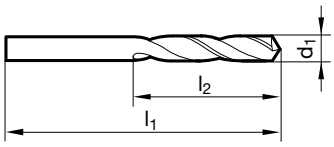
Articolo n. 81130

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 2,500 • spoglia sul cono tagliente

materiali teneri a truciolo lungo • alluminio, leghe di alluminio (a truciolo lungo) • zinco, rame affinato, silumin, elektron • materie sintetiche (tenere) e legno



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

Punte elicoidali, extra corte

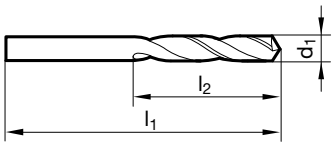
Articolo n. 81140

P	M	K	N	S	H
●	○	○	●		

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

assott. del nocc. ≥ Ø 1,500 • spoglia sul cono tagliente • per acciai molto duri

acciai automatici • acciai inossidabili e resist. al calore • acciai da cementazione e da bonifica con R fino a ca. 800 N/mm² • leghe di alluminio e rame a truciolo corto e medio



d1 mm	inch	l1 mm	l2 mm
1,500		32,000	9,000
1,600		34,000	10,000
1,800		36,000	11,000
2,000		38,000	12,000
2,100		38,000	12,000
2,200		40,000	13,000
2,350		40,000	13,000
2,400		43,000	14,000
2,500		43,000	14,000
2,600		43,000	14,000
2,700		46,000	16,000
2,800		46,000	16,000
2,900		46,000	16,000
3,000		46,000	16,000
3,100		49,000	18,000
3,150		49,000	18,000
3,300		49,000	18,000
3,500		52,000	20,000
3,700		52,000	20,000
4,000		55,000	22,000
4,100		55,000	22,000
4,200		55,000	22,000
4,300		58,000	24,000
4,600		58,000	24,000
4,700		58,000	24,000
4,800		62,000	26,000
4,900		62,000	26,000
5,000		62,000	26,000
5,100		62,000	26,000
5,200		62,000	26,000
5,300		62,000	26,000
5,400		66,000	28,000
5,500		66,000	28,000
5,600		66,000	28,000
5,700		66,000	28,000
5,800		66,000	28,000
5,900		66,000	28,000
6,000		66,000	28,000
6,200		70,000	31,000
6,300		70,000	31,000
6,400		70,000	31,000
6,500		70,000	31,000

d1 mm	inch	l1 mm	l2 mm
6,600		70,000	31,000
6,700		70,000	31,000
6,800		74,000	34,000
7,000		74,000	34,000
7,100		74,000	34,000
7,300		74,000	34,000
7,400		74,000	34,000
7,800		79,000	37,000
8,000		79,000	37,000
8,100		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
8,800		84,000	40,000
9,000		84,000	40,000
9,100		84,000	40,000
9,200		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
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
12,300	31/64	102,000	51,000
12,500		102,000	51,000
13,000		102,000	51,000
15,000		111,000	56,000
15,500		115,000	58,000

HARTNER

Punte elicoidali, extra corte

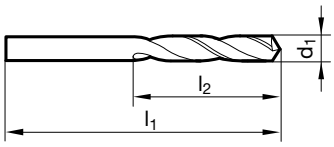
Articolo n. 81145

P	M	K	N	S	H
●	○	○	●		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • per acciai molto duri

acciai automatici • acciai inossidabili e resist. al calore • acciai da cementazione e da bonifica con R fino a ca. 800 N/mm² • leghe di alluminio e rame a truciolo corto e medio



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

Punte elicoidali, extra corte

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	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				

Punte elicoidali, extra corte

Articolo n. 84400

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • per torni automatici/revolver • anche per trapani a mano

materiale a spessore sottile • acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite

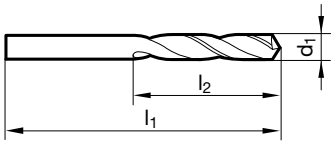
Articolo n. 84501

P	M	K	N	S	H
●		●	●		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • per torni automatici/revolver • anche per trapani a mano

materiale a spessore sottile • acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

Punte elicoidali, extra corte

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

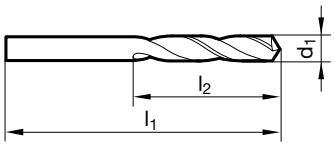
Punte elicoidali, extra corte

Articolo n. 81112

P	M	K	N	S	H
●	○	○	●	●	○

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • con alta perc. di CoMo • particolarmente resistente all'usura
leghe tenaci e molto ten. base di CrNi • Hastelloy, Inconel, Nimonic • acciai inossidabili e resistenti al calore • lamiere resistente all'usura
• acciai o bronzi con R fino a ca. 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

Punte elicoidali, extra corte

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
9,500		84,000	40,000	13,500		107,000	54,000
9,700		89,000	43,000	14,000		107,000	54,000
9,800		89,000	43,000	14,500		111,000	56,000
9,900		89,000	43,000	15,000		111,000	56,000
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				

HARTNER

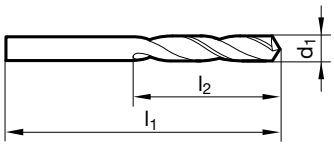
Punte elicoidali, extra corte

Articolo n. 81171

P	M	K	N	S	H
●	●	●	○	●	○

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
acciai inossidabili e resist. al calore • acciai per molle • acciai austenitici • 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

Punte elicoidali, extra corte

d1 mm	inch	l1 mm	l2 mm
5,900		66,000	28,000
5,950	15/64	66,000	28,000
6,000		66,000	28,000
6,100		70,000	31,000
6,200		70,000	31,000
6,250		70,000	31,000
6,300		70,000	31,000
6,400		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
7,200		74,000	34,000
7,300		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
7,800		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
8,400		79,000	37,000
8,500		79,000	37,000
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
9,400		84,000	40,000
9,500		84,000	40,000
9,600		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
10,400		89,000	43,000
10,500		89,000	43,000

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

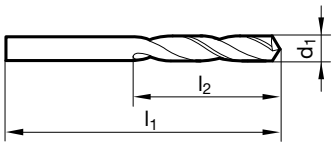
Punte elicoidali, extra corte

Articolo n. 81173

P	M	K	N	S	H
○	●		○	○	

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

punta per INOX • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
acciai inossidabili, resistenti al calore ed austenitici (V2A e 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

Punte elicoidali, extra corte

Articolo n. 84503

P	M	K	N	S	H
●	●	●	○	●	○

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

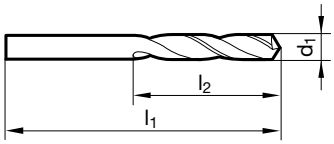
assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
acciai inossidabili e resist. al calore • acciai per molle • acciai austenitici • Hastelloy, Inconel, Nimonic

Articolo n. 84803

P	M	K	N	S	H
●	●	●	○	●	○

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
acciai inossidabili e resist. al calore • acciai per molle • acciai austenitici • 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

Punte elicoidali, extra corte

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				

Punte elicoidali, extra corte

Articolo n. 84806

P	M	K	N	S	H
•	•	•	•		

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

assott. del nocc. ≥ Ø 1,000 • affilatura su piani • acciaio HSS legato al Co • è necess. una limitata forza di avanz. • è necess. un limitato momento torcente • per impiego universale

acciai legati e non legati con R fino a 800 N/mm² • acciai per lav. a caldo e a freddo • acciai per cuscinetti • metalli non ferrosi • ghise • acciai inossidabili • plastica

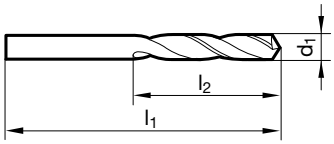
Articolo n. 84808

P	M	K	N	S	H
•	•	•	•		

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

assott. del nocc. ≥ Ø 1,000 • affilatura su piani • acciaio HSS legato al Co • è necess. una limitata forza di avanz. • è necess. un limitato momento torcente • per impiego universale

acciai legati e non legati con R fino a 800 N/mm² • acciai per lav. a caldo e a freddo • acciai per cuscinetti • metalli non ferrosi • ghise • acciai inossidabili • plastica



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

Punte elicoidali, extra corte

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

Punte elicoidali, extra corte

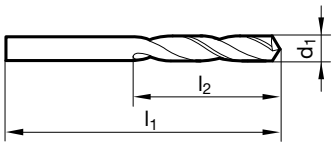
Articolo n. 81178

P	M	K	N	S	H
○	●	○	○	●	

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

assott. del nocc. ≥ Ø 1,000 • affilatura con ottimizzazione dell'assottigliamento del nocciolo • acciaio HSS legato al Co • massima resistenza all'usura

acciai inossidabili, resistenti al calore ed austenitici (V2A e V4A) • leghe speciali



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

Punte elicoidali, extra corte

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

Punte elicoidali, extra corte

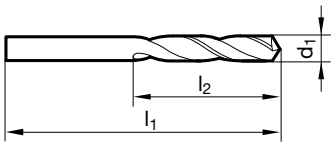
Articolo n. 84511

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al acciaio sinterizzato • stabilità elevata • particolarmente resistente all'usura

acciai ed acciai legati in alta percentuale • acciai da bonifica e da cementazione • ghise, ottone e bronzo



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

Punte elicoidali, extra corte

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
9,520	3/8	89,000	43,000	11,510	29/64	95,000	47,000
9,600		89,000	43,000	11,910	15/32	102,000	51,000
9,800		89,000	43,000	12,000		102,000	51,000
9,900		89,000	43,000	12,500		102,000	51,000
9,920	25/64	89,000	43,000	12,700	1/2	102,000	51,000
10,000		89,000	43,000	13,000		102,000	51,000
10,200		89,000	43,000	13,500		107,000	54,000
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				

HARTNER

Punte elicoidali, extra corte

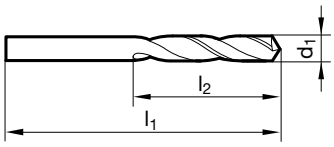
Articolo n. 89235

P	M	K	N	S	H
○	○	○	●	○	

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • ghisa grigia • bronzo, ottone • alluminio e leghe di alluminio • magnesio e leghe di magnesio • materie sintetiche e materie sintetiche a fibre rinforzate



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

Punte elicoidali, extra corte

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

d1 mm	inch	l1 mm	l2 mm
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

Punte elicoidali, extra corte

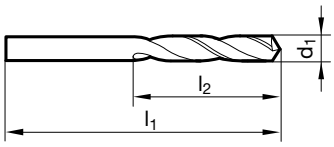
Articolo n. 89253

P	M	K	N	S	H
○	○	○	●	○	

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

assott. del nocc. ≥ Ø 2,060 • affilatura su piani • forma del tagliente principale diritta

leghe di alluminio con elevato contenuto di silicio • acciai automatici, acciai da bonifica • acciai da costruzione e da cementazione • ghise • materie sintetiche e materie sintetiche a fibre rinforzate • magnesio e leghe di magnesio • ottone



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

Punte elicoidali, extra corte

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

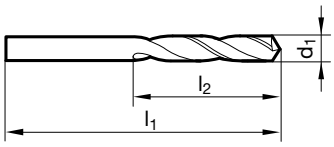
Punte elicoidali, extra corte

Articolo n. 89246

P	M	K	N	S	H
○	○	○	○	○	○

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

affilatura su piani • forma del tagliente principale diritta
materie sintetiche a fibre vetrose • altri materiali che esercitano un'azione abrasiva sui taglienti e sulle fasi della punta



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

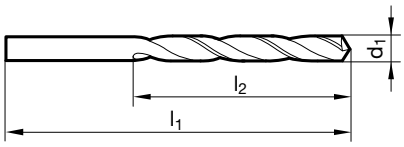
Punte elicoidali, corte

Articolo n. 81010

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

Punte elicoidali, corte

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

Punte elicoidali, corte

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

Punte elicoidali, corte

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

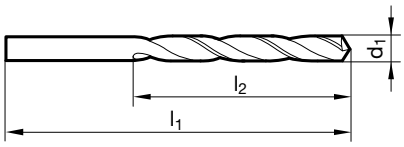
Punte elicoidali, corte

Articolo n. 81015

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 15,000 • spoglia sul cono tagliente
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

Punte elicoidali, corte

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

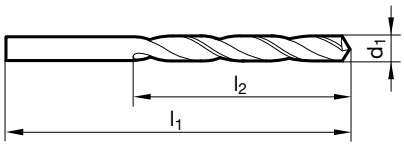
Punte elicoidali, corte

Articolo n. 81017

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • con dente di trascinamento secondo DIN 1809
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

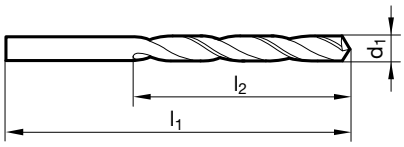
Punte elicoidali, corte

Articolo n. 81020

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 14,500 • spoglia sul cono tagliente
materiali duri e secchi • ottone, leghe di magnesio • bronzo, bronzo fosforoso • ardesia, 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

Punte elicoidali, corte

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

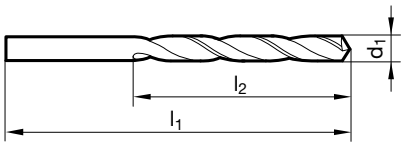
Punte elicoidali, corte

Articolo n. 81025

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 14,500 • spoglia sul cono tagliente
materiali duri e secchi • ottone, leghe di magnesio • bronzo, bronzo fosforoso • ardesia, 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

Punte elicoidali, corte

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

Punte elicoidali, corte

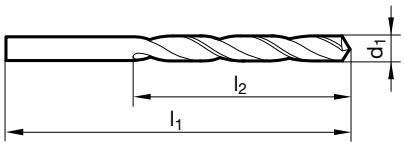
Articolo n. 81030

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 14,500 • spoglia sul cono tagliente

materiali teneri a truciolo lungo • alluminio, leghe di alluminio (a truciolo lungo) • zinco, rame affinato, silumin, elektron • materie sintetiche (tenere) • legno



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

Punte elicoidali, corte

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

Punte elicoidali, corte

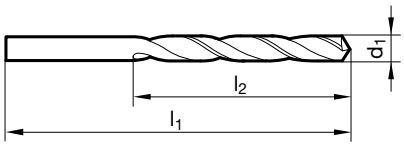
Articolo n. 81035

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 15,000 • spoglia sul cono tagliente

materiali teneri a truciolo lungo • alluminio, leghe di alluminio (a truciolo lungo) • zinco, rame affinato, silumin, elektron • materie sintetiche (tenere) • legno



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

HARTNER

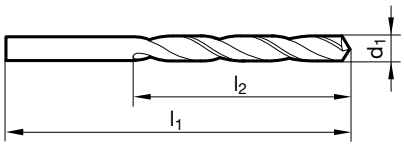
Punte elicoidali, corte

Articolo n. 81040

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • scanalature ampliate • specifiche per prof. di foro oltre 3xD
ghisa grigia • acciai con R fino a 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali, corte

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

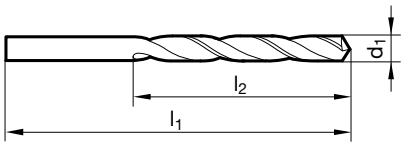
Punte elicoidali, corte

Articolo n. 81045

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 1,400 • spoglia sul cono tagliente • scanalature ampliate • specifiche per prof. di foro oltre 3xD
ghisa grigia • acciai con R fino a 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali, corte

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

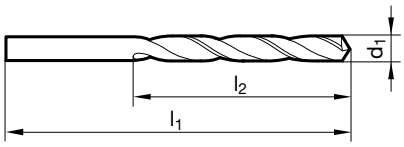
Punte elicoidali, corte

Articolo n. 84405

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

Punte elicoidali, corte

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

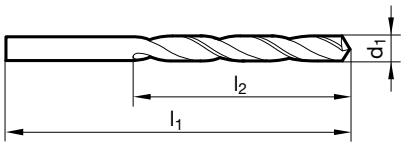
Punte elicoidali, corte

Articolo n. 84406

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • rivestimento in testa
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

Punte elicoidali, corte

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

Punte elicoidali, corte

Articolo n. 84415

P	M	K	N	S	H
•		•	•		

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

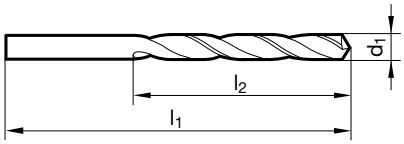
assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • scanalature ampliate • specifiche per prof. di foro oltre 3xD
ghisa grigia • acciai con R fino a 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili

Articolo n. 84502

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • scanalature ampliate • specifiche per prof. di foro oltre 3xD
ghisa grigia • acciai con R fino a 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

HARTNER

Punte elicoidali, corte

d1 mm	inch	l1 mm	l2 mm
7,000		109,000	69,000
7,100		109,000	69,000
7,200		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
7,800		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
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

d1 mm	inch	l1 mm	l2 mm
10,000		133,000	87,000
10,100		133,000	87,000
10,200		133,000	87,000
10,300		133,000	87,000
10,500		133,000	87,000
10,700		142,000	94,000
11,000		142,000	94,000
11,400		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
12,300	31/64	151,000	101,000
12,500		151,000	101,000
12,700	1/2	151,000	101,000
12,800		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
16,000		178,000	120,000

HARTNER

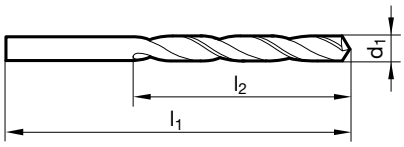
Punte elicoidali, corte

Articolo n. 81012

P	M	K	N	S	H
●	○	○	●	●	○

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

assott. del nocc. ≥ Ø 1,000 • geometria conica con assottigliamento a NAS 907 • con alta perc. di CoMo • particolarmente resistente all'usura



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

Punte elicoidali, corte

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

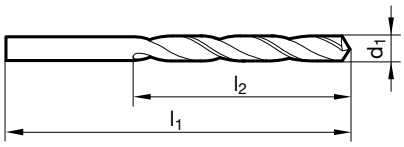
Punte elicoidali, corte

Articolo n. 81018

P	M	K	N	S	H
●	●	●	●	●	○

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

assott. del nocc. ≥ Ø 1,000 • geometria conica con assottigliamento a NAS 907 • con alta perc. di CoMo • particolarmente resistente all'usura • nucleo ascendente significativamente ridotto



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

Punte elicoidali, corte

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

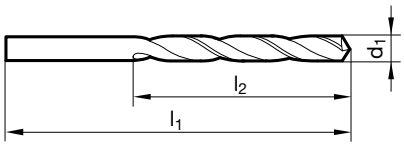
Punte elicoidali, corte

Articolo n. 81019

P	M	K	N	S	H
●	●	●	○	●	○

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

assott. del nocc. ≥ Ø 1,000 • geometria conica con assottigliamento a NAS 907 • con alta perc. di CoMo • particolarmente resistente all'usura



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

Punte elicoidali, corte

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
8,500		117,000	75,000	10,100		133,000	87,000
8,600		125,000	81,000	10,200		133,000	87,000
8,700		125,000	81,000	10,500		133,000	87,000
8,730	11/32	125,000	81,000	10,800		142,000	94,000
8,800		125,000	81,000	11,000		142,000	94,000
8,900		125,000	81,000	11,200		142,000	94,000
9,000		125,000	81,000	11,500		142,000	94,000
9,100		125,000	81,000	11,800		142,000	94,000
9,200		125,000	81,000	11,910	15/32	151,000	101,000
9,300		125,000	81,000	12,000		151,000	101,000
9,400		125,000	81,000	12,200		151,000	101,000
9,500		125,000	81,000	12,500		151,000	101,000
9,600		133,000	87,000	13,000		151,000	101,000
9,700		133,000	87,000	14,000		160,000	108,000
9,800		133,000	87,000	15,000		169,000	114,000
9,900		133,000	87,000	16,000		178,000	120,000
9,920	25/64	133,000	87,000				
10,000		133,000	87,000				

HARTNER

Punte elicoidali, corte

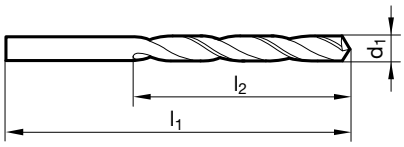
Articolo n. 81011

P	M	K	N	S	H
●	○	●	○		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura

acciaio e ghisa acciaiosa (legati e non legati) • ghise con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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

Punte elicoidali, corte

d1 mm	inch	l1 mm	l2 mm
4,500		80,000	47,000
4,550		80,000	47,000
4,600		80,000	47,000
4,650		80,000	47,000
4,700		80,000	47,000
4,800		86,000	52,000
4,900		86,000	52,000
5,000		86,000	52,000
5,020		86,000	52,000
5,050		86,000	52,000
5,100		86,000	52,000
5,150		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
5,600		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
6,000		93,000	57,000
6,050		101,000	63,000
6,100		101,000	63,000
6,150		101,000	63,000
6,200		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
6,750	17/64	109,000	69,000
6,800		109,000	69,000
7,000		109,000	69,000
7,100		109,000	69,000
7,140	9/32	109,000	69,000
7,200		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
7,900		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
8,500		117,000	75,000
8,600		125,000	81,000
8,700		125,000	81,000
8,730	11/32	125,000	81,000
8,750		125,000	81,000
8,800		125,000	81,000
8,900		125,000	81,000
9,000		125,000	81,000
9,100		125,000	81,000
9,200		125,000	81,000
9,250		125,000	81,000
9,300		125,000	81,000

d1 mm	inch	l1 mm	l2 mm
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
10,000		133,000	87,000
10,050		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
10,720	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
11,200		142,000	94,000
11,300		142,000	94,000
11,500		142,000	94,000
11,700		142,000	94,000
11,750		142,000	94,000
11,800		142,000	94,000
12,000		151,000	101,000
12,200		151,000	101,000
12,250		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
13,200		151,000	101,000
13,300		160,000	108,000
13,400		160,000	108,000
13,500		160,000	108,000
13,600		160,000	108,000
13,700		160,000	108,000
13,800		160,000	108,000
14,000		160,000	108,000
14,200		169,000	114,000
14,400		169,000	114,000
14,500		169,000	114,000
15,000		169,000	114,000
15,250		178,000	120,000
15,500		178,000	120,000
15,870	5/8	178,000	120,000
16,000		178,000	120,000
16,500		184,000	125,000
17,000		184,000	125,000
17,500		191,000	130,000
19,000		198,000	135,000
20,000		205,000	140,000

HARTNER

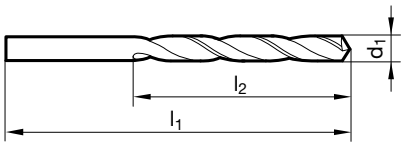
Punte elicoidali, corte

Articolo n. 81013

P	M	K	N	S	H
○	●		○	○	

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

punta per INOX • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
acciai inossidabili, resistenti al calore ed austenitici (V2A e 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

Punte elicoidali, corte

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

Punte elicoidali, corte

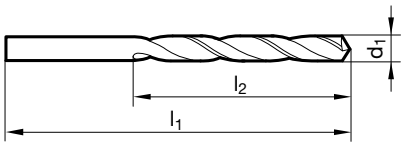
Articolo n. 81041

P	M	K	N	S	H
●	○	●	●		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura • scanalature ampliate • specifiche per prof. di foro oltre 3xD

ghisa grigia e acciai oltre gli 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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

Punte elicoidali, corte

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

Punte elicoidali, corte

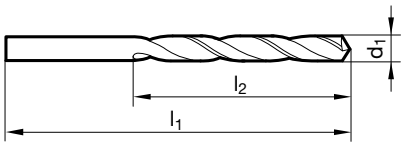
Articolo n. 81061

P	M	K	N	S	H
○	●			●	

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura

Titanio e leghe di titanio • acciai inossidabili, resistenti al calore ed austenitici • acciai molto tenaci ed a truciolo corto con R da ca. 900 N/mm² • 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

Punte elicoidali, corte

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				

Punte elicoidali, corte

Articolo n. 84800

P	M	K	N	S	H
●	○	●	○		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura • scanalature ampliate • specifiche per prof. di foro oltre 3xD

ghisa grigia e acciai oltre gli 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione

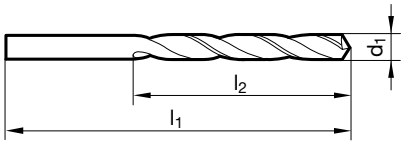
Articolo n. 84504

P	M	K	N	S	H
●	○	●	●		○

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • scanalature ampliate • massima resistenza all'usura • specifiche per prof. di foro oltre 3xD

ghisa grigia e acciai oltre gli 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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

Punte elicoidali, corte

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				

Punte elicoidali, corte

Articolo n. 84804

P	M	K	N	S	H
•	•	•	•		

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

assott. del nocc. ≥ Ø 1,000 • affilatura su piani • acciaio HSS legato al Co • è necess. una limitata forza di avanz. • è necess. un limitato momento torcente • per impiego universale

acciai legati e non legati con R fino a 800 N/mm² • acciai per lav. a caldo e a freddo • acciai per cuscinetti • metalli non ferrosi • ghise • acciai inossidabili • plastica

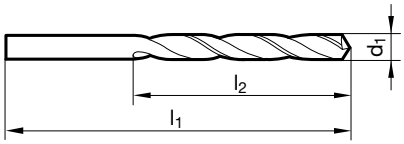
Articolo n. 84802

P	M	K	N	S	H
•	•	•	•		

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

assott. del nocc. ≥ Ø 1,000 • affilatura su piani • acciaio HSS legato al Co • è necess. una limitata forza di avanz. • è necess. un limitato momento torcente • massima resistenza all'usura • per impiego universale

acciai legati e non legati con R fino a 800 N/mm² • acciai per lav. a caldo e a freddo • acciai per cuscinetti • metalli non ferrosi • ghise • acciai inossidabili • plastica



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

Punte elicoidali, corte

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

Punte elicoidali, corte

Articolo n. 84807

P	M	K	N	S	H
○	●			●	

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura

Titanio e leghe di titanio • acciai inossidabili, resistenti al calore ed austenitici • acciai molto tenaci ed a truciolo corto con R da ca. 900 N/mm² • Hastelloy, Inconel, Nimonic

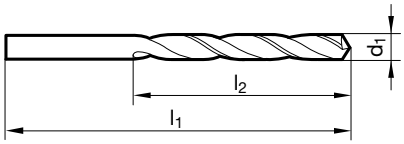
Articolo n. 84505

P	M	K	N	S	H
○	●			●	

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura

Titanio e leghe di titanio • acciai inossidabili, resistenti al calore ed austenitici • acciai molto tenaci ed a truciolo corto con R da ca. 900 N/mm² • 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

Punte elicoidali, corte

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

Punte elicoidali, corte

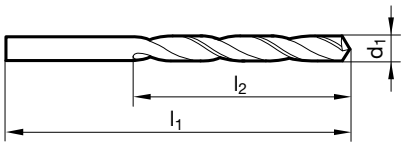
Articolo n. 81078

P	M	K	N	S	H
○	●	○	○	○	

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

assott. del nocc. ≥ Ø 1,000 • affilatura con ottimizzazione dell'assottigliamento del nocciolo • acciaio HSS legato al Co • massima resistenza all'usura

acciai inossidabili, resistenti al calore ed austenitici (V2A e V4A) • leghe speciali



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

HARTNER

Punte elicoidali, corte

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

Punte elicoidali, corte

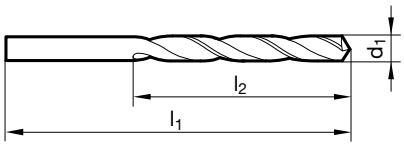
Articolo n. 84811

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al acciaio sinterizzato • stabilità elevata • particolarmente resistente all'usura

acciai legati in alta percentuale • acciai da bonifica e da cementazione • ghise, ottone e bronzo



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

HARTNER

Punte elicoidali, corte

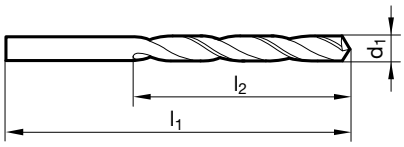
Articolo n. 89244

P	M	K	N	S	H
○	○	○	●	○	

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • ghisa grigia • bronzo, ottone • alluminio e leghe di alluminio • magnesio e leghe di magnesio • materie sintetiche e materie sintetiche a fibre rinforzate



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

HARTNER

Punte elicoidali, corte

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

HARTNER

Punte elicoidali, corte

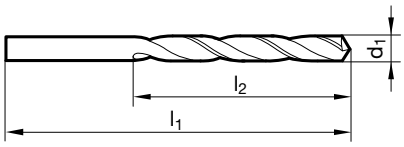
Articolo n. 89261

P	M	K	N	S	H
○	○	○	●	○	

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

assott. del nocc. ≥ Ø 2,060 • affilatura su piani • forma del tagliente principale diritta

leghe di alluminio con elevato contenuto di silicio • acciai automatici, acciai da bonifica • acciai da costruzione e da cementazione • ghise • materie sintetiche e materie sintetiche a fibre rinforzate • magnesio e leghe di magnesio • ottone



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

Punte elicoidali, corte

d1 mm	inch	l1 mm	l2 mm
6,900		109,000	69,000
7,000		109,000	69,000
7,100		109,000	69,000
7,140	9/32	109,000	69,000
7,300		109,000	69,000
7,400		109,000	69,000
7,500		109,000	69,000
7,540	19/64	117,000	75,000
7,600		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
8,030		117,000	75,000
8,100		117,000	75,000
8,200		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
9,000		125,000	81,000
9,100		125,000	81,000

d1 mm	inch	l1 mm	l2 mm
9,130	23/64	125,000	81,000
9,200		125,000	81,000
9,500		125,000	81,000
9,520	3/8	133,000	87,000
9,600		133,000	87,000
9,800		133,000	87,000
9,920	25/64	133,000	87,000
10,000		133,000	87,000
10,200		133,000	87,000
10,300		133,000	87,000
10,320	13/32	133,000	87,000
10,500		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
12,000		151,000	101,000

Punte con lunghezza elica ridotta

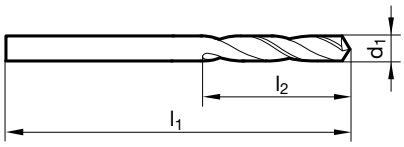
Articolo n. 81000

P	M	K	N	S	H
●	○	●	○	●	○

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

assott. del nocc. ≥ Ø 1,000 • particolarmente resistente all'usura • affilatura a croce ottimizzata • acciaio rapido HSCO legato con l' 8% di cobalto

per lavorazioni ad alte prestazioni di acciai da costruzione e da cementazione • lamiere resistente all'usura • 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

Punte con codolo rinforzato

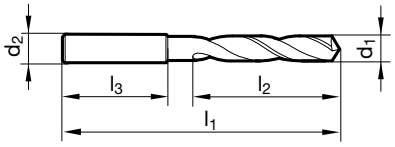
Articolo n. 84805

P	M	K	N	S	H
•	•	•	•		

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

assott. del nocc. ≥ Ø 2,000 • affilatura su piani • è necess. una limitata forza di avanz. • acciaio HSS legato al acciaio sinterizzato • è necess. un limitato momento torcente • massima resistenza all'usura • per impiego universale

acciai legati e non legati con R fino a 800 N/mm² • acciai per lav. a caldo e a freddo • acciai inossidabili • metalli non ferrosi • ghise • plastica • acciai per cuscinetti



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
1,000		3,000	38,000	6,000	28,000
1,100		3,000	39,000	7,000	28,000
1,200		3,000	40,000	8,000	28,000
1,300		3,000	40,000	8,000	28,000
1,400		3,000	41,000	9,000	28,000
1,500		3,000	41,000	9,000	28,000
1,600		3,000	42,000	10,000	28,000
1,700		3,000	42,000	10,000	28,000
1,800		3,000	43,000	11,000	28,000
1,900		3,000	43,000	11,000	28,000
2,000		3,000	44,000	12,000	28,000
2,100		3,000	44,000	12,000	28,000
2,200		3,000	45,000	13,000	28,000
2,300		3,000	45,000	13,000	28,000
2,380	3/32	3,000	46,000	14,000	28,000
2,400		3,000	46,000	14,000	28,000
2,500		3,000	46,000	14,000	28,000
2,600		3,000	46,000	14,000	28,000
2,700		3,000	48,000	16,000	28,000
2,780	7/64	3,000	48,000	16,000	28,000
2,800		3,000	48,000	16,000	28,000
2,900		3,000	48,000	16,000	28,000
3,000		3,000	48,000	16,000	28,000
3,100		4,000	50,000	18,000	28,000
3,170	1/8	4,000	50,000	18,000	28,000
3,200		4,000	50,000	18,000	28,000
3,300		4,000	50,000	18,000	28,000
3,400		4,000	52,000	20,000	28,000
3,500		4,000	52,000	20,000	28,000
3,570	9/64	4,000	52,000	20,000	28,000
3,600		4,000	52,000	20,000	28,000
3,700		4,000	52,000	20,000	28,000
3,800		4,000	54,000	22,000	28,000
3,900		4,000	54,000	22,000	28,000
3,970	5/32	4,000	54,000	22,000	28,000
4,000		4,000	54,000	22,000	28,000
4,100		6,000	66,000	22,000	36,000
4,200		6,000	66,000	22,000	36,000
4,300		6,000	68,000	24,000	36,000
4,370	11/64	6,000	68,000	24,000	36,000
4,400		6,000	68,000	24,000	36,000
4,500		6,000	68,000	24,000	36,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
4,600		6,000	68,000	24,000	36,000
4,650		6,000	68,000	24,000	36,000
4,700		6,000	68,000	24,000	36,000
4,760	3/16	6,000	70,000	26,000	36,000
4,800		6,000	70,000	26,000	36,000
4,900		6,000	70,000	26,000	36,000
5,000		6,000	70,000	26,000	36,000
5,100		6,000	70,000	26,000	36,000
5,160	13/64	6,000	70,000	26,000	36,000
5,200		6,000	70,000	26,000	36,000
5,300		6,000	70,000	26,000	36,000
5,400		6,000	72,000	28,000	36,000
5,500		6,000	72,000	28,000	36,000
5,550		6,000	72,000	28,000	36,000
5,560	7/32	6,000	72,000	28,000	36,000
5,600		6,000	72,000	28,000	36,000
5,700		6,000	72,000	28,000	36,000
5,800		6,000	72,000	28,000	36,000
5,900		6,000	72,000	28,000	36,000
5,950	15/64	6,000	72,000	28,000	36,000
6,000		6,000	72,000	28,000	36,000
6,100		8,000	75,000	31,000	36,000
6,200		8,000	75,000	31,000	36,000
6,300		8,000	75,000	31,000	36,000
6,350	1/4	8,000	75,000	31,000	36,000
6,400		8,000	75,000	31,000	36,000
6,500		8,000	75,000	31,000	36,000
6,600		8,000	75,000	31,000	36,000
6,700		8,000	75,000	31,000	36,000
6,750	17/64	8,000	78,000	34,000	36,000
6,800		8,000	78,000	34,000	36,000
6,900		8,000	78,000	34,000	36,000
7,000		8,000	78,000	34,000	36,000
7,100		8,000	78,000	34,000	36,000
7,140	9/32	8,000	78,000	34,000	36,000
7,200		8,000	78,000	34,000	36,000
7,300		8,000	78,000	34,000	36,000
7,400		8,000	78,000	34,000	36,000
7,500		8,000	78,000	34,000	36,000
7,540	19/64	8,000	81,000	37,000	36,000
7,550		8,000	81,000	37,000	36,000
7,600		8,000	81,000	37,000	36,000

Punte con codolo rinforzato

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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

Punte con codolo rinforzato

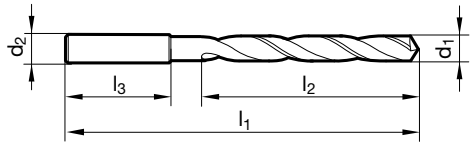
Articolo n. 84801

P	M	K	N	S	H
•	•	•	•		

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

assott. del nocc. ≥ Ø 2,000 • affilatura su piani • è necess. una limitata forza di avanz. • è necess. un limitato momento torcente • acciaio HSS legato al acciaio sinterizzato • massima resistenza all'usura • per impiego universale

acciai legati e non legati con R fino a 800 N/mm² • acciai per lav. a caldo e a freddo • acciai inossidabili • metalli non ferrosi • ghise • plastica



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

Punte con codolo rinforzato

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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

Punte con codolo rinforzato

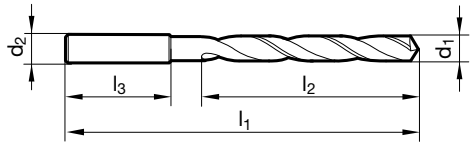
Articolo n. 84507

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • acciaio HSS legato al acciaio sinterizzato • particolarmente resistente all'usura • stabilità elevata

acciai ed acciai legati in alta percentuale • acciai da bonifica e da cementazione • ghise, ottone e bronzo



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

Punte con codolo rinforzato

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

Serie di punte

Articolo n. 88303

WN

Cassetta vuota in plastica

d1 mm	in progressione mm	Pezzi/set	Codice
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

Serie di punte

Articolo n. 88015

P	M	K	N	S	H
●	○	○	○		

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

assott. del nocc. ≥ Ø 1,000 • Set in cassetta di metallo • spoglia sul cono tagliente

d1 mm	in progressione mm	Pezzi/set	Codice
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

Articolo n. 88013

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • Set in cassetta di plastica • spoglia sul cono tagliente
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite

d1 mm	in progressione mm	Pezzi/set	Codice
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

Serie di punte

Articolo n. 88016

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • Set in cassetta di plastica • spoglia sul cono tagliente • rivestimento in testa
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite

d1 mm	in progressione mm	Pezzi/set	Codice
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

Articolo n. 88014

P	M	K	N	S	H
○	●			●	

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

assott. del nocc. ≥ Ø 0,970 • Set in cassetta di plastica • spoglia sul cono tagliente
Titanio e leghe di titanio • acciai inossidabili, resistenti al calore ed austenitici • acciai molto tenaci ed a truciolo corto con R da ca. 900 N/mm² • Hastelloy, Inconel, Nimonic

d1 mm	in progressione mm	Pezzi/set	Codice
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

Serie di punte

Articolo n. 88026

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • Set in cassetta di plastica • spoglia sul cono tagliente

acciaio e ghisa acciaiosa (legati e non legati) • ghise con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione

d1 mm	in progressione mm	Pezzi/set	Codice
1,0-10,0	0,5	19	3,013
1,0-13,0	0,5	25	3,014

Articolo n. 88018

P	M	K	N	S	H
●	●	●	●	●	○

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

assott. del nocc. ≥ Ø 1,000 • dotato di punta elocoidale M42 articolo 81018

d1 mm	in progressione mm	Pezzi/set	Codice
1,0-10,0	0,5	19	0,013
1,0-13,0	0,5	25	0,014

Punte cilindriche per centri CN

Articolo n. 81191

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 120° | h6 | R | Cyl

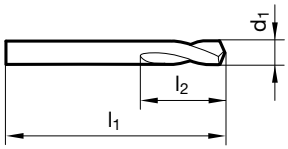
spoglia sul cono tagliente • adatte solo per centrare
per impiego universale

Articolo n. 84434

P	M	K	N	S	H
●	○	●	●	○	

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

spoglia sul cono tagliente • adatte solo per centrare
per impiego universale



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

Punte cilindriche per centri CN

Articolo n. 81192

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 90° | h6 | R | Cyl

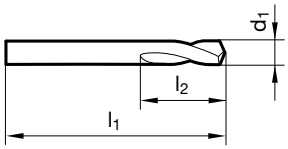
spoglia sul cono tagliente • adatte solo per centrare
per impiego universale

Articolo n. 84435

P	M	K	N	S	H
●	○	●	●	○	

HSS | T | N | WN | 90° | h6 | R | Cyl

spoglia sul cono tagliente • adatte solo per centrare
per impiego universale



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	16,000		115,000	37,500
6,000		66,000	16,000	20,000		131,000	45,000
8,000		79,000	21,000	25,000	63/64	151,000	53,000
10,000		89,000	25,000				

Punte cilindriche per centri CN

Articolo n. 89242

P	M	K	N	S	H
○	○	○	○	○	○

VHM | ○ | N | WN | 120° | h6 | R | Cyl

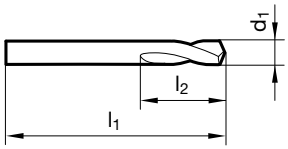
affilatura su piani • adatte solo per centrare
per impiego universale

Articolo n. 89249

P	M	K	N	S	H
○	○	○	○	○	○

VHM | ○ | N | WN | 142° | h6 | R | HB

affilatura su piani • adatte solo per centrare
per impiego universale



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

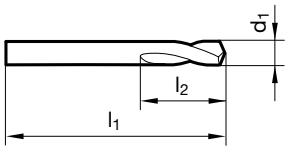
Punte cilindriche per centri CN

Articolo n. 89243

P	M	K	N	S	H
○	○	○	○	○	○

VHM | ○ | N | WN | 90° | h6 | R | HA

affilatura su piani • adatte solo per centrare
per impiego universale



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

HARTNER

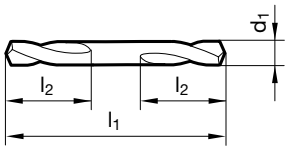
Punte doppie per carrozzeria

Articolo n. 81190

P	M	K	N	S	H
●	○	●	●	●	

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

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • per impiego su entrambi i lati • per trapani a mano per carrozzeria materiale a spessore sottile



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			

Punte con canali di refrigerazione

Articolo n. 82761

P	M	K	N	S	H
•	•	•	•	•	

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

assott. del nocc. ≥ Ø 5,000 • spoglia sul cono tagliente • acciaio HSS legato al Co

materiali a truciolo lungo con R fino a ca. 1000 N/mm² • acciai inossidabili • ghise • metalli non ferrosi

Articolo n. 84461

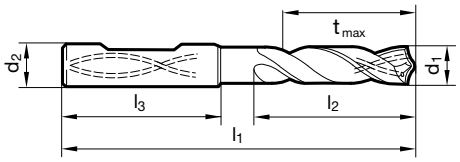
P	M	K	N	S	H
•	•	•	•	•	○

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

assott. del nocc. ≥ Ø 5,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura

materiali a truciolo lungo con R fino a ca. 1000 N/mm² • acciai inossidabili • ghise • metalli non ferrosi

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



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

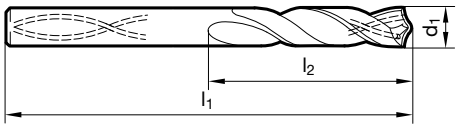
Punte con canali di refrigerazione

Articolo n. 82710

P	M	K	N	S	H
●	○	●	●	○	

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • per forare con bussola di guida • specifiche per prof. di foro oltre 5xD

pacchi di lamierini • acciaio e ghisa acciaiosa, ghisa grigia • acciai austenitici a ca. 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

Punte per foratura con bussola di guida

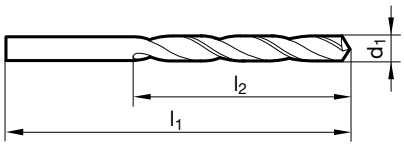
Articolo n. 81210

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • per forare con bussola di guida • con dente di trascinamento secondo DIN 1809

acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

Punte per foratura con bussola di guida

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

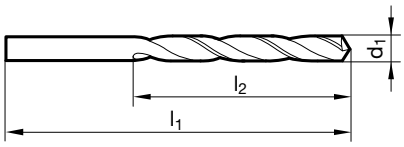
Punte elicoidali, lunghe

Articolo n. 81310

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • per fori profondi
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

Punte elicoidali, lunghe

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

d1 mm	inch	l1 mm	l2 mm
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

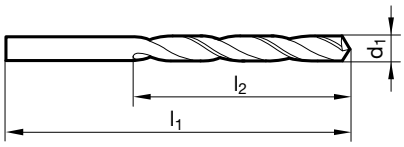
Punte elicoidali, lunghe

Articolo n. 81315

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 15,000 • spoglia sul cono tagliente • per fori profondi • per forare con bussola di guida
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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			

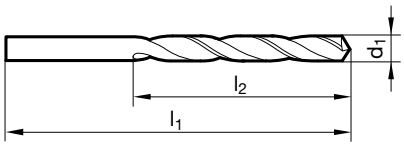
Punte elicoidali, lunghe

Articolo n. 81317

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 3,100 • spoglia sul cono tagliente • con dente di trascinamento
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

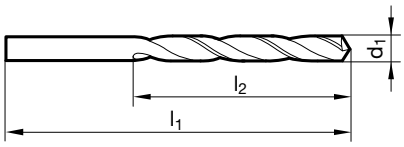
Punte elicoidali, lunghe

Articolo n. 81320

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 14,500 • spoglia sul cono tagliente • per fori profondi
materiali duri e secchi • ottone, leghe di magnesio • bronzo, bronzo fosforoso • ardesia, 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

Punte elicoidali, lunghe

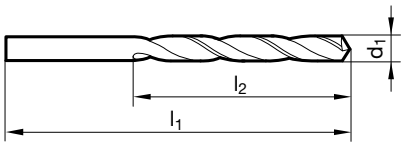
Articolo n. 81330

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 14,250 • spoglia sul cono tagliente • per fori profondi

materiali teneri a truciolo lungo • alluminio, leghe di alluminio (a truciolo lungo) • zinco, rame affinato, silumin, elektron • materie sintetiche (tenere) e legno



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

Punte elicoidali, lunghe

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

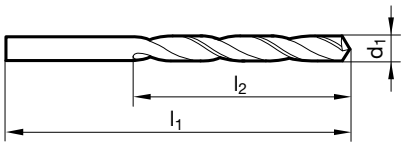
Punte elicoidali, lunghe

Articolo n. 81340

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • scanalature ampliate • in caso di evacuazione truciolo insufficiente
ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali, lunghe

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
11,500		195,000	128,000	14,000		214,000	140,000
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				

HARTNER

Punte elicoidali, lunghe

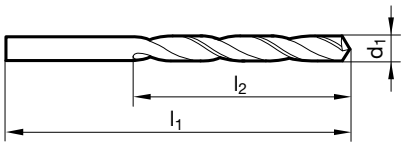
Articolo n. 81350

P	M	K	N	S	H
○			●		

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

assott. del nocc. ≥ Ø 2,400 • spoglia sul cono tagliente • scanalature particolarmente larghe

materiali teneri a truciolo lungo • fino a 500 N/mm² • acciai teneri automatici • alluminio, leghe di alluminio (a truciolo lungo) • zinco, rame affinato, silumin, elektron • zamak, argalium, materie sintetiche (tenere) e legno



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

Punte elicoidali, lunghe

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				

HARTNER

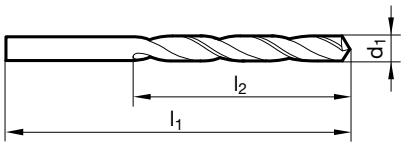
Punte elicoidali, lunghe

Articolo n. 84418

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • per fori profondi • per forare con bussola di guida
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

Punte elicoidali, lunghe

Articolo n. 84423

P	M	K	N	S	H
•		•	•		

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

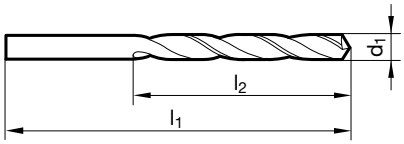
assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • scanalature ampliate • in caso di evacuazione truciolo insufficiente
ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili

Articolo n. 84506

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • scanalature ampliate • in caso di evacuazione truciolo insufficiente
ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali, lunghe

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

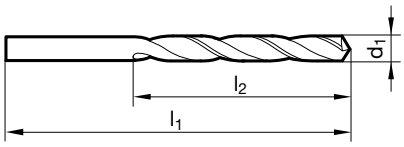
Punte elicoidali, lunghe

Articolo n. 81311

P	M	K	N	S	H
●	○	●	●	○	

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
acciai legati e non legati e tipi di ghisa con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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

HARTNER

Punte elicoidali, lunghe

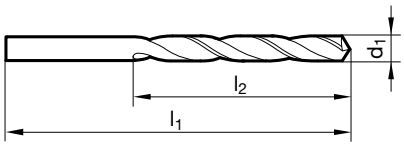
Articolo n. 81341

P	M	K	N	S	H
●	●	●	●		○

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

assott. del nocc. ≥ Ø 1,100 • spoglia sul cono tagliente • acciaio HSS legato al Co • scanalature ampliate • massima resistenza all'usura • in caso di evacuazione truciolo insufficiente

acciai legati e non legati e tipi di ghisa con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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

Punte elicoidali, lunghe

d1 mm	inch	l1 mm	l2 mm	d1 mm	inch	l1 mm	l2 mm
9,200		175,000	115,000	11,000		195,000	128,000
9,300		175,000	115,000	11,500		195,000	128,000
9,500		175,000	115,000	11,800		195,000	128,000
9,600		184,000	121,000	11,910	15/32	205,000	134,000
9,700		184,000	121,000	12,000		205,000	134,000
9,800		184,000	121,000	12,500		205,000	134,000
9,900		184,000	121,000	12,700	1/2	205,000	134,000
10,000		184,000	121,000	13,000		205,000	134,000
10,200		184,000	121,000	16,000		227,000	149,000
10,500		184,000	121,000				
10,800		195,000	128,000				
10,900		195,000	128,000				

Punte elicoidali, lunghe

Articolo n. 81361

P	M	K	N	S	H
○	●			●	

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

assott. del nocc. ≥ Ø 1,400 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura

Titanio e leghe di titanio • acciai inossidabili, resistenti al calore ed austenitici • acciai molto tenaci ed a truciolo corto con R da ca. 900 N/mm² • acciai per cuscinetti • Hastelloy, Inconel, Nimonic

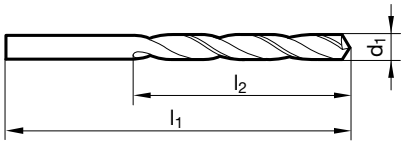
Articolo n. 81362

P	M	K	N	S	H
○	●			●	

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura

Titanio e leghe di titanio • acciai inossidabili, resistenti al calore ed austenitici • acciai molto tenaci ed a truciolo corto con R da ca. 900 N/mm² • acciai per cuscinetti • 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

Punte elicoidali, lunghe

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

Punte elicoidali, lunghe

Articolo n. 84814

P	M	K	N	S	H
•	•	•	•		

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

assott. del nocc. ≥ Ø 1,000 • affilatura su piani • acciaio HSS legato al Co • è necess. una limitata forza di avanz. • è necess. un limitato momento torcente • massima resistenza all'usura • per impiego universale

acciai legati e non legati con R fino a 800 N/mm² • acciai per lav. a caldo e a freddo • acciai per cuscinetti • metalli non ferrosi • ghise • acciai inossidabili • plastica

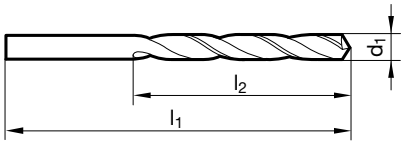
Articolo n. 84812

P	M	K	N	S	H
•	•	•	•		

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

assott. del nocc. ≥ Ø 1,000 • affilatura su piani • acciaio HSS legato al Co • è necess. un limitato momento torcente • è necess. una limitata forza di avanz. • massima resistenza all'usura • per impiego universale

acciai legati e non legati con R fino a 800 N/mm² • acciai per lav. a caldo e a freddo • acciai per cuscinetti • metalli non ferrosi • ghise • plastica • acciai inossidabili



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

Punte elicoidali, lunghe

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

Punte elicoidali, lunghe

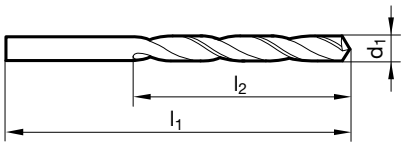
Articolo n. 84508

P	M	K	N	S	H
●	●	●	●		○

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

assott. del nocc. ≥ Ø 1,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • scanalature ampliate • particolarmente resistente all'usura • in caso di evacuazione truciolo insufficiente

acciai legati e non legati e tipi di ghisa con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai altamente legati • acciai da bonifica e da cementazione



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			

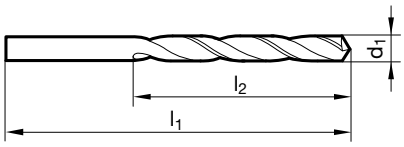
Punte elicoidali, lunghe

Articolo n. 89286

P	M	K	N	S	H
○		○			○

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

affilatura su piani • forma del tagliente principale diritta
materie sintetiche a fibre vetrose • altri materiali che esercitano un'azione abrasiva sui taglienti e sulle fasi della punta



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

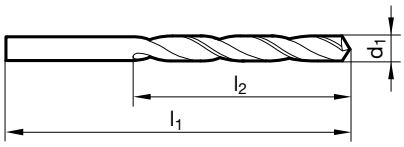
Punte elicoidali in lunghezze speciali, grandezza 1

Articolo n. 81410

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 2,400 • spoglia sul cono tagliente • per fori estremamente profondi
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

Punte elicoidali in lunghezze speciali, grandezza 1

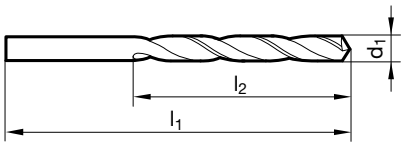
Articolo n. 81440

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali in lunghezze speciali, grandezza 1

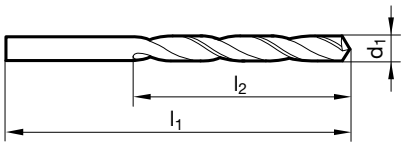
Articolo n. 81450

P	M	K	N	S	H
○			●		

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

assott. del nocc. ≥ Ø 2,500 • spoglia sul cono tagliente • per fori estremamente profondi

materiali teneri a truciolo lungo con R fino a 500 N/mm² • acciai teneri automatici • alluminio, leghe di alluminio (a truciolo lungo) • zinco, rame affinato, silumin, elektron • zamak, argalium, materie sintetiche (tenere) e legno



d1 mm	l1 mm	l2 mm	d1 mm	l1 mm	l2 mm
2,000	125,000	85,000	9,500	250,000	175,000
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			

Punte elicoidali in lunghezze speciali, grandezza 1

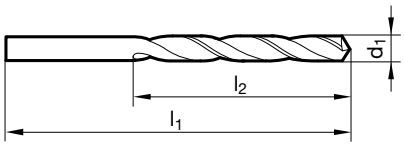
Articolo n. 84425

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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			

Punte elicoidali in lunghezze speciali, grandezza 1

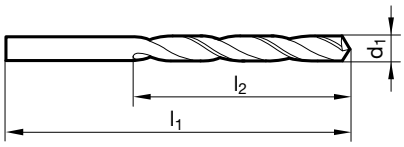
Articolo n. 81441

P	M	K	N	S	H
●	●	●	●	●	○

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • scanalature ampliate • massima resistenza all'usura • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

acciai legati e non legati e tipi di ghisa con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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				

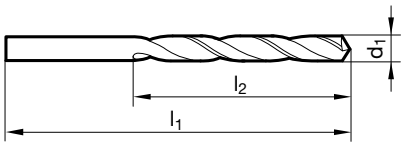
Punte elicoidali in lunghezze speciali, grandezza 2

Articolo n. 81510

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • per fori estremamente profondi
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

Punte elicoidali in lunghezze speciali, grandezza 2

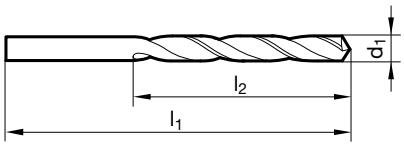
Articolo n. 81540

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali in lunghezze speciali, grandezza 2

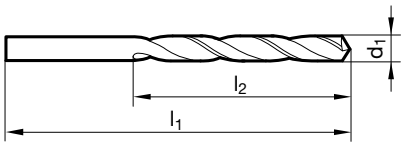
Articolo n. 84426

P	M	K	N	S	H
●		●	●	○	

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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			

Punte elicoidali in lunghezze speciali, grandezza 2

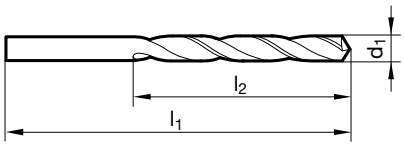
Articolo n. 81541

P	M	K	N	S	H
●	●	●	●		○

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

acciai legati e non legati e tipi di ghisa con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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

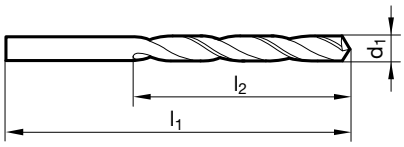
Punte elicoidali in lunghezze speciali, grandezza 3

Articolo n. 81610

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 4,000 • spoglia sul cono tagliente • per fori estremamente profondi
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

Punte elicoidali in lunghezze speciali, grandezza 3

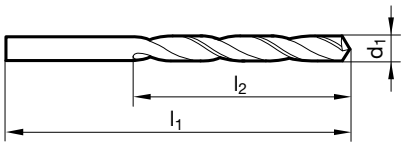
Articolo n. 81640

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali in lunghezze speciali, grandezza 3

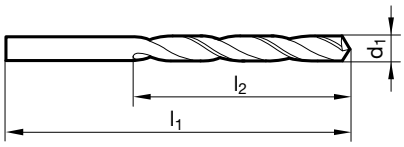
Articolo n. 81641

P	M	K	N	S	H
•	•		•	•	

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

assott. del nocc. ≥ Ø 2,500 • spoglia sul cono tagliente • acciaio HSS legato al Co • scanalature ampliate • massima resistenza all'usura • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

acciai e ghisa acciaiosa ad alta resistenza • ghisa grigia, ghisa malleabile, ghisa sferoidale



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

Punte elicoidali, extra lunghe

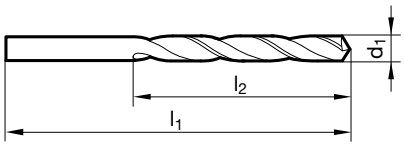
Articolo n. 81740

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 6,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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			

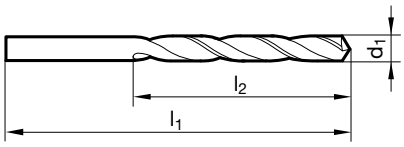
Punte elicoidali, extra lunghe

Articolo n. 81750

P	M	K	N	S	H
•		•	•		

assott. del nocc. ≥ Ø 8,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

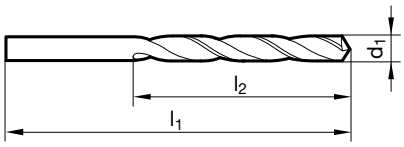
Punte elicoidali, extra lunghe

Articolo n. 81760

P	M	K	N	S	H
•		•	•		

assott. del nocc. ≥ Ø 10,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

d1 mm	l1 mm	l2 mm

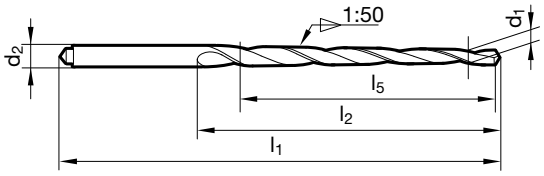
Punte per fori conici

Articolo n. 81810

P	M	K	N	S	H
●	○	●	○		

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

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • per fori conici • con dente di trascinamento secondo 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

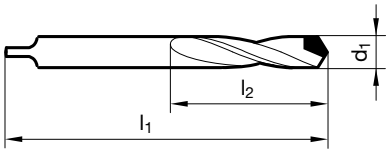
Punte speciali, con taglienti in MD

Articolo n. 89301

P	M	K	N	S	H
○		○			○

HM | N | DIN 8037 | 118° | h8 | Cyl

assott. del nocc. ≥ Ø 2,600 • affilatura su piani • con riporti in MD • con dente di trascinamento secondo DIN 1809
acciaio per nastri per molle • ghisa conchigliata con oltre 300 HB • molibdeno puro • bronzi duri



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			

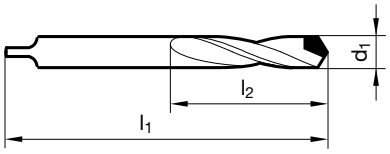
Punte speciali, con taglienti in MD

Articolo n. 89303

P	M	K	N	S	H
○		○			○

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

assott. del nocc. ≥ Ø 3,100 • affilatura su piani • con riporti in MD • con dente di trascinamento secondo DIN 1809
materie sintetiche a fibre vetrose • altri materiali che esercitano un'azione abrasiva sui taglienti e sulle fasi della punta



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

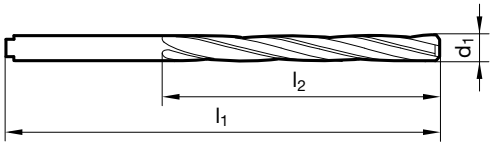
Allargatori cilindrici

Articolo n. 86010

P	M	K	N	S	H
●	○	●	○		

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

spoglia sul cono tagliente • stabilità elevata • con dente di trascinamento secondo DIN 1809 • per fori prefusi, precolati, preforati • corregge la precisione di allineamento • corregge la mancanza di rotondità • finitura di superf. del foro migliorata • Ø imbocco < al foro da praticare • considerare la quota “d0” come misura più piccola del foro pilota



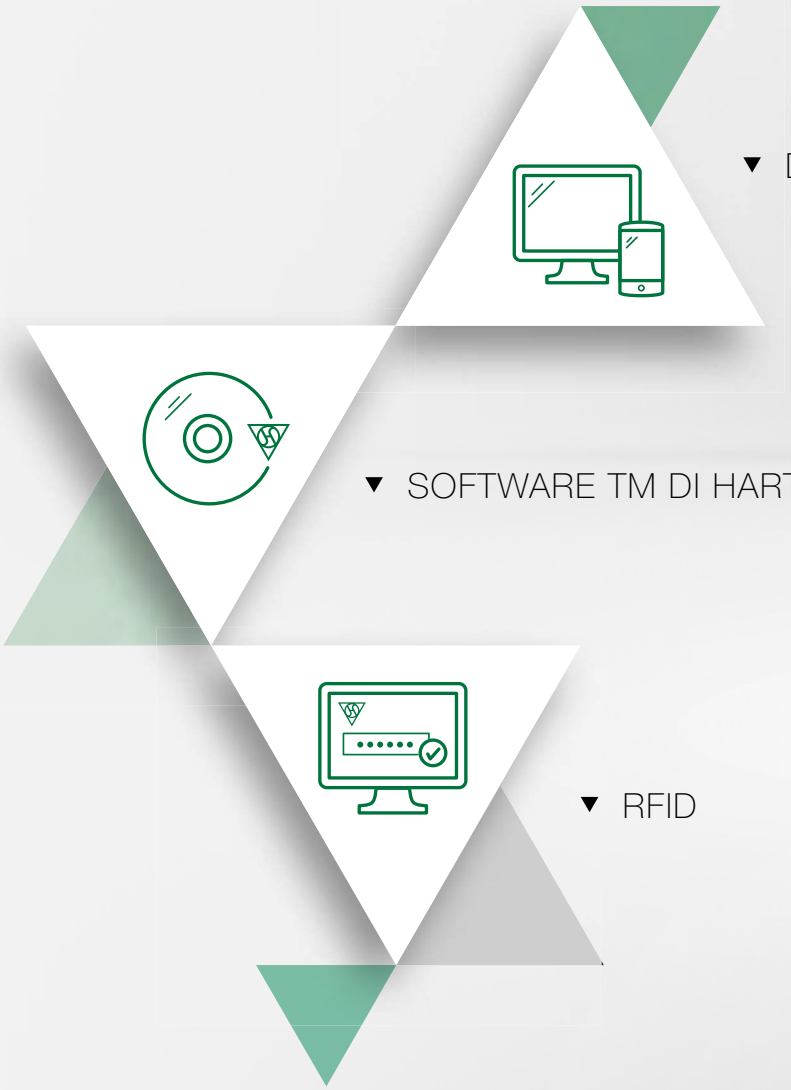
d1 mm	inch	d0 mm	l1 mm	l2 mm
3,800		2,8	96,000	64,000
4,000		2,8	96,000	64,000
4,750		3,2	102,000	69,000
4,800		3,5	108,000	74,000
4,900		3,5	108,000	74,000
5,000		3,5	108,000	74,000
5,800		4,2	116,000	80,000
6,000		4,2	116,000	80,000
6,200		4,2	124,000	86,000
6,400		4,2	124,000	86,000
6,800		4,9	133,000	93,000
7,500		4,9	133,000	93,000
7,700		5,6	142,000	100,000
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

d1 mm	inch	d0 mm	l1 mm	l2 mm
10,200		7,0	162,000	116,000
10,500		7,0	162,000	116,000
10,600		7,0	162,000	116,000
11,000		7,7	173,000	125,000
11,300		7,7	173,000	125,000
11,750		8,4	184,000	134,000
12,000		8,4	184,000	134,000
12,750		9,1	184,000	134,000
13,000		9,1	184,000	134,000
13,750		9,8	194,000	142,000
14,000		9,8	194,000	142,000
14,750		10,5	202,000	147,000
15,000		10,5	202,000	147,000

MASSIMA VARIABILITÀ E FLESSIBILITÀ

Caratteristiche del sistema

- Sistema rotante con tapparella ad apertura automatica
- Controllo completo degli articoli distribuiti
- Rapida configurazione individuale dello scomparto
- Scomparti disponibili in diverse dimensioni
- Dal singolo inserto WSP, passando per le punte elicoidali da Ø 6 mm e i guanti, fino alle punte per foratura profonda: nei distributori automatici è possibile immagazzinare proprio tutto e gestire ed emettere il necessario tramite il software TM di Hartner.
- Processo di ordine automatico nel software TM di Hartner programmato in azienda
- Altezze variabili dello scomparto da 25 mm fino a 1.525 mm con una suddivisione da 25 mm
- Massimo 987 scomparti (nella configurazione più piccola)
- Tempo di prelievo inferiore a 10 s
- Disponibilità 24/7
- Carico utile massimo di 544 kg
- Design a manutenzione ridotta



HARTNER

Precision Cutting Tools

TOOL MANAGEMENT

TM 826

HARTNER

Precision Cutting Tools

Punte elicoidali con codolo cono morse

PUNTE ELICOIDALI CON CODOLO CONO MORSE

in HSS, HSS-E, con riporti in MD
lucide e ricoperte

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte elicoidali															
●		●	○			DIN 345	N	HSS	⬤	destra	CM	~5xD	3,000 - 75,000	**82010**	173
			●			DIN 345	W	HSS	○	destra	CM	~5xD	6,800 - 30,500	**82030**	175
●		●	○			DIN 345	N	HSS	(T)	destra	CM	~5xD	8,000 - 30,000	**84460**	176
●	○	●	○			DIN 345	N	HSS-E	⬤	destra	CM	~5xD	5,000 - 50,000	**82011**	177
○	●		○	●		DIN 345	IS	HSS-E	○	destra	CM	~5xD	11,500 - 32,000	**82012**	178
○		●	○			DIN 345	FN	HSS-E	(A)	destra	CM	~5xD	19,000 - 19,500	**84660**	179
●	○	●	○			DIN 345	N	HSS-E	(T)	destra	CM	~5xD	8,000 - 23,000	**84859**	180
Punte elicoidali, corte															
●	●	●	○	●	○	Norma di fab.	V	HSS-E	⬤	destra	CM	~3xD	10,000 - 28,000	**82971**	181
○	●		○	○		Norma di fab.	IS	HSS-E	○	destra	CM	~3xD	10,000 - 31,000	**82972**	182
Punte cilindriche per centri CN															
●	○	●	●	○		Norma di fab.	N	HSS	⬤	destra	CM		12,000 - 25,000	**82191**	183
●	○	●	●	○		Norma di fab.	N	HSS	⬤	destra	CM		12,000 - 25,000	**82192**	183

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte elicoidali, lunghe															
•		•	○			DIN 341	N	HSS	●	destra	CM	~10xD	4,000 - 50,000	**82210**	184
•	○	•	•	○		DIN 341	N	HSS-E	●	destra	CM	~10xD	5,000 - 30,000	**82211**	185
Punte elicoidali in lunghezze speciali, grandezza 1															
•		•	○			DIN 1870	N	HSS	●	destra	CM	~15xD	8,500 - 38,000	**82310**	186
•		•	•			DIN 1870	FN	HSS	>Ø 16,0	destra	CM	~15xD	8,000 - 30,000	**82340**	187
•	•	•	•	•	○	DIN 1870	FN	HSS-E	>Ø 16,0	destra	CM	~15xD	10,000 - 20,000	**82341**	188
Punte elicoidali in lunghezze speciali, grandezza 2															
•		•	○			DIN 1870	N	HSS	●	destra	CM	~20xD	8,500 - 30,000	**82410**	189
•		•	•			DIN 1870	FN	HSS	>Ø 16,0	destra	CM	~20xD	8,000 - 30,000	**82440**	190
Punte elicoidali, extra lunghe															
•		•	•			Norma di fab.	FN	HSS	>Ø 16,0	destra	CM	>20xD	8,000 - 20,000	**82466**	191
•		•	•			Norma di fab.	FN	HSS	>Ø 16,0	destra	CM	20xD	14,000 - 38,000	**82467**	192
•		•	•			Norma di fab.	FN	HSS	○	destra	CM	>20xD	14,000 - 18,000	**82468**	193
•		•	•			Norma di fab.	FN	HSS	○	destra	CM	>20xD	15,000 - 18,000	**82469**	194

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte con fori di refrigerazione, tipo lungo															
●	○	●	●	○		Norma di fab.	N	HSS	◯	destra	CM	~10xD	10,000 - 40,000	**82521**	195
●	○	●	●			Norma di fab.	FN	HSS	◯	destra	CM	~10xD	10,000 - 20,000	**82535**	196
●	●	●	●	●	○	Norma di fab.	FN	HSS-E	◯	destra	CM	~10xD	15,000 - 32,500	**82525**	197
Punte con fori di refrigerazione, tipo extra-lungo															
●	●	●	●	●	○	Norma di fab.	FN	HSS-E	◯	destra	CM	~15xD	14,000 - 20,000	**82515**	198
Punte speciali, con taglienti in MD															
○		○			○	DIN 8041	N	con riporto in MD	○	destra	CM		8,500 - 40,000	**89302**	199
Allargatori con attacco cono morse															
●	○	●	○			DIN 343	N	HSS	◯	destra	CM		8,000 - 40,000	**86110**	200
●	○	●	●	○		DIN 343	N	HSS-E	◯	destra	CM		12,000 - 22,000	**86111**	201
Punte per fori conici															
●	○	●	○			DIN 1898	N	HSS	◯	destra	CM		5,000 - 20,000	**82810**	202

Punte elicoidali

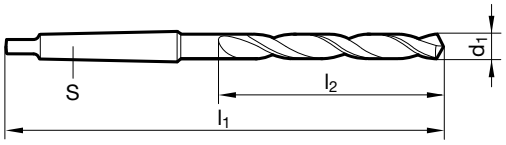
Articolo n. 82010

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 14,100 • spoglia sul cono tagliente

acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



d1 mm	inch	S	l1 mm	l2 mm
3,000		MK-1	114,000	33,000
3,300		MK-1	117,000	36,000
3,600		MK-1	120,000	39,000
3,750		MK-1	120,000	39,000
4,000		MK-1	124,000	43,000
4,200		MK-1	124,000	43,000
4,250		MK-1	124,000	43,000
4,500		MK-1	128,000	47,000
4,900		MK-1	133,000	52,000
5,000		MK-1	133,000	52,000
5,200		MK-1	133,000	52,000
5,500		MK-1	138,000	57,000
5,700		MK-1	138,000	57,000
6,000		MK-1	138,000	57,000
6,200		MK-1	144,000	63,000
6,500		MK-1	144,000	63,000
6,700		MK-1	144,000	63,000
6,750	17/64	MK-1	150,000	69,000
6,800		MK-1	150,000	69,000
7,000		MK-1	150,000	69,000
7,250		MK-1	150,000	69,000
7,500		MK-1	150,000	69,000
7,900		MK-1	156,000	75,000
8,000		MK-1	156,000	75,000
8,100		MK-1	156,000	75,000
8,200		MK-1	156,000	75,000
8,250		MK-1	156,000	75,000
8,400		MK-1	156,000	75,000
8,500		MK-1	156,000	75,000
8,700		MK-1	162,000	81,000
8,750		MK-1	162,000	81,000
8,800		MK-1	162,000	81,000
9,000		MK-1	162,000	81,000
9,200		MK-1	162,000	81,000
9,250		MK-1	162,000	81,000
9,500		MK-1	162,000	81,000
9,700		MK-1	168,000	87,000
9,750		MK-1	168,000	87,000
9,800		MK-1	168,000	87,000
10,000		MK-1	168,000	87,000
10,100		MK-1	168,000	87,000
10,200		MK-1	168,000	87,000

d1 mm	inch	S	l1 mm	l2 mm
10,250		MK-1	168,000	87,000
10,300		MK-1	168,000	87,000
10,500		MK-1	168,000	87,000
10,600		MK-1	168,000	87,000
10,700		MK-1	175,000	94,000
10,750		MK-1	175,000	94,000
10,800		MK-1	175,000	94,000
11,000		MK-1	175,000	94,000
11,100		MK-1	175,000	94,000
11,200		MK-1	175,000	94,000
11,250		MK-1	175,000	94,000
11,500		MK-1	175,000	94,000
11,750		MK-1	175,000	94,000
11,800		MK-1	175,000	94,000
12,000		MK-1	182,000	101,000
12,100		MK-1	182,000	101,000
12,200		MK-1	182,000	101,000
12,250		MK-1	182,000	101,000
12,300	31/64	MK-1	182,000	101,000
12,500		MK-1	182,000	101,000
12,750		MK-1	182,000	101,000
12,800		MK-1	182,000	101,000
13,000		MK-1	182,000	101,000
13,200		MK-1	182,000	101,000
13,250		MK-1	189,000	108,000
13,490	17/32	MK-1	189,000	108,000
13,500		MK-1	189,000	108,000
13,750		MK-1	189,000	108,000
13,800		MK-1	189,000	108,000
14,000		MK-1	189,000	108,000
14,100		MK-2	212,000	114,000
14,200		MK-2	212,000	114,000
14,250		MK-2	212,000	114,000
14,300		MK-2	212,000	114,000
14,500		MK-2	212,000	114,000
14,600		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
15,800		MK-2	218,000	120,000

Punte elicoidali

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

d1 mm	inch	S	l1 mm	l2 mm
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

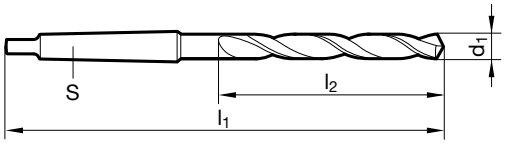
Punte elicoidali

Articolo n. 82030

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 15,000 • spoglia sul cono tagliente
materiali teneri a truciolo lungo • alluminio, leghe di alluminio (a truciolo lungo) • zinco, rame affinato, silumin, elektron



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

Punte elicoidali

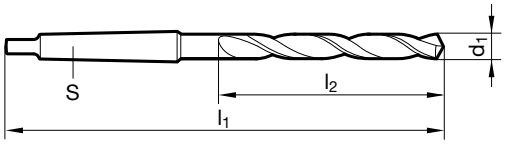
Articolo n. 84460

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 5,500 • spoglia sul cono tagliente

acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

HARTNER

Punte elicoidali

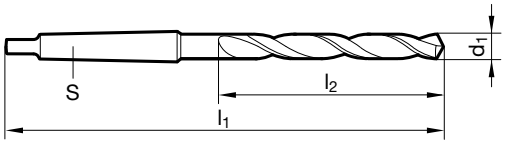
Articolo n. 82011

P	M	K	N	S	H
●	○	●	○		

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

assott. del nocc. ≥ Ø 5,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura

acciai legati e non legati e tipi di ghisa con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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

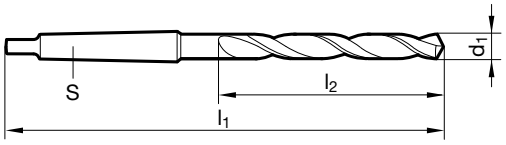
Punte elicoidali

Articolo n. 82012

P	M	K	N	S	H
○	●		○	●	

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

punta per INOX • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
acciai inossidabili, resistenti al calore ed austenitici (V2A e V4A)



d1 mm	S	l1 mm	l2 mm
11,500	MK-1	175,000	94,000
12,000	MK-1	182,000	101,000
14,000	MK-1	189,000	108,000
15,000	MK-2	212,000	114,000
15,500	MK-2	218,000	120,000
16,000	MK-2	218,000	120,000
16,500	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
18,000	MK-2	228,000	130,000
19,500	MK-2	238,000	140,000

d1 mm	S	l1 mm	l2 mm
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
26,000	MK-3	286,000	165,000
27,500	MK-3	291,000	170,000
28,000	MK-3	291,000	170,000
31,500	MK-3	301,000	180,000
32,000	MK-4	334,000	185,000

Punte elicoidali

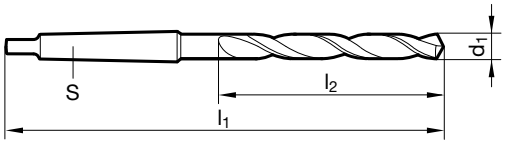
Articolo n. 84660

P	M	K	N	S	H
○		●	○		

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

assott. del nocc. ≥ Ø 14,200 • spoglia sul cono tagliente • scanalature ampliate • acciaio HSS legato al Co • massima resistenza all'usura • specifiche per prof. di foro oltre 3xD

acciai legati e non legati e tipi di ghisa con R superiore a 1000 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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

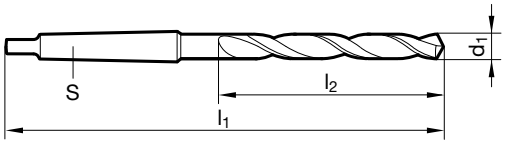
Punte elicoidali

Articolo n. 84859

P	M	K	N	S	H
●	○	●	○		

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

assott. del nocc. ≥ Ø 8,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
acciai legati e non legati e tipi di ghisa con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
8,000	MK-1	156,000	75,000	15,000	MK-2	212,000	114,000
10,000	MK-1	168,000	87,000	23,000	MK-2	253,000	155,000
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				

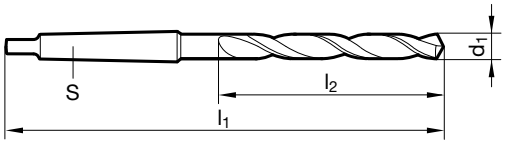
Punte elicoidali, corte

Articolo n. 82971

P	M	K	N	S	H
●	●	●	○	●	○

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

assott. del nocc. ≥ Ø 10,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
materiali difficili da lavorare • acciai inossidabili e resist. al calore • acciai per molle, acciai austenitici



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
10,000	MK-1	138,000	57,000	20,000	MK-3	212,000	91,000
10,200	MK-1	138,000	57,000	21,000	MK-3	216,000	95,000
10,500	MK-1	138,000	57,000	21,500	MK-3	219,000	98,000
11,500	MK-1	142,000	61,000	22,000	MK-3	219,000	98,000
12,000	MK-1	147,000	66,000	23,000	MK-3	222,000	101,000
12,500	MK-1	147,000	66,000	24,000	MK-3	225,000	104,000
13,000	MK-1	147,000	66,000	25,000	MK-3	225,000	104,000
13,500	MK-2	168,000	70,000	26,000	MK-4	256,000	107,000
14,000	MK-2	168,000	70,000	27,000	MK-4	259,000	110,000
14,500	MK-2	172,000	74,000	28,000	MK-4	259,000	110,000
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				

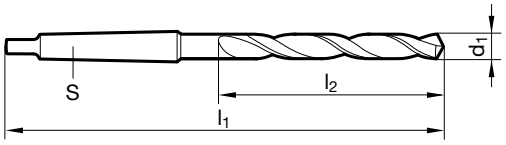
Punte elicoidali, corte

Articolo n. 82972

P	M	K	N	S	H
○	●		○	○	

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

punta per INOX • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura
acciai inossidabili, resistenti al calore ed austenitici (V2A e V4A)



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
10,000	MK-1	138,000	57,000	27,500	MK-4	259,000	110,000
10,500	MK-1	138,000	57,000	28,500	MK-4	263,000	114,000
10,800	MK-1	142,000	61,000	29,000	MK-4	263,000	114,000
11,500	MK-1	142,000	61,000	29,500	MK-4	263,000	114,000
11,800	MK-1	142,000	61,000	30,500	MK-4	266,000	117,000
12,000	MK-1	147,000	66,000	31,000	MK-4	266,000	117,000
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				

Punte cilindriche per centri CN

Articolo n. 82191

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 120° | h6 | R | MK

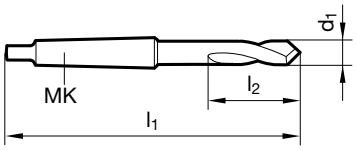
spoglia sul cono tagliente • adatte solo per centrare • stabilità elevata

Articolo n. 82192

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 90° | h6 | R | MK

spoglia sul cono tagliente • adatte solo per centrare • stabilità elevata



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

Punte elicoidali, lunghe

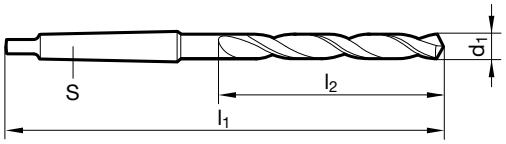
Articolo n. 82210

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 14,500 • spoglia sul cono tagliente • per forare con bussola di guida

acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato, alpacca e grafite



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

Punte elicoidali, lunghe

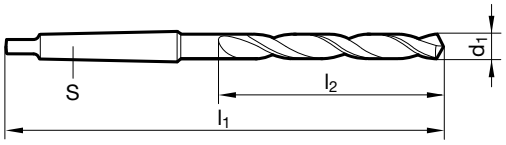
Articolo n. 82211

P	M	K	N	S	H
●	○	●	●	○	

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

assott. del nocc. ≥ Ø 5,000 • spoglia sul cono tagliente • acciaio HSS legato al Co • massima resistenza all'usura • per forare con bussola di guida

acciai legati e non legati e tipi di ghisa con R superiore a 800 N/mm² • acciai per lavorazioni a caldo e a freddo • acciai per cuscinetti • acciai legati in alta percentuale • acciai da bonifica e da cementazione



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

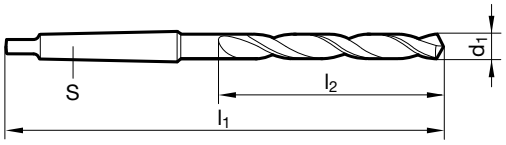
Punte elicoidali in lunghezze speciali, grandezza 1

Articolo n. 82310

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 8,500 • spoglia sul cono tagliente • per fori estremamente profondi
acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

HARTNER

Punte elicoidali in lunghezze speciali, grandezza 1

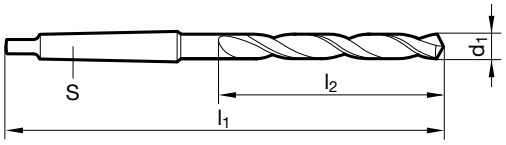
Articolo n. 82340

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 8,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali in lunghezze speciali, grandezza 1

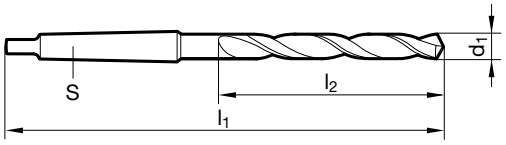
Articolo n. 82341

P	M	K	N	S	H
●	●	●	●	●	○

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

assott. del nocc. ≥ Ø 10,000 • spoglia sul cono tagliente • scanalature ampliate • massima resistenza all'usura • acciaio HSS legato al Co • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

acciai e ghisa acciaiosa ad alta resistenza • ghisa grigia, ghisa malleabile, ghisa sferoidale



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
10,000	MK-1	285,000	185,000	16,000	MK-2	355,000	230,000
12,000	MK-1	310,000	205,000	16,500	MK-2	355,000	230,000
12,500	MK-1	310,000	205,000	17,000	MK-2	355,000	230,000
13,000	MK-1	310,000	205,000	18,000	MK-2	370,000	245,000
14,000	MK-1	325,000	220,000	19,000	MK-2	370,000	245,000
15,000	MK-2	340,000	220,000	20,000	MK-2	385,000	260,000

HARTNER

Punte elicoidali in lunghezze speciali, grandezza 2

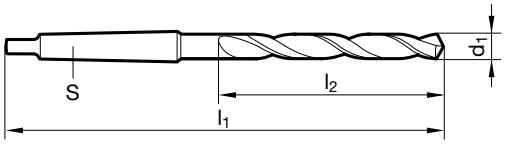
Articolo n. 82410

P	M	K	N	S	H
●		●	○		

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

assott. del nocc. ≥ Ø 8,500 • spoglia sul cono tagliente • per fori estremamente profondi

acciaio e ghisa acciaiosa (legati e non legati) • ghisa grigia, ghisa malleabile, ghisa sferoidale • ferro sinterizzato e grafite



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

Punte elicoidali in lunghezze speciali, grandezza 2

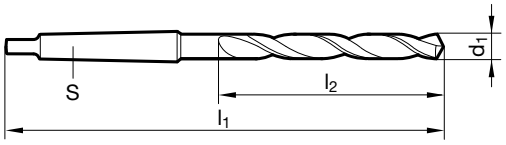
Articolo n. 82440

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 8,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali, extra lunghe

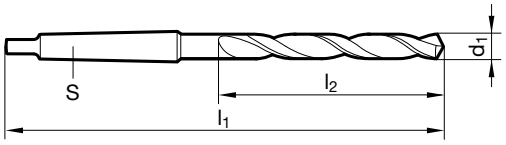
Articolo n. 82466

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 8,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili

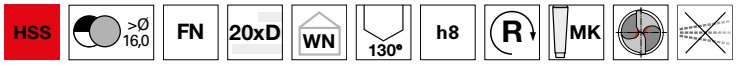


d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
8,000	MK-1	500,000	420,000	20,000	MK-2	500,000	400,000
8,500	MK-1	500,000	420,000				
9,000	MK-1	500,000	420,000				
10,000	MK-1	500,000	420,000				
12,000	MK-1	500,000	420,000				
13,000	MK-1	500,000	420,000				
14,000	MK-1	500,000	420,000				
15,000	MK-2	500,000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

Punte elicoidali, extra lunghe

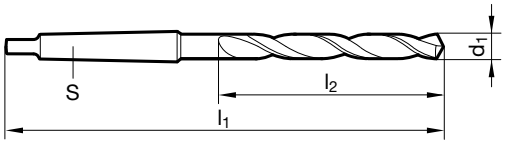
Articolo n. 82467

P	M	K	N	S	H
•		•	•		



assott. del nocc. ≥ Ø 14,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



d1 mm	S	l1 mm	l2 mm	d1 mm	S	l1 mm	l2 mm
14,000	MK-1	600,000	500,000	32,000	MK-4	600,000	450,000
15,000	MK-2	600,000	500,000	35,000	MK-4	600,000	450,000
16,000	MK-2	600,000	500,000	38,000	MK-4	600,000	450,000
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				

Punte elicoidali, extra lunghe

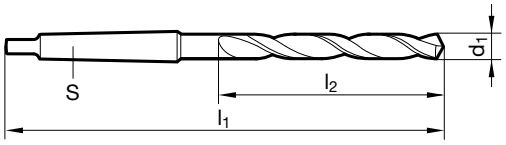
Articolo n. 82468

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 14,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

Punte elicoidali, extra lunghe

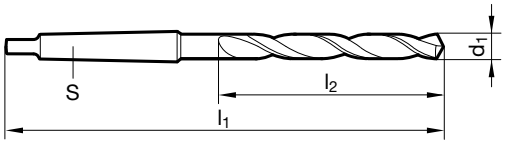
Articolo n. 82469

P	M	K	N	S	H
•		•	•		

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

assott. del nocc. ≥ Ø 15,000 • spoglia sul cono tagliente • scanalature ampliate • per fori estremamente profondi • in caso di evacuazione truciolo insufficiente

ghisa grigia ed acciai con R max. 1000 N/mm² • Eccezione: acciai al CrNi, al VA e materiali simili



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

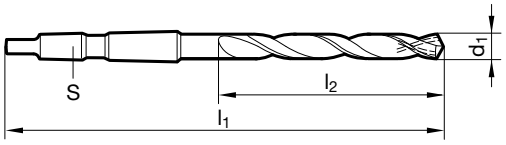
Punte con fori di refrigerazione, tipo lungo

Articolo n. 82521

P	M	K	N	S	H
●	○	●	●	○	

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

assott. del nocc. ≥ Ø 10,000 • spoglia sul cono tagliente • refrigerazione assiale attraverso l'attacco CM • per forare con bussola di guida pacchi di lamierini • acciaio e ghisa acciaiosa, ghisa grigia • acciai austenitici a ca. 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

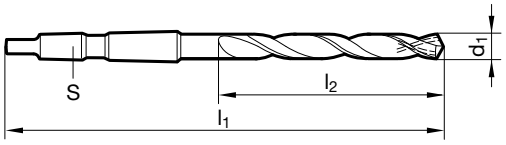
Punte con fori di refrigerazione, tipo lungo

Articolo n. 82535

P	M	K	N	S	H
●	○	●	●		

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

assott. del nocc. ≥ Ø 10,000 • spoglia sul cono tagliente • refrigerazione assiale attraverso l'attacco CM • per forare con bussola di guida pacchi di lamierini • acciaio e ghisa acciaiosa, ghisa grigia • acciai austenitici a ca. 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

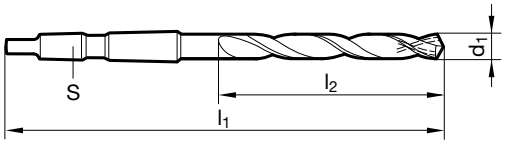
Punte con fori di refrigerazione, tipo lungo

Articolo n. 82525

P	M	K	N	S	H
●	●	●	●	●	○

assott. del nocc. ≥ Ø 15,000 • spoglia sul cono tagliente • refrigerazione assiale attraverso l'attacco CM • acciaio HSS legato al Co • massima resistenza all'usura • per forare con bussola di guida

acciai ad alta resistenza • acciaio e ghisa acciaiosa • acciai inossidabili e resistenti al calore • con R superiore fino a 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				

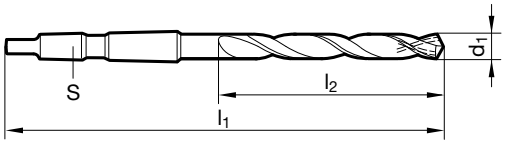
Punte con fori di refrigerazione, tipo extra-lungo

Articolo n. 82515

P	M	K	N	S	H
●	●	●	●	●	○

assott. del nocc. ≥ Ø 14,000 • spoglia sul cono tagliente • refrigerazione assiale attraverso l'attacco CM • acciaio HSS legato al Co • massima resistenza all'usura • per forare con bussola di guida

acciai ad alta resistenza • acciaio e ghisa acciaiosa • acciai inossidabili e resistenti al calore • con R superiore fino a 1300 N/mm²



d1 mm	S	l1 mm	l2 mm	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				

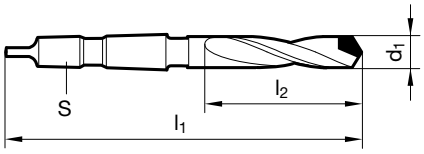
Punte speciali, con taglienti in MD

Articolo n. 89302

P	M	K	N	S	H
○		○			○

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

assott. del nocc. ≥ Ø 8,500 • affilatura su piani • con riporti in MD
acciaio per nastri per molle • ghisa conchigliata con oltre 300 HB • molibdeno puro • bronzi duri



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
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

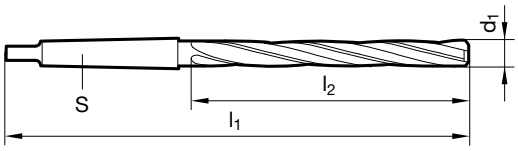
Allargatori con attacco cono morse

Articolo n. 86110

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 343 | 120° | R | MK

spoglia sul cono tagliente • a tre taglienti • stabilità elevata • per fori prefusi, precolati, preforati • corregge la precisione di allineamento • corregge la mancanza di rotondità • finitura di superf. del foro migliorata • Ø imbocco < al foro da praticare • considerare la quota “d0” come misura più piccola del foro pilota • dopo l’allargatura, finire con alesatura



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

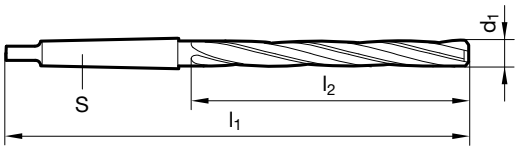
Allargatori con attacco cono morse

Articolo n. 86111

P	M	K	N	S	H
●	○	●	●	○	

HSS-E | N | DIN 343 | 120° | R | MK

spoglia sul cono tagliente • a tre taglienti • stabilità elevata • per fori prefusi, precolati, preforati • corregge la precisione di allineamento • corregge la mancanza di rotondità • finitura di superf. del foro migliorata • Ø imbocco < al foro da praticare • considerare la quota “d0” come misura più piccola del foro pilota • dopo l’allargatura, finire con alesatura



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

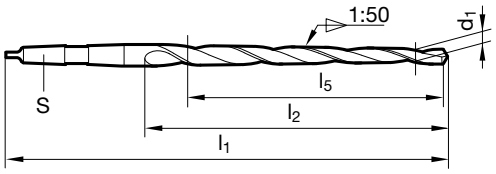
Punte per fori conici

Articolo n. 82810

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 1898 | 118° | R | MK

assott. del nocc. ≥ Ø 13,000 • spoglia sul cono tagliente • per fori sferici su attacchi di perni sferici secondo DIN 1 (nuovo: DIN EN 22339), DIN 7978 (nuovo: DIN EN 28736), DIN 7977 (nuovo: DIN EN 28737) e 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

Affilatura di vertice

- Affilatura con taglienti concavi - trucioli corti
- Forma dei taglienti robusta con protezione del tagliente (fase negativa)

Scanalatura lucida con la più elevata qualità della superficie

- ottimizza il trasporto dei trucioli
- riduce le forze di processo attraverso la diminuzione dell'attrito tra il truciolo e l'utensile

Microgeometria

- preparazione della geometria del taglienti tramite idrofinitura e lucidatura
- riduzione delle forze di taglio e della temperatura di processo

4 pattini di guida

per la migliore qualità del foro e la massima silenziosità

TS 100 HPC

HARTNER

Precision Cutting Tools

TS-Drills

TS-DRILLS

Utensili high-tech in metallo duro integrale
lucidi e ricoperti

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
TS-Drills senza refrigerazione interna															
●	○	●	○	○	○	DIN 6537K	TS 100 U	**MDI**	T	destra	HE	3xD	3,000 - 19,500	**89264**	210
●	○	●	○	○	○	DIN 6537K	TS 100 U	**MDI**	F	destra	HA	3xD	3,000 - 20,000	**89413**	212
●	○	●	○	○	○	DIN 6537K	TS 100 U	**MDI**	F	destra	HE	3xD	3,000 - 20,000	**89402**	212
●				●	○	DIN 6537K	TS 100 H	**MDI**	Y	destra	HA	3xD	3,000 - 20,000	**89422**	214
●	○	●	○	○	○	DIN 6539	TS 100 U	**MDI**	T	destra	cil.	3xD	3,000 - 16,000	**89237**	216
●	○	●	○	○	○	DIN 6539	TS 100 U	**MDI**	F	destra	cil.	3xD	3,000 - 16,000	**89401**	216
●	○	●	○	○	○	DIN 6537L	TS 100 U	**MDI**	F	destra	HA	5xD	3,000 - 20,000	**89414**	218
●	○	●	○	○	○	DIN 6537L	TS 100 U	**MDI**	F	destra	HE	5xD	3,000 - 20,000	**89417**	218
●	○	●	○	○	○	Norma di fab.	TS 100 U	**MDI**	T	destra	cil.	5xD	5,160 - 16,000	**89275**	220
TS-Drills con refrigerazione interna															
●	○	○	○			DIN 6538K	TS 80 U	**con riporto in MD**	T	destra	HE	3xD	10,000 - 25,000	**89306**	221
●	○	●	○	○	○	DIN 6537K	TS 100 U	**MDI**	T	destra	HE	3xD	3,000 - 20,000	**89266**	222
●	○	●	○	○	○	DIN 6537K	TS 100 U	**MDI**	F	destra	HA	3xD	3,000 - 20,000	**89410**	223
●	○	●	○	○	○	DIN 6537K	TS 100 U	**MDI**	F	destra	HE	3xD	3,000 - 20,000	**89415**	223

TS-Drills con refrigerazione interna

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
●				●	○	DIN 6537K	TS 100 H	MDI	Y	destra	HA	3xD	3,000 - 20,000	**89423**	225
●				●	○	DIN 6537K	TS 100 H	MDI	Y	destra	HE	3xD	3,000 - 20,000	**89424**	225
○	●			○		DIN 6537K	TS 100 INOX	MDI	a	destra	HA	3xD	3,000 - 20,000	**89450**	227
○	●			○		DIN 6537K	TS 100 INOX	MDI	a	destra	HE	3xD	3,000 - 20,000	**89550**	227
		●	○			Norma di fab.	TS 150 GG	MDI	○	destra	HA	4xD	3,000 - 20,000	**89292**	229
●	○	○	○			DIN 6538M	TS 80 U	con riporto in MD	T	destra	HE	5xD	9,800 - 25,000	**89307**	230
●	○	●	○	○	○	DIN 6537L	TS 100 U	MDI	T	destra	HE	5xD	3,000 - 19,500	**89272**	231
●	○	●	○	○	○	DIN 6537L	TS 100 U	MDI	F	destra	HA	5xD	3,000 - 20,000	**89411**	232
●	○	●	○	○	○	DIN 6537L	TS 100 U	MDI	F	destra	HE	5xD	3,000 - 20,000	**89408**	232
		●				DIN 6537L	TS 100 R	MDI	F	destra	HA	5xD	3,000 - 20,000	**89420**	234
●				●	○	DIN 6537L	TS 100 H	MDI	Y	destra	HA	5xD	3,000 - 20,000	**89425**	236
●				●	○	DIN 6537L	TS 100 H	MDI	Y	destra	HE	5xD	3,000 - 20,000	**89426**	236
○	●			○		DIN 6537L	TS 100 INOX	MDI	a	destra	HA	5xD	3,000 - 20,000	**89451**	238
○	●			○		DIN 6537L	TS 100 INOX	MDI	a	destra	HE	5xD	3,000 - 20,000	**89551**	238

TS-Drills con refrigerazione interna

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
			●			DIN 6537L	TS 100 ALU	MDI	○	destra	HA	5xD	3,000 - 20,000	**89560**	240
●	○	○		○	○	DIN 6537L	TS 100 HPC	MDI	F	destra	HA	5xD	3,000 - 20,000	**89460**	242
●	○	○	○			DIN 6538L	TS 80 U	con riporto in MD	T	destra	HE	7xD	10,000 - 22,000	**89308**	244
		●	○			Norma di fab.	TS 150 GG	MDI	○	destra	HA	7xD	3,000 - 20,000	**89294**	245
●	○	●	○	○	○	Norma di fab.	TS 100 U	MDI	F	destra	HA	7xD	3,000 - 20,000	**89412**	246
●	○	●	○	○	○	Norma di fab.	TS 100 U	MDI	F	destra	HE	7xD	3,000 - 20,000	**89416**	246
		●				Norma di fab.	TS 100 R	MDI	F	destra	HA	7xD	4,000 - 20,000	**89421**	248
●				●	○	Norma di fab.	TS 100 H	MDI	Y	destra	HA	7xD	3,000 - 16,000	**89427**	250
●	○	○		○	○	Norma di fab.	TS 100 HPC	MDI	F	destra	HA	7xD	3,000 - 20,000	**89461**	251
		●	○			Norma di fab.	TS 150 GG	MDI	○	destra	HA	10xD	3,000 - 20,000	**89293**	253
		○	●			Norma di fab.	TS 150 GG	MDI	○	destra	HA	10xD	3,000 - 20,000	**89295**	253
●	○	●	○	○	○	Norma di fab.	TS 100 U	MDI	F	destra	HA	12xD	3,000 - 20,000	**89418**	255
●	●	●		○	○	Norma di fab.	TS 100 T	MDI	A	destra	HA	15xD	3,000 - 16,000	**86509**	257
●	●	●		○	○	Norma di fab.	TS 100 T	MDI	A	destra	HA	20xD	3,000 - 16,000	**86511**	258

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
TS-Drills con refrigerazione interna															
●	●	●		○	○	Norma di fab.	TS 100 T	**MDI**	A	destra	HA	25xD	3,000 - 16,000	**86512**	259
●	●	●		○	○	Norma di fab.	TS 100 T	**MDI**	A	destra	HA	30xD	3,000 - 14,000	**86513**	260
●	●	●		○	○	Norma di fab.	TS 100 T	**MDI**	A	destra	HA	40xD	3,000 - 10,000	**86514**	261
Punte TS a 3 taglienti															
		●	●			DIN 6537L	TS 3 G	**MDI**	◯	destra	HA	5xD	3,000 - 20,000	**89247**	262
		○	○			DIN 6539	TS 3 G	**MDI**	◯	destra	cil.	5xD	3,000 - 20,000	**89239**	263

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TS-Drills senza refrigerazione interna

Articolo n. 89264

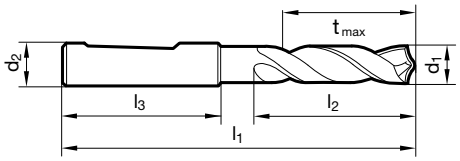
P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



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 senza refrigerazione interna

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 senza refrigerazione interna

Articolo n. 89413

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

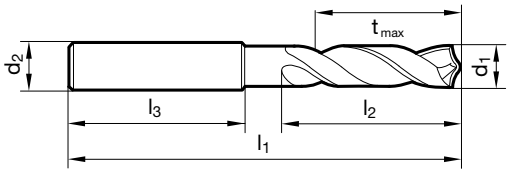
Articolo n. 89402

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



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 senza refrigerazione interna

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

TS-Drills senza refrigerazione interna

Articolo n. 89422

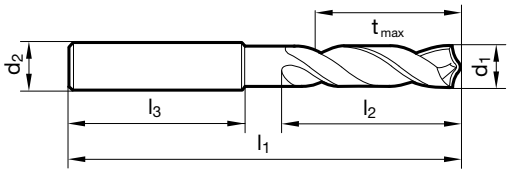
P	M	K	N	S	H
●				●	○

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • il tagliente principale è leggermente concavo • geometria dei taglienti ottimizzata

per acciai legati e altamente legati fino a 1400 N/mm² • Inconel, Hastelloy, Monel • Titanio e leghe di titanio

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



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 senza refrigerazione interna

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 senza refrigerazione interna

Articolo n. 89237

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

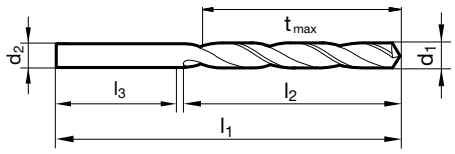
Articolo n. 89401

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		3,000	46,000	16,000	30,000
3,100		3,100	49,000	18,000	31,000
3,200		3,200	49,000	18,000	31,000
3,300		3,300	49,000	18,000	31,000
3,500		3,500	52,000	20,000	32,000
3,600		3,600	52,000	20,000	32,000
3,700		3,700	52,000	20,000	32,000
3,800		3,800	55,000	22,000	33,000
3,900		3,900	55,000	22,000	33,000
4,000		4,000	55,000	22,000	33,000
4,100		4,100	55,000	22,000	33,000
4,200		4,200	55,000	22,000	33,000
4,500		4,500	58,000	24,000	34,000
5,000		5,000	62,000	26,000	36,000
5,100		5,100	62,000	26,000	36,000
5,200		5,200	62,000	26,000	36,000
5,500		5,500	66,000	28,000	38,000
5,600		5,600	66,000	28,000	38,000
5,700		5,700	66,000	28,000	38,000
5,800		5,800	66,000	28,000	38,000
6,000		6,000	66,000	28,000	38,000
6,100		6,100	70,000	31,000	39,000
6,400		6,400	70,000	31,000	39,000
6,500		6,500	70,000	31,000	39,000

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
6,700		6,700	70,000	31,000	39,000
6,800		6,800	74,000	34,000	40,000
7,000		7,000	74,000	34,000	40,000
7,100		7,100	74,000	34,000	40,000
7,140	9/32	7,140	74,000	34,000	40,000
7,500		7,500	74,000	34,000	40,000
7,800		7,800	79,000	37,000	42,000
8,000		8,000	79,000	37,000	42,000
8,200		8,200	79,000	37,000	42,000
8,400		8,400	79,000	37,000	42,000
8,500		8,500	79,000	37,000	42,000
8,600		8,600	84,000	40,000	44,000
8,700		8,700	84,000	40,000	44,000
8,800		8,800	84,000	40,000	44,000
9,000		9,000	84,000	40,000	44,000
9,500		9,500	84,000	40,000	44,000
9,800		9,800	89,000	43,000	46,000
10,000		10,000	89,000	43,000	46,000
10,100		10,100	89,000	43,000	46,000
10,200		10,200	89,000	43,000	46,000
10,300		10,300	89,000	43,000	46,000
10,500		10,500	89,000	43,000	46,000
10,600		10,600	89,000	43,000	46,000
10,800		10,800	95,000	47,000	48,000

TS-Drills senza refrigerazione interna

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
11,000		11,000	95,000	47,000	48,000	15,500		15,500	115,000	58,000	57,000
11,110	7/16	11,110	95,000	47,000	48,000	16,000		16,000	115,000	58,000	57,000
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						

TS-Drills senza refrigerazione interna

Articolo n. 89414

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

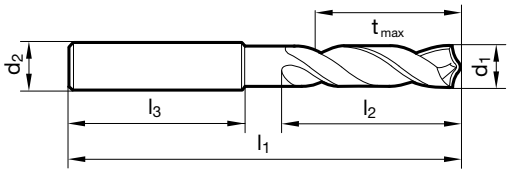
Articolo n. 89417

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



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 senza refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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

TS-Drills senza refrigerazione interna

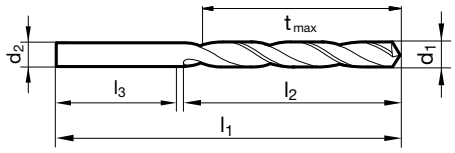
Articolo n. 89275

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 5,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



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 con refrigerazione interna

Articolo n. 89306

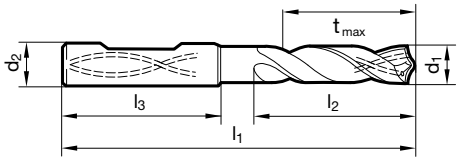
P	M	K	N	S	H
●	○	○	○		

HM | T | TS 80 U | 3xD | DIN 6538 K | 140° | h7 | R | HE

assott. del nocc. ≥ Ø 10,000 • spoglia sul cono tagliente • smorza vibrazioni e colpi • supporto in HSS con riporti in MD • affilatura su piani • con riporti in MD • con dente di trascinamento secondo DIN 1809

acciai non legati o legati in bassa percentuale • ghisa grigia, ghisa grafitica sferoidale • ottone, bronzi, materie sintetiche, grafite

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



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 con refrigerazione interna

Articolo n. 89266

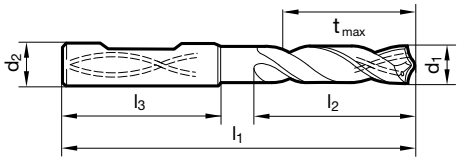
P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 4,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



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 con refrigerazione interna

Articolo n. 89410

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

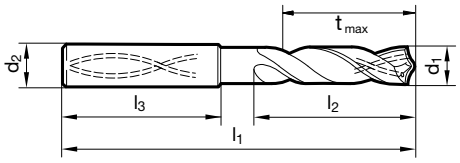
Articolo n. 89415

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



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 con refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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 con refrigerazione interna

Articolo n. 89423

P	M	K	N	S	H
●				●	○

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • il tagliente principale è leggermente concavo • geometria dei taglienti ottimizzata

per acciai legati e altamente legati fino a 1400 N/mm² • Inconel, Hastelloy, Monel • Titanio e leghe di titanio

Articolo n. 89424

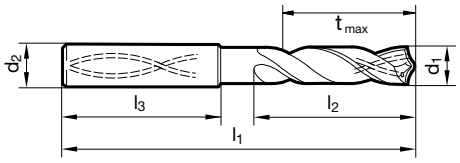
P	M	K	N	S	H
●				●	○

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • il tagliente principale è leggermente concavo • geometria dei taglienti ottimizzata

per acciai legati e altamente legati fino a 1400 N/mm² • Inconel, Hastelloy, Monel • Titanio e leghe di titanio

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



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 con refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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 con refrigerazione interna

Articolo n. 89450

P	M	K	N	S	H
○	●			○	

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai inossidabili e resistenti al calore • Titanio e leghe di titanio • Inconel, Hastelloy, Monel

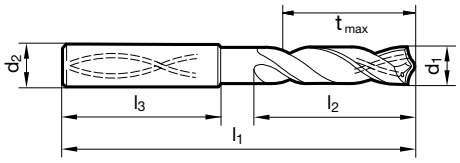
Articolo n. 89550

P	M	K	N	S	H
○	●			○	

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai inossidabili e resistenti al calore • Titanio e leghe di titanio • Inconel, Hastelloy, Monel

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



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 con refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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 con refrigerazione interna

Articolo n. 89292

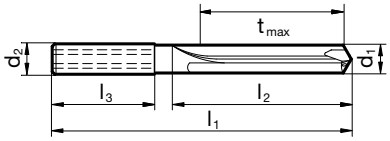
P	M	K	N	S	H
		●	○		

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • strette tolleranze sul diametro • ottima finitura di superf. del foro • attenzione alla press. del refrig.

ghisa grigia, ghisa malleabile, ghisa sferoidale

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



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 con refrigerazione interna

Articolo n. 89307

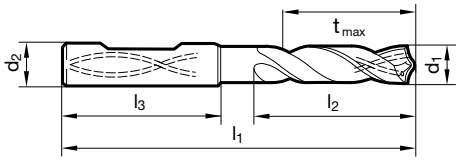
P	M	K	N	S	H
●	○	○	○		

HM | T | TS 80 U | 5xD | DIN 6538 M | 140° | h7 | R | HE

assott. del nocc. ≥ Ø 9,800 • spoglia sul cono tagliente • supporto in HSS con riporti in MD • smorza vibrazioni e colpi

acciai non legati o legati in bassa percentuale • ghisa grigia, ghisa grafitica sferoidale • ottone, bronzi, materie sintetiche, grafite

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



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 con refrigerazione interna

Articolo n. 89272

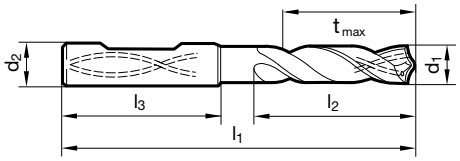
P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,700 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



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 con refrigerazione interna

Articolo n. 89411

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

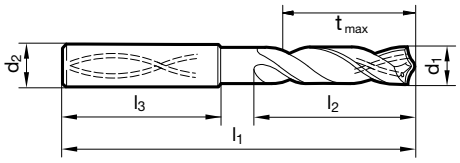
Articolo n. 89408

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



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 con refrigerazione interna

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 con refrigerazione interna

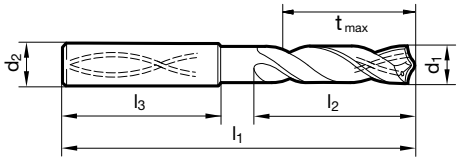
Articolo n. 89420

P	M	K	N	S	H
		•			

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

assott. del nocc. ≥ Ø 3,000 • affilatura raggiata brevettata • tagliente dritto (con la correzione del labbro)
ghisa vermicolare GGV e ADI, CDI • ghisa grigia, ghisa malleabile, ghisa sferoidale

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



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 con refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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 con refrigerazione interna

Articolo n. 89425

P	M	K	N	S	H
●				●	○

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • il tagliente principale è leggermente concavo • geometria dei taglienti ottimizzata

per acciai legati e altamente legati fino a 1400 N/mm² • Inconel, Hastelloy, Monel • Titanio e leghe di titanio

Articolo n. 89426

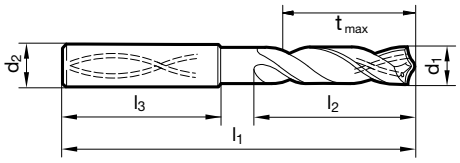
P	M	K	N	S	H
●				●	○

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • il tagliente principale è leggermente concavo • geometria dei taglienti ottimizzata

per acciai legati e altamente legati fino a 1400 N/mm² • Inconel, Hastelloy, Monel • Titanio e leghe di titanio

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



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 con refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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 con refrigerazione interna

Articolo n. 89451

P	M	K	N	S	H
○	●			○	

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai inossidabili e resistenti al calore • Titanio e leghe di titanio • Inconel, Hastelloy, Monel

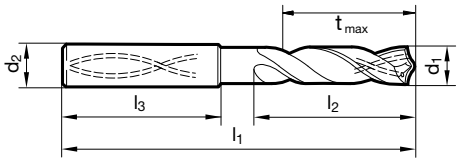
Articolo n. 89551

P	M	K	N	S	H
○	●			○	

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai inossidabili e resistenti al calore • Titanio e leghe di titanio • 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 con refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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

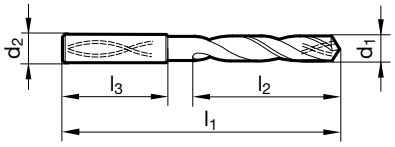
TS-Drills con refrigerazione interna

Articolo n. 89560

P	M	K	N	S	H
			•		

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • tagliente principale forma concava • geometria dei taglienti ottimizzata
alluminio e leghe di alluminio • rame, ottone e leghe di bronzo • plastica



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 con refrigerazione interna

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

HARTNER

TS-Drills con refrigerazione interna

Articolo n. 89460

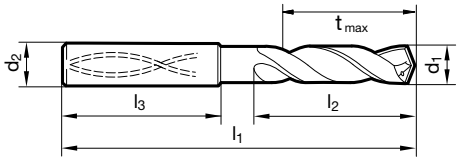
P	M	K	N	S	H
●	○	○		○	○

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • forma del tagliente principale concava • geometria dei taglienti ottimizzata • massime prestazioni

per lavorazioni ad alte prestazioni di acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1400 N/mm² • acciai inossidabili e resistenti al calore • Titanio e leghe di titanio • leghe speciali

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



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
4,040		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
5,110		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
5,410		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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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
6,530		8,000	91,000	53,000	36,000
6,550		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
7,550		8,000	91,000	53,000	36,000
7,600		8,000	91,000	53,000	36,000
7,650		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

TS-Drills con refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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 con refrigerazione interna

Articolo n. 89308

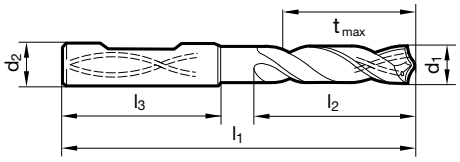
P	M	K	N	S	H
●	○	○	○		

HM | T | TS 80 U | 7xD | DIN 6538 L | 140° | h7 | R | HE

assott. del nocc. ≥ Ø 10,000 • spoglia sul cono tagliente • smorza vibrazioni e colpi • supporto in HSS con riporti in MD

acciai non legati o legati in bassa percentuale • ghisa grigia, ghisa grafitica sferoidale • ottone, bronzi, materie sintetiche, grafite

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



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 con refrigerazione interna

Articolo n. 89294

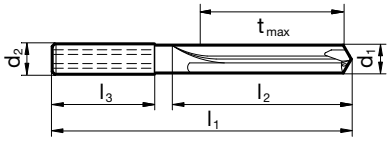
P	M	K	N	S	H
		●	○		

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • strette tolleranze sul diametro • ottima finitura di superf. del foro • attenzione alla press. ottimale del refrig.

ghisa grigia, ghisa malleabile, ghisa sferoidale

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



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
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 con refrigerazione interna

Articolo n. 89412

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

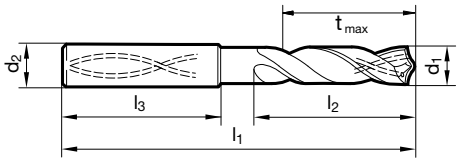
Articolo n. 89416

P	M	K	N	S	H
●	○	●	○	○	○

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

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • forma del tagliente principale diritta • geometria dei taglienti ottimizzata
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio

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



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
4,100		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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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
5,560	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

TS-Drills con refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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 con refrigerazione interna

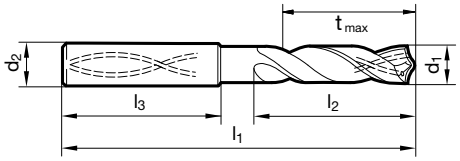
Articolo n. 89421

P	M	K	N	S	H
		•			

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

assott. del nocc. ≥ Ø 4,000 • affilatura raggiata brevettata • tagliente dritto (con la correzione del labbro)
ghisa vermicolare GGV e ADI, CDI • ghisa grigia, ghisa malleabile, ghisa sferoidale

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



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 con refrigerazione interna

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 con refrigerazione interna

Articolo n. 89427

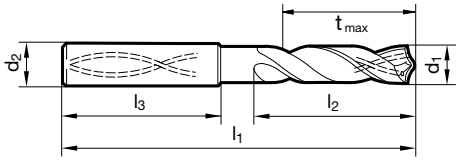
P	M	K	N	S	H
•				•	○

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

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • il tagliente principale è leggermente concavo • geometria dei taglienti ottimizzata

per acciai legati e altamente legati fino a 1400 N/mm² • Inconel, Hastelloy, Monel • Titanio e leghe di titanio

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



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

HARTNER

TS-Drills con refrigerazione interna

Articolo n. 89461

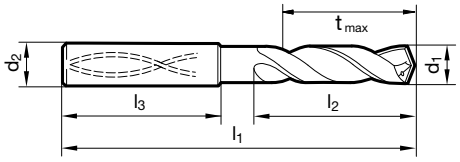
P	M	K	N	S	H
●	○	○		○	○

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

assott. del nocc. ≥ Ø 3,000 • forma del tagliente principale concava • spoglia sul cono tagliente • geometria dei taglienti ottimizzata • massime prestazioni

acciai automatici, acciai da bonifica • acciai inossidabili e resistenti al calore • Titanio e leghe di titanio • acciai (legati/non legati) fino a 1400 N/mm² • per lavorazioni ad alte prestazioni di acciai da costruzione e da cementazione • leghe speciali

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



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 con refrigerazione interna

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 con refrigerazione interna

Articolo n. 89293

P	M	K	N	S	H
		●	○		

VHM | TS 150 GG | 10xD | WN | 120° | m7 | R | HA

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • strette tolleranze sul diametro • ottima finitura di superf. del foro • attenzione alla press. ottimale del refrig.

ghisa grigia, ghisa malleabile, ghisa sferoidale

Articolo n. 89295

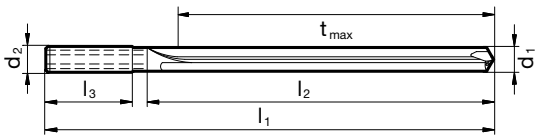
P	M	K	N	S	H
		○	●		

VHM | TS 150 GG | 10xD | WN | 130° | m7 | R | HA

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • strette tolleranze sul diametro • ottima finitura di superf. del foro • attenzione alla press. ottimale del refrig.

ghisa grigia, ghisa malleabile, ghisa sferoidale

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



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 con refrigerazione interna

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
12,700	1/2	14,000	233,000	183,000	45,000	18,500		20,000	308,000	255,000	50,000
13,000		14,000	233,000	183,000	45,000	20,000		20,000	308,000	255,000	50,000
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						

HARTNER

TS-Drills con refrigerazione interna

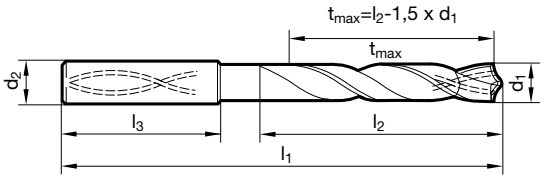
Articolo n. 89418

P	M	K	N	S	H
●	○	●	○	○	○

VHM | F | TS 100 U | 12xD | WN | 135° | h7 | R | HA

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • rivestimento in testa • forma del tagliente principale diritta • geometria dei taglienti ottimizzata

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai (legati/non legati) fino a 1200 N/mm² • ghise • bronzo, ottone • leghe di alluminio con elevato contenuto di silicio



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 con refrigerazione interna

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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
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

HARTNER

TS-Drills con refrigerazione interna

Articolo n. 86509

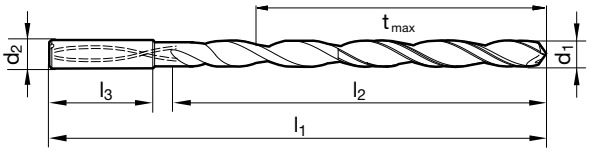
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 15xD | WN | 135° | h7 | R | HA

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • rivestimento in testa • tagliente principale forma concava • forma della scanalatura ottimizzata • maggior diametro dei fori di lubrificazione • attenzione alla press. del refrig.

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



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 con refrigerazione interna

Articolo n. 86511

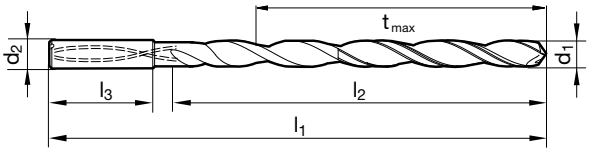
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 20xD | WN | 135° | h7 | R | HA

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • rivestimento in testa • tagliente principale forma concava • forma della scanalatura ottimizzata • maggior diametro dei fori di lubrificazione • attenzione alla press. del refrig.

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	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

HARTNER

TS-Drills con refrigerazione interna

Articolo n. 86512

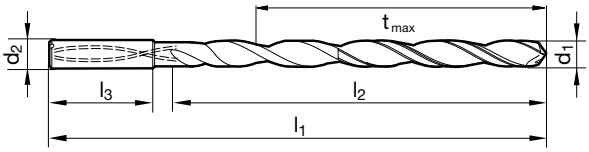
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 25xD | WN | 135° | h7 | R | HA

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • rivestimento in testa • tagliente principale forma concava • forma della scanalatura ottimizzata • maggior diametro dei fori di lubrificazione • attenzione alla press. del refrig.

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	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 con refrigerazione interna

Articolo n. 86513

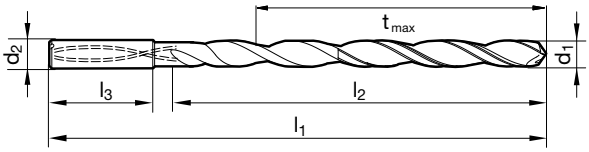
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 30xD | WN | 135° | h7 | R | HA

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • rivestimento in testa • tagliente principale forma concava • forma della scanalatura ottimizzata • maggior diametro dei fori di lubrificazione • attenzione alla press. del refrig.

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	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

HARTNER

TS-Drills con refrigerazione interna

Articolo n. 86514

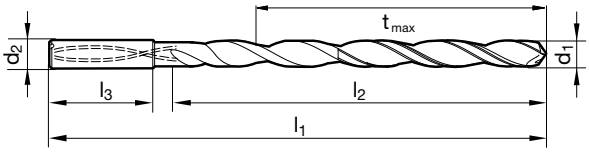
P	M	K	N	S	H
●	●	●		○	○

VHM | A | TS 100 T | 40xD | WN | 135° | h7 | R | HA

assott. del nocc. ≥ Ø 3,000 • spoglia sul cono tagliente • rivestimento in testa • tagliente principale forma concava • forma della scanalatura ottimizzata • maggior diametro dei fori di lubrificazione • attenzione alla press. del refrig.

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm
3,000		6,000	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

Punte TS a 3 taglienti

Articolo n. 89247

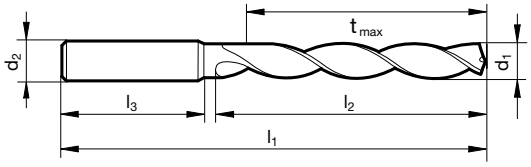
P	M	K	N	S	H
		•	•		

VHM | TS 3 G | 5xD | DIN 6537 L | 130° | m7 | R | HA

assott. del nocc. ≥ Ø 3,000 • affilatura spiropoint • scanalature ampliate • ottimale centraggio • utilizzabile per taglio interrotto

ghisa • leghe di alluminio a truciolo lungo • ottone, bronzo

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



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

HARTNER

Punte TS a 3 taglienti

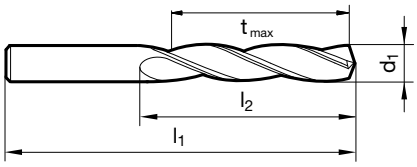
Articolo n. 89239

P	M	K	N	S	H
		○	○		

VHM | TS 3 G | 5xD | DIN 6539 | 150° | h7 | R | Cyl

assott. del nocc. ≥ Ø 3,000 • affilatura su piani • per fori molto precisi • ottima finitura di superf. del foro • utilizzabile per taglio interrotto ghise • allunimio - leghe di ghisa

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



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

Punte TS a 3 taglienti

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			

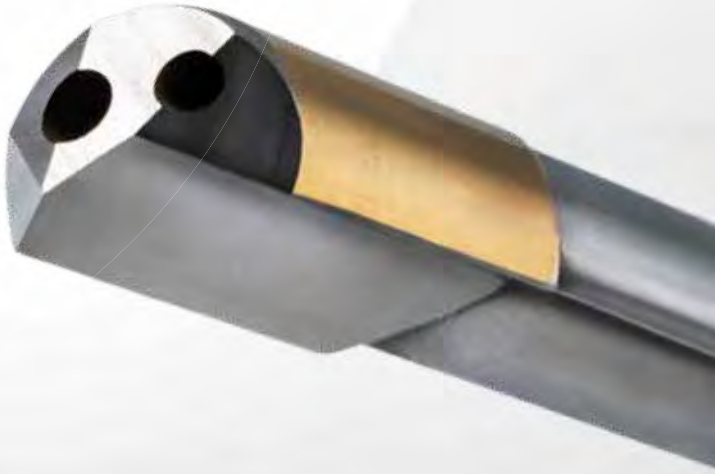
HARTNER

Precision Cutting Tools

MULTIPLEX

E 80 XXL

- ideale per lavorazioni di foratura profonda
- lunghezze totali 800 mm / 1.200 mm / 1.600 mm / 2.000 mm
- utilizzo non solo nella costruzione di stampi e matrici
- scanalature lucidate per la migliore asportazione del truciolo
- rivestimento TiN per applicazione universale
- elementi di serraggio per macchine per foratura profonda T 3.1



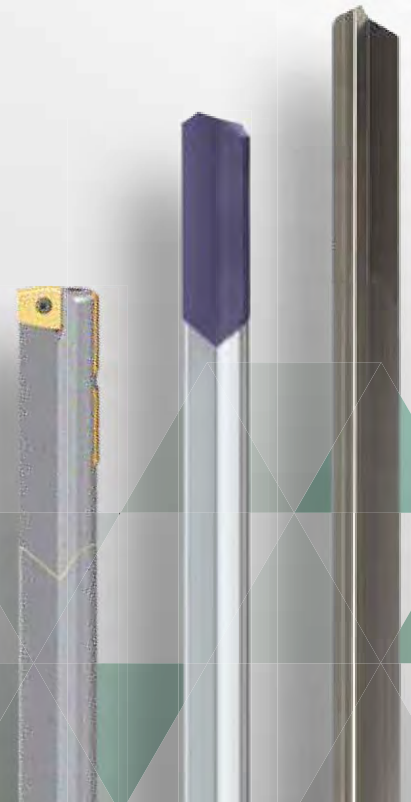
HARTNER

Precision Cutting Tools

Punte a cannone

PUNTE A CANNONE

in metallo duro, con testa in MD o con inserti intercambiabili
lucide e ricoperte



Punte a cannone ad 1 tagliente E 100

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
○	○	○	●	●	○	Norma di fab.	TLB E 100	MDI	○	destra	HA	25xD	1,000 - 16,000	**89523**	271
●	●	○	●	○	○	Norma di fab.	TLB E 100	MDI	a	destra	HA	25xD	1,000 - 16,000	**89520**	271
○	○	○	●	●	○	Norma di fab.	TLB E 100	MDI	○	destra	HA	50xD	1,000 - 10,000	**89524**	273
●	●	○	●	○	○	Norma di fab.	TLB E 100	MDI	a	destra	HA	50xD	1,000 - 10,000	**89521**	273
○	○	○	●	●	○	Norma di fab.	TLB E 100	MDI	○	destra	HA	75xD	1,000 - 7,144	**89525**	275
●	●	○	●	○	○	Norma di fab.	TLB E 100	MDI	a	destra	HA	75xD	1,000 - 7,144	**89522**	275
○	○	○	●	●	○	Norma di fab.	TLB E 100	MDI	○	destra	HA	45.000	1,200 - 3,200	**89503**	276
●	○	●	○	○	○	Norma di fab.	TLB E 100	MDI	A	destra	HA	45.000	1,200 - 3,200	**89510**	276
○	○	○	●	●	○	Norma di fab.	TLB E 100	MDI	○	destra	HA	80.000	1,200 - 5,000	**89501**	277
●	○	●	○	○	○	Norma di fab.	TLB E 100	MDI	A	destra	HA	80.000	1,200 - 5,000	**89511**	277
○	○	○	●	●	○	Norma di fab.	TLB E 100	MDI	○	destra	HA	120.000	1,500 - 5,000	**89504**	278
●	○	●	○	○	○	Norma di fab.	TLB E 100	MDI	A	destra	HA	120.000	1,500 - 5,000	**89512**	278
○	○	○	●	●	○	Norma di fab.	TLB E 100	MDI	○	destra	HA	160.000	1,500 - 8,000	**89502**	279
●	○	●	○	○	○	Norma di fab.	TLB E 100	MDI	A	destra	HA	160.000	1,500 - 8,000	**89513**	279

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte a cannone ad 1 tagliente E 80															
●	○	●	○	○	○	Norma di fab.	TLB E 80	**con riporto in MD**	T	destra	HA	20xD	3,970 - 12,700	**89505**	280
●	●	○	○	●	○	Norma di fab.	TLB E 80	**con riporto in MD**	C	destra	HA	20xD	3,970 - 12,700	**89514**	280
●	○	●	○	○	○	Norma di fab.	TLB E 80	**con riporto in MD**	T	destra	HA	30xD	3,970 - 12,700	**89509**	281
●	●	○	○	●	○	Norma di fab.	TLB E 80	**con riporto in MD**	C	destra	HA	30xD	3,970 - 12,700	**89515**	281
●	○	●	○	○	○	Norma di fab.	TLB E 80	**con riporto in MD**	T	destra	HA	40xD	3,970 - 12,700	**89506**	282
●	●	○	○	●	○	Norma di fab.	TLB E 80	**con riporto in MD**	C	destra	HA	40xD	3,970 - 12,700	**89516**	282
●	○	●	○	○	○	Norma di fab.	TLB E 80	**con riporto in MD**	T	destra	HA	80xD	4,950 - 12,650	**89507**	283
●	●	○	○	●	○	Norma di fab.	TLB E 80	**con riporto in MD**	C	destra	HA	80xD	4,950 - 12,650	**89517**	283
Punte a cannone ad 1 tagliente E 80 XXL															
●	○	●	○	○	○	Norma di fab.	TLB E 80	**con riporto in MD**	T	destra	T 3.1	GL 600	3,000 - 25,000	**89539**	284
●	○	●	○	○	○	Norma di fab.	TLB E 80	**con riporto in MD**	T	destra	T 3.1	GL 800	3,000 - 25,000	**89540**	285
●	○	●	○	○	○	Norma di fab.	TLB E 80	**con riporto in MD**	T	destra	T 3.1	GL1000	3,000 - 25,000	**89544**	286
●	○	●	○	○	○	Norma di fab.	TLB E 80	**con riporto in MD**	T	destra	T 3.1	GL1200	3,000 - 25,000	**89541**	287
●	○	●	○	○	○	Norma di fab.	TLB E 80	**con riporto in MD**	T	destra	T 3.1	GL1400	4,000 - 25,000	**89545**	288

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Punte a cannone ad 1 tagliente E 80 XXL															
●	○	●	○	○	○	Norma di fab.	TLB E 80	con riporto in MD	T	destra	T 3.1	GL1600	4,000 - 25,000	**89542**	289
●	○	●	○	○	○	Norma di fab.	TLB E 80	con riporto in MD	T	destra	T 3.1	GL1800	4,000 - 32,000	**89546**	290
●	○	●	○	○	○	Norma di fab.	TLB E 80	con riporto in MD	T	destra	T 3.1	GL2000	4,000 - 32,000	**89543**	291
Punte a cannone ad 1 tagliente E 800 con inserti intercambiabili															
●	○	○	●	○		Norma di fab.	TLB E 800	con riporto in MD	T	destra	HB	30xD	12,000 - 24,000	**89530**	292
Inserti per punte a cannone ad 1 tagliente E 800															
●	○	○	●	○		Norma di fab.		MDI	T	destra			12,000 - 40,000	**89535**	293
Pattini di guida per punte a cannone ad 1 tagliente E 800															
●	○	○	●	○		Norma di fab.		MDI	T				12,000 - 40,000	**89536**	294
Punte a cannone a 2 taglienti Z 80															
			●			Norma di fab.	TLB Z 80	con riporto in MD	◯	destra	HA	30xD	8,000 - 12,000	**89508**	295
		●				Norma di fab.	TLB Z 80	con riporto in MD	◯	destra	HA	30xD	8,000 - 12,000	**89518**	295

Punte a cannone ad 1 tagliente E 100

Articolo n. 89523

P	M	K	N	S	H
○	○	○	●	●	○

VHM | TLB E 100 | 25xD | WN | h5 | R | HA

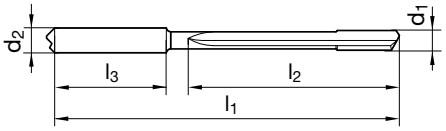
profondità di foro fino a 25xD • forma tagliente G • codolo in MDI con parte terminale MQL

Articolo n. 89520

P	M	K	N	S	H
●	●	○	●	○	○

VHM | a | TLB E 100 | 25xD | WN | h5 | R | HA

profondità di foro fino a 25xD • forma tagliente G • codolo in MDI con parte terminale 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

Punte a cannone ad 1 tagliente 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

Punte a cannone ad 1 tagliente E 100

Articolo n. 89524

P	M	K	N	S	H
○	○	○	●	●	○

VHM | TLB E 100 | 50xD | WN | h5 | R | HA

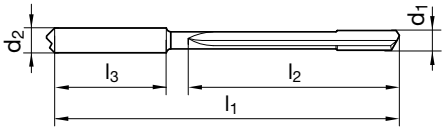
profondità di foro fino a 25xD • forma tagliente G • codolo in MDI con parte terminale MQL

Articolo n. 89521

P	M	K	N	S	H
●	●	○	●	○	○

VHM | a | TLB E 100 | 50xD | WN | h5 | R | HA

profondità di foro fino a 50xD • forma tagliente G • codolo in MDI con parte terminale 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

Punte a cannone ad 1 tagliente 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

Punte a cannone ad 1 tagliente E 100

Articolo n. 89525

P	M	K	N	S	H
○	○	○	●	●	○

VHM | TLB E 100 | 75xD | WN | h5 | R | HA

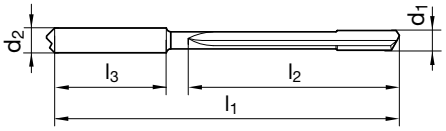
profondità di foro fino a 25xD • forma tagliente G • codolo in MDI con parte terminale MQL

Articolo n. 89522

P	M	K	N	S	H
●	●	○	●	○	○

VHM | a | TLB E 100 | 75xD | WN | h5 | R | HA

profondità di foro fino a 75xD • forma tagliente G • codolo in MDI con parte terminale 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

Punte a cannone ad 1 tagliente E 100

Articolo n. 89503

P	M	K	N	S	H
○	○	○	●	●	○

VHM | ○ | TLB E 100 | SPL 45,00 | WN | h5 | R | HA

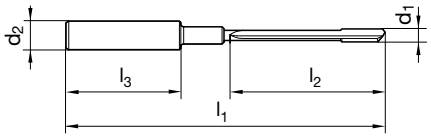
lunghezza elica 45 mm • forma tagliente G

Articolo n. 89510

P	M	K	N	S	H
●	○	●	○	○	○

VHM | A | TLB E 100 | SPL 45,00 | WN | h5 | R | HA

lunghezza elica 45 mm • forma tagliente 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

Punte a cannone ad 1 tagliente E 100

Articolo n. 89501

P	M	K	N	S	H
○	○	○	●	●	○

VHM | TLB E 100 | SPL 80,00 | WN | h5 | R | HA

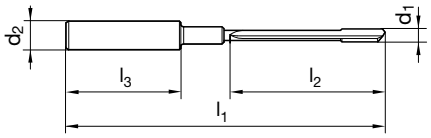
lunghezza elica 80 mm • forma tagliente G

Articolo n. 89511

P	M	K	N	S	H
●	○	●	○	○	○

VHM | A | TLB E 100 | SPL 80,00 | WN | h5 | R | HA

lunghezza elica 80 mm • forma tagliente 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

Punte a cannone ad 1 tagliente E 100

Articolo n. 89504

P	M	K	N	S	H
○	○	○	●	●	○

VHM | ○ | TLB E 100 | SPL 120,00 | WN | h5 | R | HA

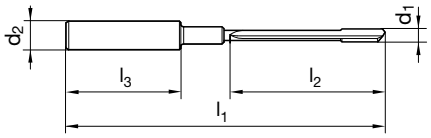
lunghezza elica 120 mm • forma tagliente G

Articolo n. 89512

P	M	K	N	S	H
●	○	●	○	○	○

VHM | A | TLB E 100 | SPL 120,00 | WN | h5 | R | HA

lunghezza elica 120 mm • forma tagliente 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

Punte a cannone ad 1 tagliente E 100

Articolo n. 89502

P	M	K	N	S	H
○	○	○	●	●	○

VHM | ○ | TLB E 100 | SPL 160,00 | WN | h5 | R | HA

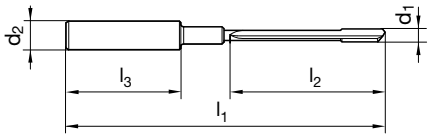
lunghezza elica 160 mm • forma tagliente G

Articolo n. 89513

P	M	K	N	S	H
●	○	●	○	○	○

VHM | A | TLB E 100 | SPL 160,00 | WN | h5 | R | HA

lunghezza elica 160 mm • forma tagliente 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

Punte a cannone ad 1 tagliente E 80

Articolo n. 89505

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | 20xD | WN | h5 | R | HA

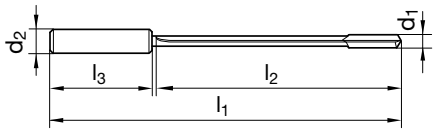
profondità di foro fino a 20xD • forma tagliente G • con rompitruciolo laterale

Articolo n. 89514

P	M	K	N	S	H
●	●	○	○	●	○

HM | C | TLB E 80 | 20xD | WN | h5 | R | HA

profondità di foro fino a 20xD • forma tagliente G • per acciai legati e altamente legati



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

Punte a cannone ad 1 tagliente E 80

Articolo n. 89509

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | 30xD | WN | h5 | R | HA

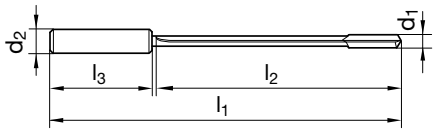
profondità di foro fino a 30xD • forma tagliente G • con rompitruciolo laterale

Articolo n. 89515

P	M	K	N	S	H
●	●	○	○	●	○

HM | C | TLB E 80 | 30xD | WN | h5 | R | HA

profondità di foro fino a 30xD • forma tagliente G • per acciai legati e altamente legati



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

Punte a cannone ad 1 tagliente E 80

Articolo n. 89506

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | 40xD | WN | h5 | R | HA

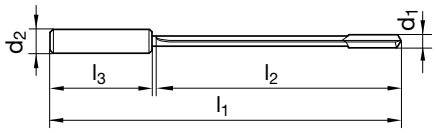
profondità di foro fino a 40xD • forma tagliente G • con rompitruciolo laterale

Articolo n. 89516

P	M	K	N	S	H
●	●	○	○	●	○

HM | C | TLB E 80 | 40xD | WN | h5 | R | HA

profondità di foro fino a 40xD • forma tagliente G • per acciai legati e altamente legati



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

Punte a cannone ad 1 tagliente E 80

Articolo n. 89507

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | 80xD | WN | h5 | R | HA

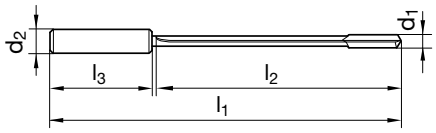
profondità di foro fino a 80xD • forma tagliente G • con rompitruciolo laterale • per materiali a truciolo lungo • massima profondità di taglio per utensile 40xD, per profondità di taglio maggiore utilizzare prima la punte Art. n. 89506

Articolo n. 89517

P	M	K	N	S	H
●	●	○	○	●	○

HM | C | TLB E 80 | 80xD | WN | h5 | R | HA

profondità di foro fino a 80xD • forma tagliente G • massima profondità di taglio per utensile 40xD, per profondità di taglio maggiore utilizzare prima la punte Art. n. 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

HARTNER

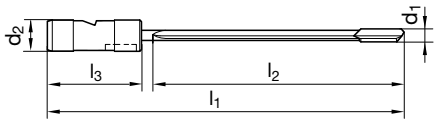
Punte a cannone ad 1 tagliente E 80 XXL

Articolo n. 89539

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 600 | WN | h5 | R | T 3.1

per le lavorazioni su macchine per punte a cannone • Articoli in stock con lunghezza totale fissa per macchine per punte a cannone • scanalature lucidate • testa saldo-brasata in metallo duro con forma tagliente 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

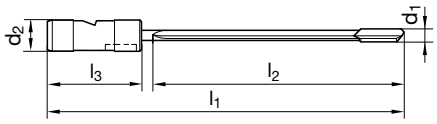
Punte a cannone ad 1 tagliente E 80 XXL

Articolo n. 89540

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 800 | WN | h5 | R | T 3.1

per le lavorazioni su macchine per punte a cannone • Articoli in stock con lunghezza totale fissa per macchine per punte a cannone • scanalature lucidate • testa saldo-brasata in metallo duro con forma tagliente 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

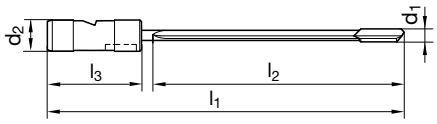
Punte a cannone ad 1 tagliente E 80 XXL

Articolo n. 89544

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1000 | WN | h5 | R | T 3.1

per le lavorazioni su macchine per punte a cannone • Articoli in stock con lunghezza totale fissa per macchine per punte a cannone • scanalature lucidate • testa saldo-brasata in metallo duro con forma tagliente 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

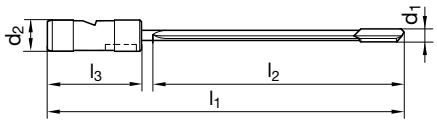
Punte a cannone ad 1 tagliente E 80 XXL

Articolo n. 89541

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1200 | WN | h5 | R | T 3.1

per le lavorazioni su macchine per punte a cannone • Articoli in stock con lunghezza totale fissa per macchine per punte a cannone • scanalature lucidate • testa saldo-brasata in metallo duro con forma tagliente 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

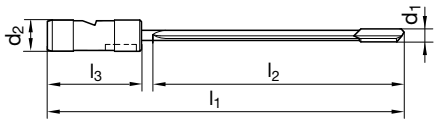
Punte a cannone ad 1 tagliente E 80 XXL

Articolo n. 89545

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1400 | WN | h5 | R | T 3.1

per le lavorazioni su macchine per punte a cannone • Articoli in stock con lunghezza totale fissa per macchine per punte a cannone • scanalature lucidate • testa saldo-brasata in metallo duro con forma tagliente 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

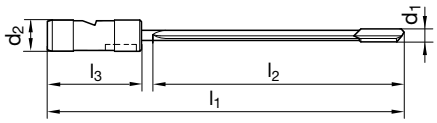
Punte a cannone ad 1 tagliente E 80 XXL

Articolo n. 89542

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1600 | WN | h5 | R | T 3.1

per le lavorazioni su macchine per punte a cannone • Articoli in stock con lunghezza totale fissa per macchine per punte a cannone • scanalature lucidate • testa saldo-brasata in metallo duro con forma tagliente 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

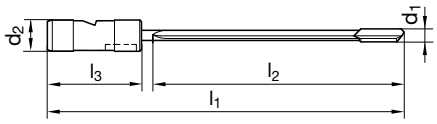
Punte a cannone ad 1 tagliente E 80 XXL

Articolo n. 89546

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 1800 | WN | h5 | R | T 3.1

per le lavorazioni su macchine per punte a cannone • Articoli in stock con lunghezza totale fissa per macchine per punte a cannone • scanalature lucidate • testa saldo-brasata in metallo duro con forma tagliente 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

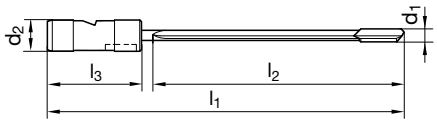
Punte a cannone ad 1 tagliente E 80 XXL

Articolo n. 89543

P	M	K	N	S	H
●	○	●	○	○	○

HM | T | TLB E 80 | GL 2000 | WN | h5 | R | T 3.1

per le lavorazioni su macchine per punte a cannone • Articoli in stock con lunghezza totale fissa per macchine per punte a cannone • scanalature lucidate • testa saldo-brasata in metallo duro con forma tagliente 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

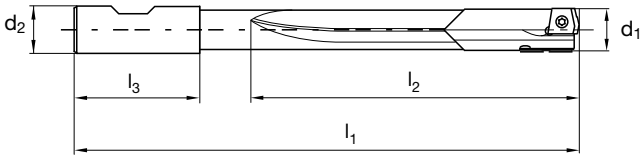
Punte a cannone ad 1 tagliente E 800 con inserti intercambiabili

Articolo n. 89530

P	M	K	N	S	H
●	○	○	●	○	

HM | T | TLB E 800 | 30xD | WN | h8 | R | HB

profondità di foro fino a 30xD • con inserti intercambiabili • con pattini di guida intercambiabili • con giravite • con viti • per impiego universale



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

HARTNER

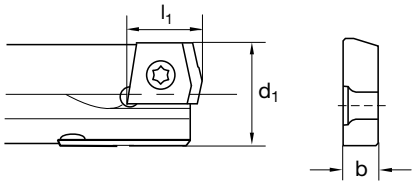
Inserti per punte a cannone ad 1 tagliente E 800

Articolo n. 89535

P	M	K	N	S	H
●	○	○	●	○	

VHM T WN R

per impiego universale



d1 mm	l1 mm	b mm	Codice
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	Codice
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

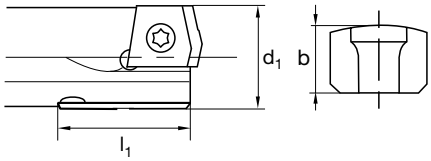
Pattini di guida per punte a cannone ad 1 tagliente E 800

Articolo n. 89536

P	M	K	N	S	H
●	○	○	●	○	

VHM T WN

per impiego universale



d1 mm	l1 mm	b mm	Codice
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	Codice
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

Punte a cannone a 2 taglienti Z 80

Articolo n. 89508

P	M	K	N	S	H
			•		

HM | TLB Z 80 | 30xD | WN | h5 | R | HA

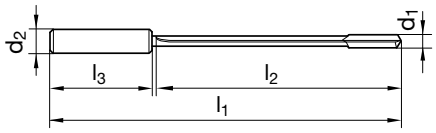
profondità di foro fino a 30xD • Punte a cannone a 4 fasi • per alluminio

Articolo n. 89518

P	M	K	N	S	H
		•			

HM | TLB Z 80 | 30xD | WN | h5 | R | HA

profondità di foro fino a 30xD • Punte a cannone a 4 fasi • per ghise



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

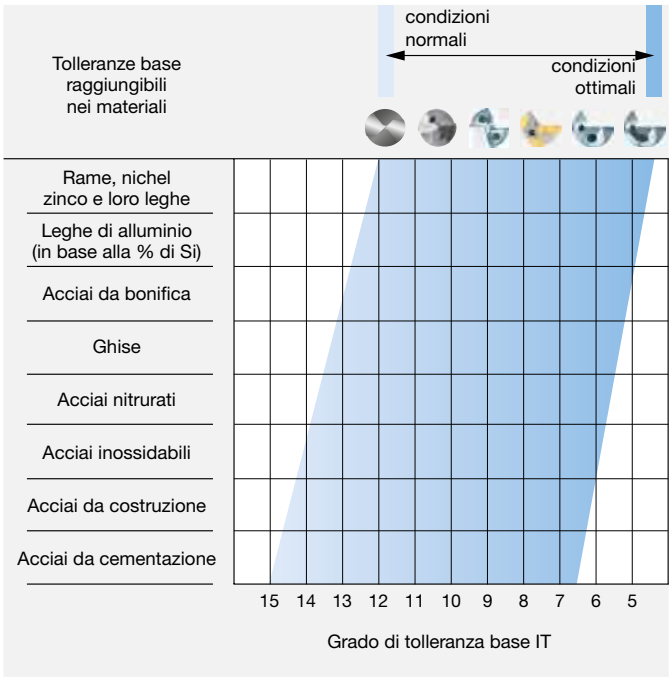
Caratteristiche di qualità

Nella lavorazione di metalli, il termine foratura profonda viene utilizzato per profondità di foratura di 15xD e oltre.
- punte a cannone standard ad 1 tagliente in MDI o con la testa saldobrasato in MD
- punte a cannone standard a 2 taglienti in MDI o con la testa saldobrasato in MD
- sistema di cambio con taglienti in MDI e pattini intercambiabili
- punte elicoidali per foratura profonda in MDI o HSS/HSS-E

L'utensile giusto viene scelto in base all'applicazione e dei requisiti di qualità del foro.
I seguenti diagrammi forniscono una guida alla scelta dell'utensile:

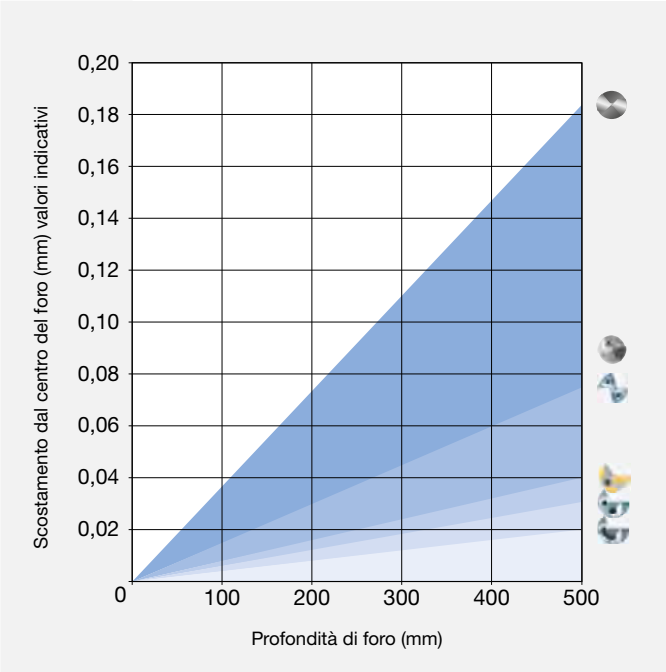
Tolleranze base

I diversi tipi di utensili producono tolleranze di base diverse a seconda del design dell'utensile. Le punte a cannone ad 1 tagliente producono fori estremamente precisi. In condizioni ottimali con le punte a cannone ad 1 tagliente possono essere raggiunte tolleranze fino a IT5.



Rettilineità del foro

La rettilineità del foro descrive una deviazione direzionale. La rettilineità è influenzata dall'accurato centraggio in dipendenza dalla forma e dalla posizione del foro pilota o della bussola di guida. Le proprietà del materiale o del pezzo, così come la stabilità dell'utensile e della macchina, influenzano ulteriormente il risultato della rettilineità.



Classi di rugosità		N12	N11	N10	N9	N8	N7	N6	N5	N4	N3
E 100/E 80 Foratura profonda											
E 800 Foratura profonda											
Z 80/TS 100 T Foratura profonda											
HSS/HSS-E Foratura profonda											
E 100/80/800 Allargatura											
Valori di superficie	Rz (µm)	160	100	63	40	15,6	7,87	4,65	2,60	1,74	0,81
Valori di rugosità	Ra (µm)	50	25	12,5	6,3	3,2	1,6	0,8	0,4	0,2	0,1

condizioni normali (valori standard) — condizioni ideali

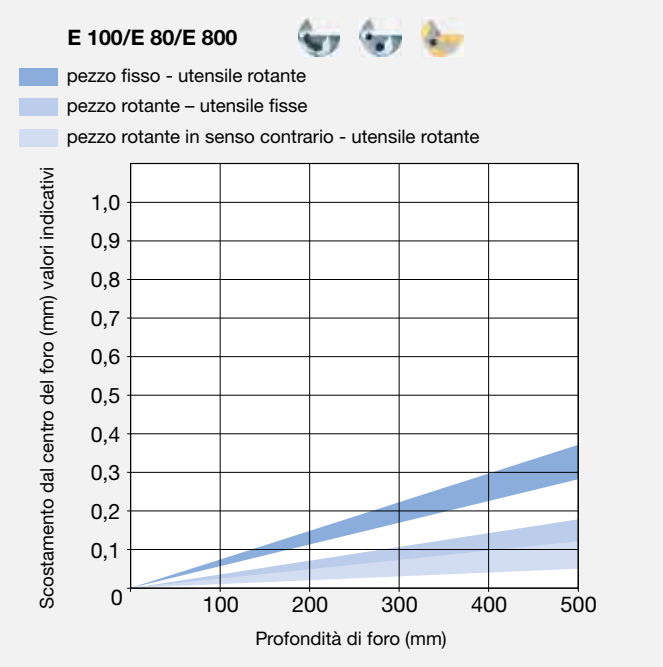
Finitura di superficie

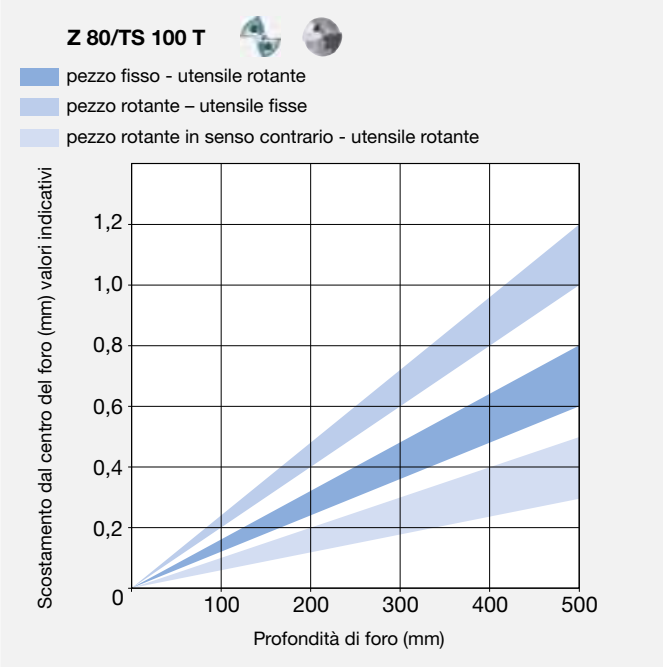
La rugosità del foro è influenzata da molti fattori. Fattori decisivi sono il tipo e la geometria dell'utensile, il materiale e il refrigerante. A differenza degli utensili a taglienti multipli, la parete del foro viene ulteriormente levigata dai pattini di guida durante la foratura con le punte a cannone ad 1 tagliente. Le superfici sull'utensile (ad es. rivestimento) o le condizioni del tagliente (usura) sui taglienti principali e secondari determinano la qualità della superficie.

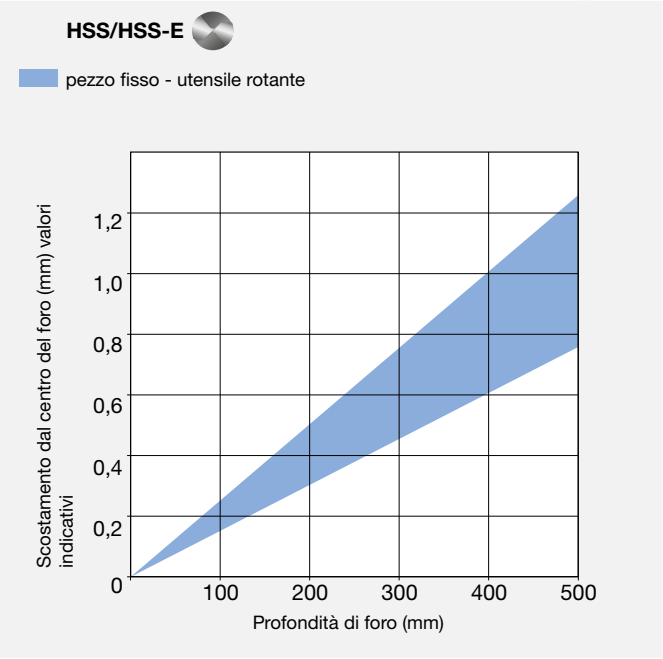
Caratteristiche di qualità

Scostamento dal centro del foro

Uno spostamento continuo dell'utensile con profondità di foratura crescente descrive la linea centrale del foro. Oltre alle proprietà geometriche della punta, anche le condizioni di taglio, la struttura del materiale e le temperature influenzano il risultato del ciclo. Si ottengono risultati ottimali quando si lavora con velocità contro-rotanti del pezzo e dell'utensile. Le punte a cannone a 1 tagliente producono scostamenti di centro minimi rispetto alle punte a più taglienti.







HARTNER

Applicazione dei rivestimenti Hartner

Materiale	Gruppi ISO	E/Z	TS 100 T	HSS
Acciai C, **Acciai automatici,** **Acciai Mn**	P	TiN Endurum TiAlSiN	Endurum Raptor FIRE	FIRE – –
Acciai, legati in bassa percentuale	P	lucido TiN FIRE	FIRE Endurum Raptor	FIRE TiN –
Acciai, legati	P	FIRE Signum TiAlSiN	FIRE Signum nanoA	FIRE TiN –
Acciai, temperati, <55 HRC	P	Signum FIRE TiAlN	Signum FIRE TiAlN	– – –
Acciai, temperati, 55–65 HRC	P	Signum FIRE TiAlN	Signum FIRE TiAlN	– – –
Acciai, inossidabili e resist. al calore	M	SuperA Sirius TiAlSiN	nanoA Sirius Endurum	Sirius FIRE TiN
Ghise	K	Signum Endurum FIRE	Signum FIRE nanoA	FIRE – –
Leghe a base di nickel (p. es. Inconel)	S	nanoA Sirius Endurum	nanoA Signum FIRE	FIRE – –
Titanio / leghe di titanio	S	lucido Zenit nanoA	Zenit nanoA	FIRE –
Leghe di cobalto-cromo	S	nanoA FIRE TiAlSiN	nanoA Signum FIRE	– – –
Metalli preziosi	S	nanoA Carbo	nanoA	–
Leghe di alu per lav. plastiche	N	lucido Carbo –	lucido Carbo Diamant	lucido Carbo –
Leghe di alu-ghisa (<12% silicio)	N	lucido Zenit Carbo	lucido Zenit Carbo	lucido Zenit Carbo
Leghe di alu-ghisa (≥12% silicio)	N	Diamant Signum –	Diamant – –	– – –
Rame/Bronzi / Ottone	N	lucido Carbo CrN	CrN Carbo	TiN –
Ceramica	N	Diamant Signum	Diamant	–
Mat. plastiche, non rinforzati	N	lucido	Carbo	–
Mat. plastiche, a fibre rinforzate	N	Diamant Signum	Diamant Signum	– –
Grafite	N	lucido	–	–

Note: *La panoramica mostra le raccomandazioni generali di applicazione per i rivestimenti Hartner. La priorità è sempre dall'alto verso il basso.*

Introduzione alla foratura profonda

Nella tecnica del taglio dei metalli da una profondità di foro di 15xD e superiore, si parla della così detta punta a cannone, anche se, logicamente, con punte a cannone si possono produrre fori più corti. In questo modo vengono sfruttati gli effetti collaterali positivi della foratura, come buona finitura di superficie, minimo scostamento di diametro e rettilineità ottimizzata.

Raffreddamento ad alta pressione - oggi una cosa ormai ovvia

Poichè negli ultimi anni hanno preso piede utensili con fori di refrigerazione interni, il lubrificante passa attraverso tali fori, per arrivare là dove è necessario. Con questo sviluppo si ottennero anche con punte elicoidali, maschi ecc. sensibili miglioramenti del tempo di impiego ed inferiori rotture degli utensili. Oggi ogni macchina utensile convenzionale è offerta con refrigerazione interna ad alta pressione, adatta quindi anche per punte a cannone. In tal modo la quota di punte a cannone impiegate su centri di lavoro, torni ecc. guadagna sempre maggiore importanza. Il procedimento risulta sempre più popolare nella tecnica di truciolatura.

Tutte le punte a cannone devono essere guidate da un preforo.
Le punte a cannone non devono essere mai mosse libere al massimo dei giri nello spazio macchina.

La foratura profonda non è una sfida insuperabile rispettando determinate condizioni chiunque può ricevere buon risultati.

Troverete i valori indicativi per l'impiego delle punte a cannone Hartner alle pagine dei rispettivi consigli.

Suggerimenti e trucchi

- Per profondità di foro superiori a 40xD si consiglia l'impiego di due o più punte a cannone, ad es. Ø 10x400 mm e Ø 9,95x800 mm, quando si utilizzano le classiche punte per fori profondi con codolo in acciaio E 80, E 800 e Z 80.
- Le punte a cannone in MDI E 100 M e la versione brasata E 100 possono raggiungere una profondità di foratura massima di 80xD con un solo utensile.
- Punte a cannone per profondità di foro superiore a 40 x D dovrebbero essere guidate nel foro pilota con rotazione sinistrorsa.
- Durante il cambio di utensili da 40 x D, gli stessi possono essere smorzati con l'accensione di refrigerazione interna ad alta pressione per circa 1 secondo.
- Per la lavorazione di materiali a truciolo lungo, consigliamo di ordinare punte a cannone con scanalature lucidate.
- In generale, si consiglia di regolare il contenuto di grassi dell'emulsione ad almeno l'8%.
- Punte a cannone ad un tagliente per alluminio a truciolo lungo devono essere ordinate con angolo di affilatura a 180° e spazio per vano olio.
- Una tenuta corretta delle lunette di guida consente di stabilizzare il processo di foratura e aumenta la qualità del foro.
- Per evitare un passaggio tra il foro pilota e il foro profondo, è possibile ottenere una transizione graduale con la forma tagliente G e un pilota con una leggera sottodimensione.
- In caso di formazione di trucioli lunghi, un'interruzione periodica dell'avanzamento (senza corsa di ritorno) può consentire un processo di lavorazione.

Procedimento di foratura su centri di lavoro standard (CDL)

Le fasi di lavoro per la foratura profonda

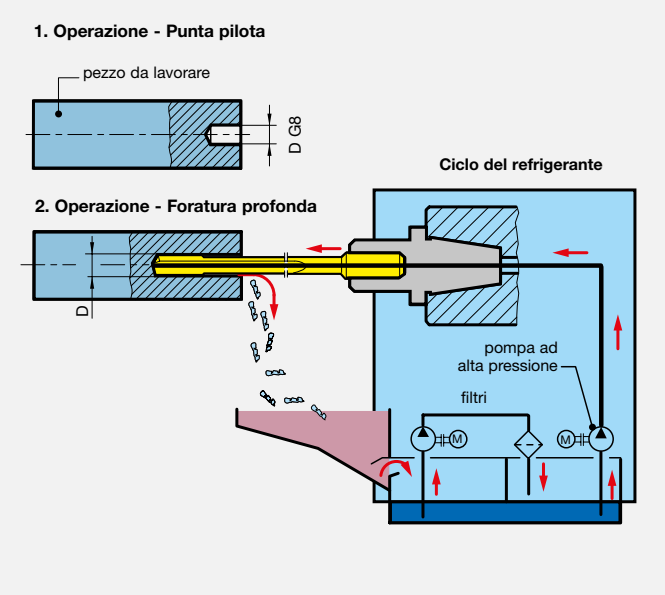
- Produzione di un foro pilota
- Entrare con basso nr. di giri
- Regolazione della pressione del lubrificante e del nr. di giri
- Foratura in continuo sull'intera lunghezza, senza scaricare
- Spegnimento dell'adduzione refrigerante al raggiungimento della profondità di foro desiderata.
- Corsa di ritorno dell'utensile dal foro

I parametri di taglio possono essere ridotti se i parametri di refrigerazione sono insufficienti. Opzionalmente, è possibile aumentare la pressione del sistema.

Procedimento

Per produrre fori profondi con risultati ottimali, specialmente con entrata su raggi o su una struttura superficiale non livellata, consigliamo di procedere con i seguenti passi:

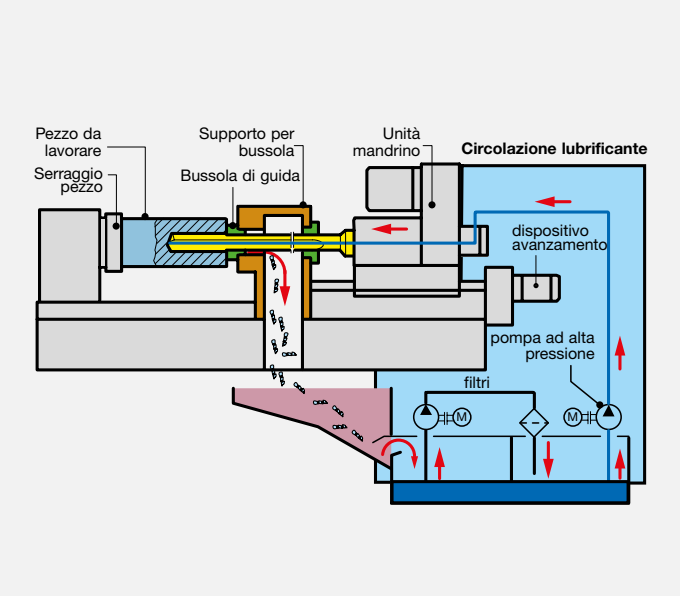
1. Fresatura di una superficie, ad es. con la TF 100 MULTI-MILL. La superficie deve essere perpendicolare all'angolo di entrata dell'operazione di foratura.
2. Produzione di un foro pilota cilindrico, ad es. con una punta TS 100 U. Grazie al suo angolo di affillatura a 140° e alla sua tolleranza m7 sul diametro queste punte sono ideali per questa fase di lavorazione.
3. Entrata nel foro pilota con un numero di giri di circa 200 giri/min ad un avanzamento di circa 500 mm/min con rotazione sinistrorsa.
4. Regolazione della pressione lubrorefrigerante e del numero di giri.
5. Forare in continuo l'intera profondità senza ciclo di scarico. Impiegando punte a cannone con un grosso rapporto lunghezza/diametro (ad es. punte a cannone a 1 tagliente con lunghezza scanalatura da 160 mm), consigliamo di lavorare fino ad una profondità di foro di ca. 25 mm con parametri di taglio ridotti (circa 75 % della velocità di taglio ottimale).
6. Per fori passanti con uscita diritta, cioè a 90°, ridurre la velocità di avanzamento vf del 50 % a circa 1 mm prima dell'uscita.
7. Per fori passanti con uscita del foro obliqua, ridurre la velocità di avanzamento vf del 40 % a circa 1 mm prima dell'uscita.
8. Al raggiungimento della profondità desiderata spegnete giri e lubrorefrigerante, uscire in corsa rapida con mass. 5.000 mm/min.



Il procedimento per la foratura profonda su foratrici

Quando la produzione di massa, la fresatura di fori molto profondi e la qualità superficiale sono richiesti, si utilizzano macchine per la foratura profonda. È disponibile un vastissimo range di profondità di foratura. Il movimento a fisarmonica delle bussole permette una foratura continua.

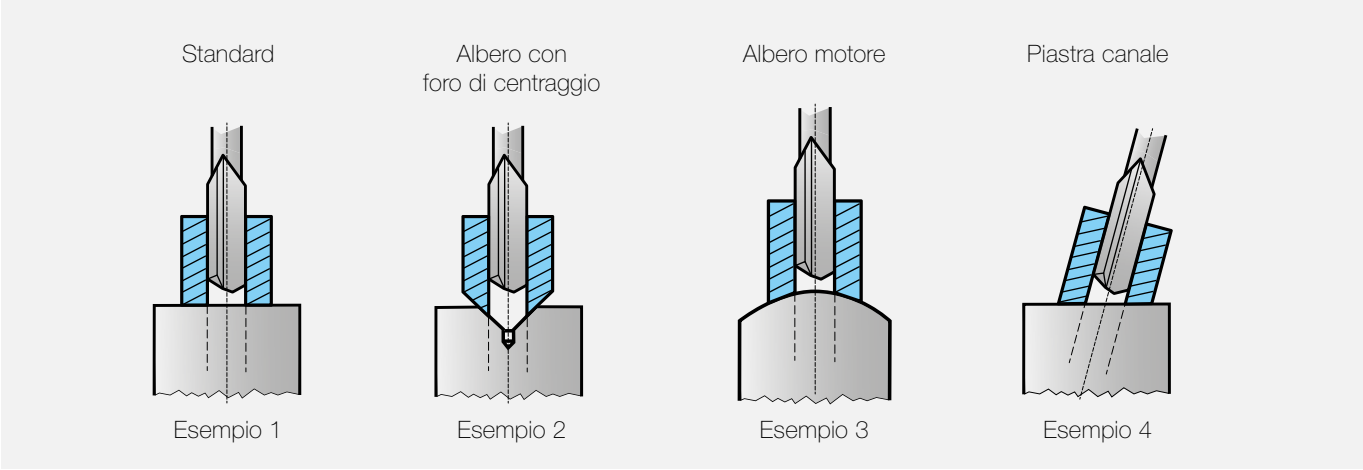
Non occorrono punte pilota, questo permette di ridurre i costi e i tempi per il cambio utensile offrendo allo stesso tempo una maggiore profondità e un'eccellente qualità superficiale. Una pompa ad alta pressione e un sistema di filtraggio del refrigerante garantiscono una massima sicurezza del processo di foratura. La lunghezza totale delle lunette fisse e del supporto delle bussole di guida determina la cosiddetta lunghezza di perdita, che è decisiva per il calcolo della lunghezza dell'utensile.



Foro pilota e bussola di guida

Poiché la punta a cannone ad 1 tagliente è un unico utensile da taglio e non può centrarsi da sola, l'utensile deve essere guidato da una bussola di guida o da un foro pilota.
Tuttavia, le punte autocentranti a due taglienti devono essere guidate anche con bussole o fori pilota, altrimenti potrebbero oscillare verso l'alto.

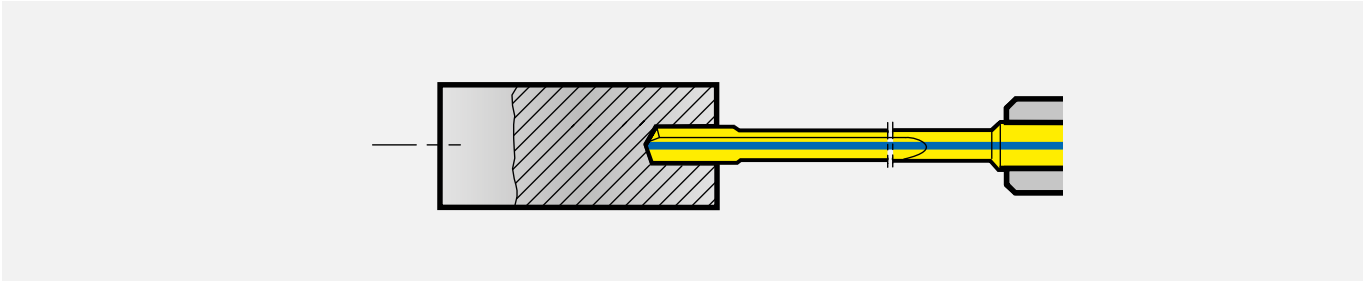
Esempio bussola di guida con art. n. 89600 (HSS) / 89601 (MDI)



Da osservare durante l'uso di bussole di guida

- La bussola di guida deve essere collegata al bordo esterno del foro in modo sicuro
- Tra bussola di guida e utensile il gioco deve essere il meno possibile.
- Se la punta a cannone ha un diametro di guida, la bussola dovrebbe essere almeno abbastanza lunga da guidare entrambe le forme taglienti durante l'operazione di foratura.
- Controllo regolare dello stato della bussola di guida per evitare influenze negative sull'utensile.
- Consigliamo le bussole di guida in HSS per le piccole serie e le bussole di guida in MDI per le grandi serie.

Esempio foro pilota



Valori guida per la profondità del foro pilota

Punte a cannone standard	Ø nom. Utensile di seguito				
Profondità di foro	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
fino a 20xD	3,0xD	2,5xD	2,0xD	1,5xD	1,5xD
fino a 30xD		3,0xD	2,5xD	2,0xD	
fino a 40xD		4,0xD	3,0xD	2,5xD	

Foro pilota e bussola di guida

Gamma di applicazioni degli utensili pilota

	Gamma di diametri [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
Micropunte	Art. 86400 senza lubrif.																			
			86405 c. lub.																	
TS 100 U					Art. 89413 senza lubrif.															
					Art. 89410 con lubrif.															
Multiplex HPC								Art. 86721 Inserti intercambiabili per pilota												
TF 100 Pilot			Art. 85000 4 tagli. senza lubrif.																	
TF 100 MULTI-MILL						Art. 84951 4 tagli. senza lubrif.														
Typ V	Art. 84803 HSS-E senza lubrif.																			

Micropunte
- per fori pilota <Ø3,000/E 100, E 80
- per situazioni standard/superficie di foratura piana

TS 100 U
- utensile pilota universale Ø3,000-19,500/E 100, E 80, Z 80, E 800, TS 100 T
- per situazioni standard/superficie di foratura piana

Multiplex HPC
- inserti intercambiabili-Utensilie pilota Ø11,000-40,000/E 100, E 80, Z 80, E 800, TS 100 T
- per situazioni standard/superficie di foratura piana

TF 100 Pilot
- frese per pilota ad alta precisione Ø1,400-12,000/E 100, E 80, Z 80, E 800, TS 100 T
- per situazioni standard e speciali /per superfici piane, angolari, cubiche o altre

TF 100 MULTI-MILL
- frese per pilota ad alta precisione Ø4,000-52,000/E 100, E 80, Z 80, E 800, TS 100 T
- per situazioni standard e speciali /per superfici piane, angolari, cubiche o altre

Typ V
- punta per preforo Ø0,900-15,500 / Punta a cannone HSS
- per situazioni standard/superficie di foratura piana

Da osservare per i fori pilota

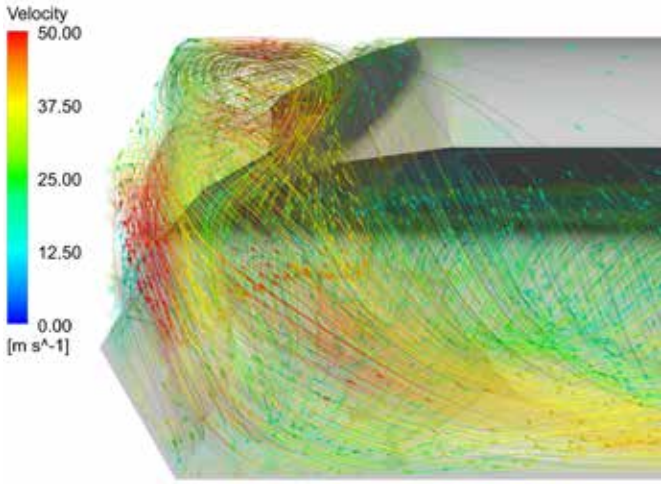
- Il diametro del foro pilota dovrebbe essere tollerato fino al G8 e gli utensili dovrebbero essere sempre tollerati fino al diametro nominale **m7**.
- Se la punta a cannone ad un tagliente ha un diametro di guida, la bussola dovrebbe essere almeno abbastanza lunga da guidare entrambe le forme taglienti durante l'operazione di foratura.
- A seconda dell'applicazione, è talvolta vantaggioso se il foro pilota ha uno smusso di inserimento.
- Se la posizione e l'andamento della foratura profonda sono soggetti ad elevate esigenze, il foro pilota deve essere fresato o ruotato su un tornio, se possibile.

Importante:
La qualità della bussola di guida e del foro pilota ha una grande influenza sulla linea centrale del foro e sulla durata dell'utensile che segue.

Lubrorefrigerante

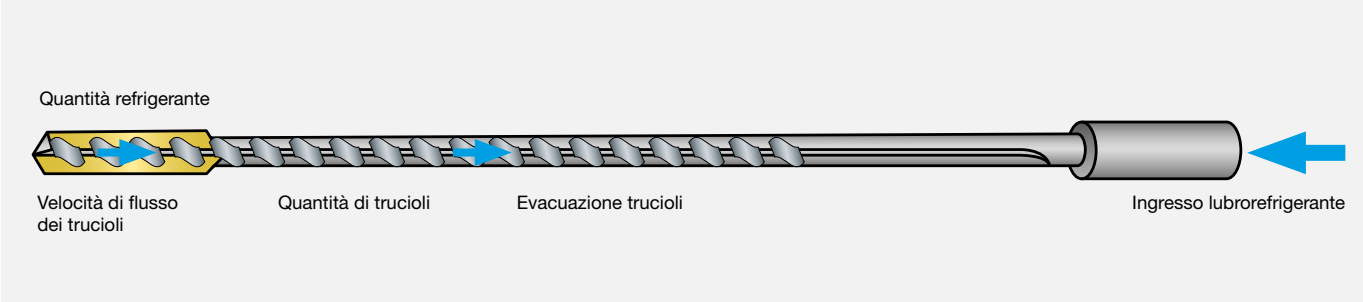
Introduzione

Il lubrorefrigerante è uno degli elementi più importanti per la foratura di rapporti LxD superiori a 15xD o, in particolare, per la foratura profonda. La scelta dell'alimentazione del lubrorefrigerante, le sue caratteristiche e le prestazioni, come pressione e portata volumetrica, sono fondamentali per le prestazioni del processo e quindi anche per la qualità del foro. Una pressione eccessiva del lubrorefrigerante può generare ondulazioni e un maggiore errore di concentricità.



Funzione

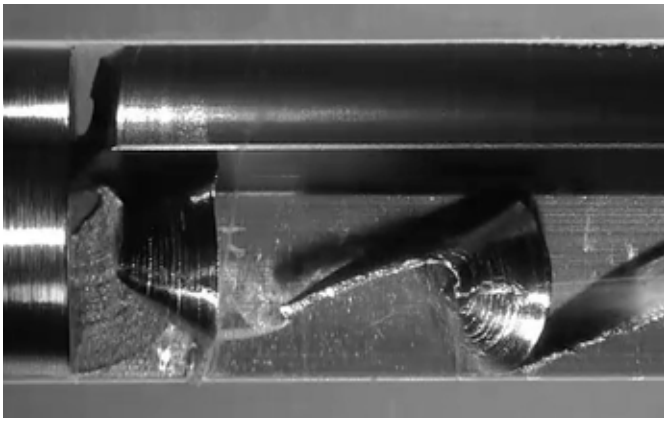
Il lubrorefrigerante (olio, emulsione, MQL, aria) rimuove i trucioli dal foro e lubrifica tutti i segmenti dell'utensile a contatto con il pezzo (forma tagliente e taglienti). La foratura avviene ad alta pressione. La pressione è tuttavia "solo" la somma della quantità di lubrorefrigerante generata e delle resistenze presenti, come la lunghezza del canale di raffreddamento o dell'utensile e la massa di trucioli. Dal punto di vista idraulico, la quantità di lubrorefrigerante e di resistenze menzionate crea una velocità di flusso che, se correttamente utilizzata, riduce al minimo il tempo di contatto dei trucioli con il tagliente, previene l'intasamento delle punte e ha quindi un effetto diretto sul processo di lavorazione. Le proprietà lubrificanti del lubrorefrigerante determinano in modo decisivo la formazione di trucioli e il prodotto superficiale. Additivi come gli additivi EP (Extreme Pressure) garantiscono la scorrevolezza dei listelli guida che possono essere sottoposti a enormi pressioni superficiali e forze di rotolamento.



Filtrazione

Per garantire processi di foratura sicuri è assolutamente necessario predisporre la purezza del lubrorefrigerante in funzione del diametro dell'utensile:

- < Ø 2,000 mass. 15 µm
- Ø 2,000 fino a ≤ Ø 6,000 mass. 40 µm
- > Ø 6,000 fino a 100 µm



Tipi di lubrorefrigerante

Olio solubile

I diversi tipi di lubrorefrigeranti miscelabili con acqua, come le composizioni minerali, sintetiche o naturali, influiscono notevolmente sul processo di perforazione, oltre al contenuto di grasso selezionato. Il contenuto di grasso per la foratura profonda è idealmente compreso tra 8 e 12 %. Valori inferiori portano a perdite di prestazioni fino a malfunzionamenti.

Proprietà emulsione*

- In caso di pressioni elevate, utilizzare additivi EP (Extreme Pressure) in emulsione per evitare la formazione di schiuma e la conseguente perdita delle proprietà lubrificanti.
- In caso di emulsione, a causa della minore viscosità, è possibile ridurre le pressioni di circa il 15 % rispetto all'olio per ottenere un lavaggio simile.
- Per i materiali con contenuto di cromo superiore al 12 % è necessario prevedere una durata inferiore a 1,5 m.

Olio

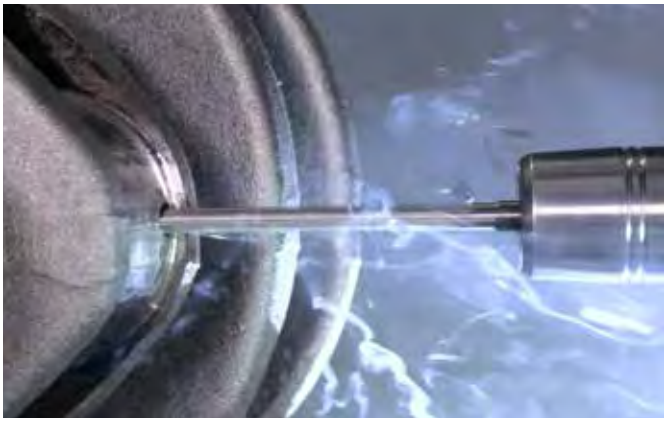
Come l'emulsione, l'olio per foratura profonda si differenzia per la sua composizione minerale, sintetica e naturale. La maggiore viscosità degli oli per foratura profonda rispetto all'emulsione determina in parte l'aumento della resistenza al refrigerante, che per gli oli a bassa viscosità comporta velocità di scorrimento troppo elevate (diametri ridotti) o, per gli oli ad alta viscosità, forze idrauliche maggiori (decisive per i diametri più grandi). La viscosità e le proprietà lubrificanti degli oli mostrano una forte reazione alla temperatura. Evitare un surriscaldamento >50 °C per poter forare in tutta sicurezza.

Proprieta dell'olio*

- < Ø 2 mm 7-10 mm^2/s
- > Ø 2 mm 10-20 mm^2/s

MQL / A secco

La foratura profonda è possibile a secco o con MQL. I rispettivi processi vengono eseguiti in funzione del materiale, del diametro e della profondità di foratura. Determinanti sono la forma, le dimensioni e la massa dei trucioli.
La lavorazione a secco è possibile solo in caso di formazione di trucioli polverosi (ad es. grafite o grezzi in MD).

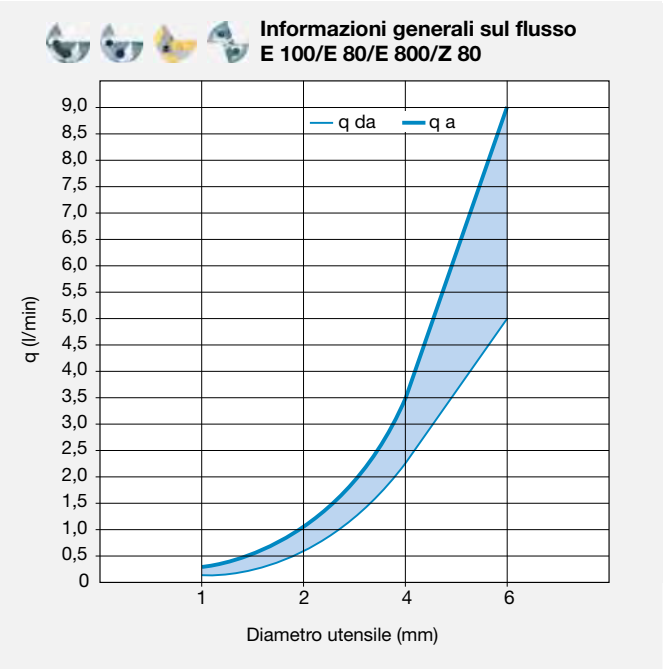


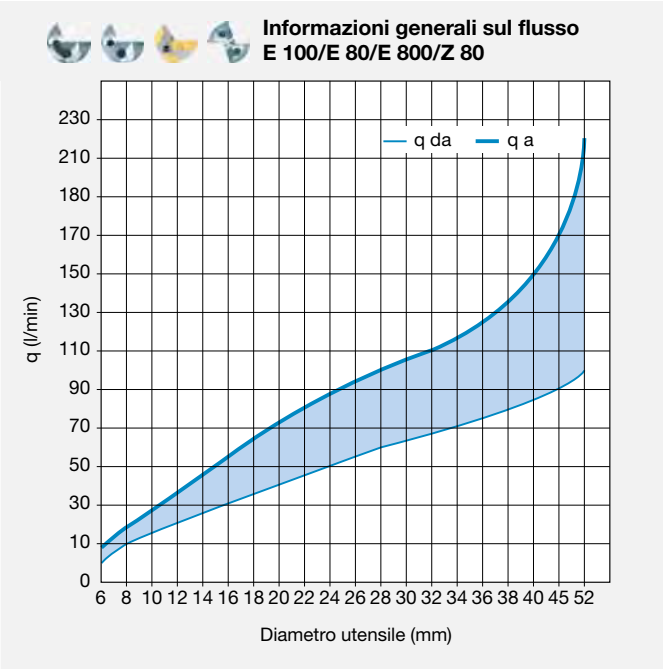
*nessuna responsabilità in caso di scostamento dalle specifiche del produttore

Dati del lubrorefrigerante

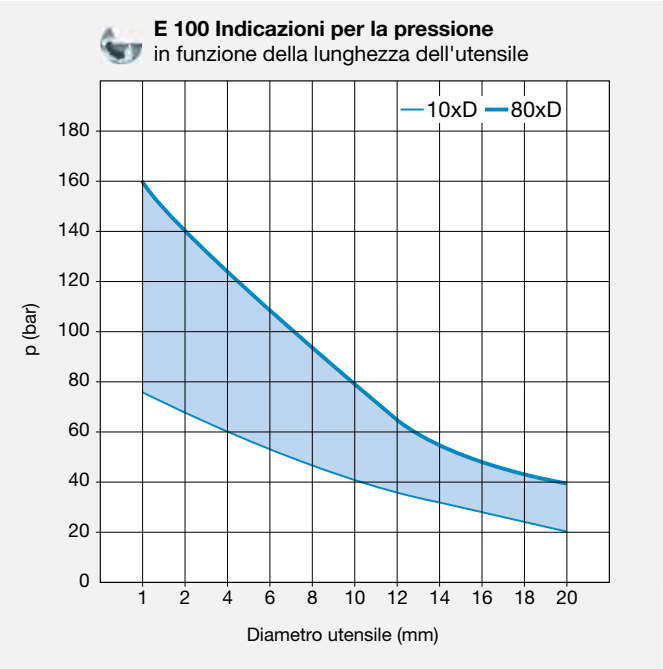
Si prega di notare:

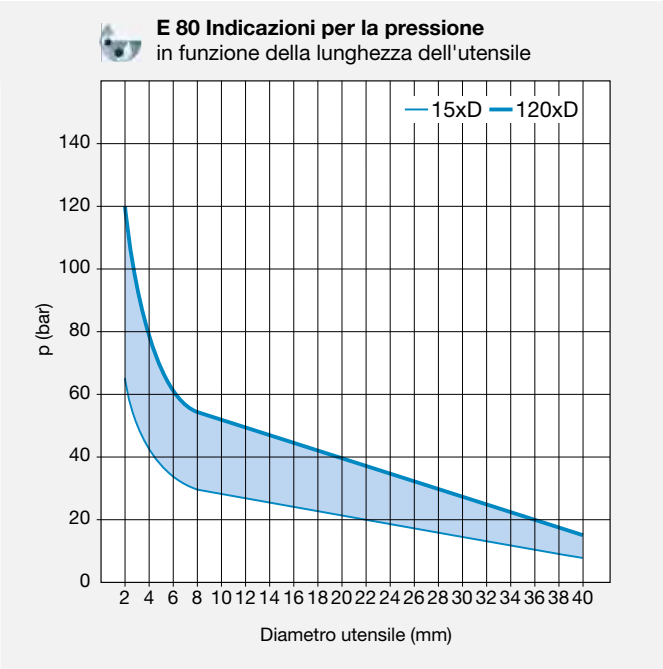
- Tutte le punte a cannone possono essere utilizzate solo con refrigerazione interna, sia ad aria, emulsione o olio.
- Tutte le punte a cannone possono essere utilizzate anche con olio come medio di refrigerazione interna.
- Se si utilizzano punte a cannone con MQL, può essere necessario un aumento della pressione per i diametri nominali più piccoli, a seconda della pressione del sistema MQL.
- Se i dati del lubrorefrigerante non sono sufficienti, è possibile lavorare con parametri di taglio ridotti. Sono possibili anche sistemi per l'aumento di pressione.
- Con l'aumento della lunghezza di una punta a cannone, ci si deve aspettare un aumento della pressione per trasportare la quantità di refrigerante necessaria attraverso i canali di refrigerazione.

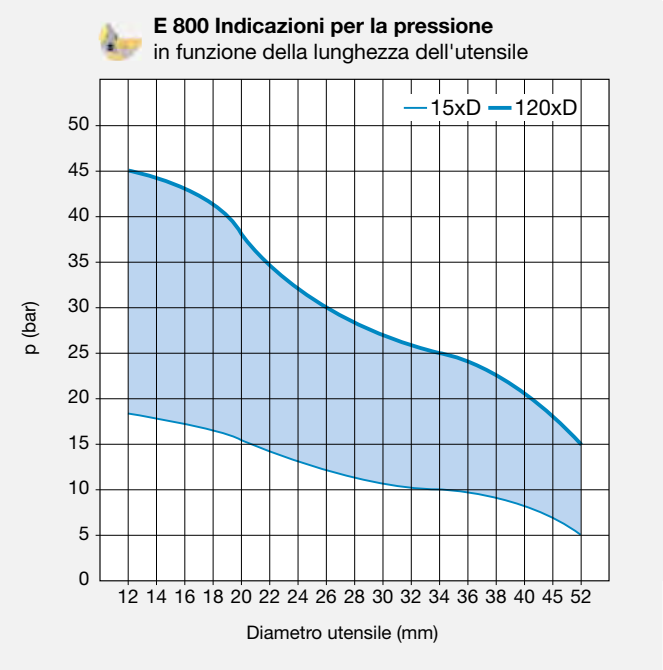


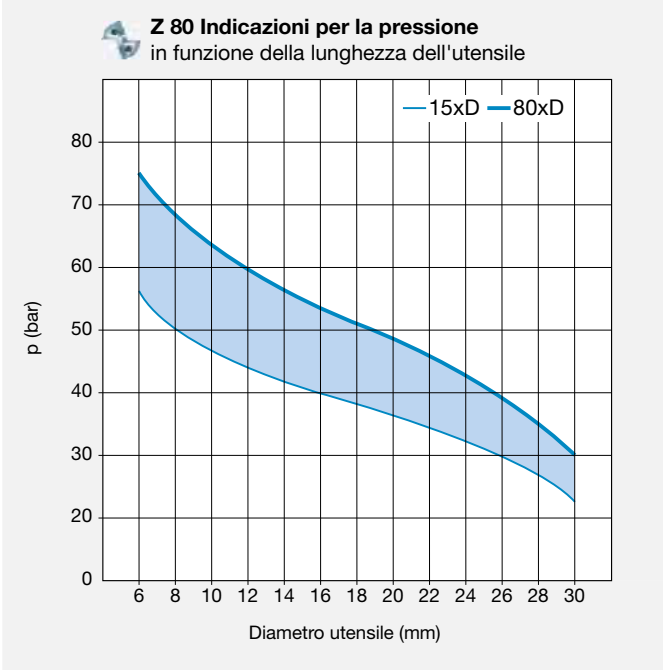


Dati del lubrorefrigerante







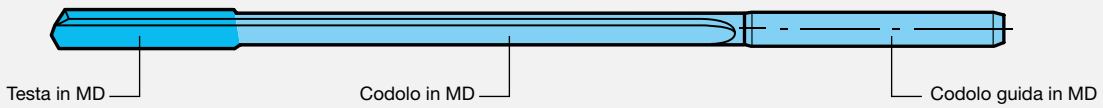


Proprietà

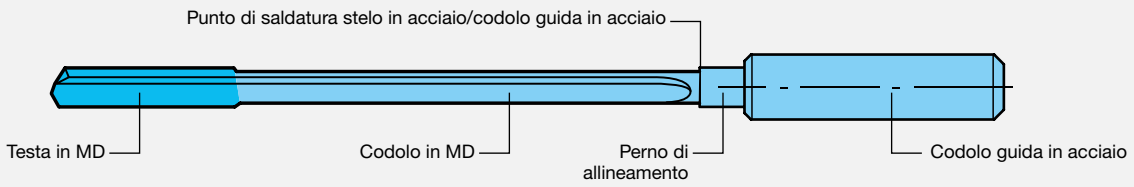
Gamma di applicazioni

	Gamma di diametri																		
	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	Lunghezza totale mass. 615 mm																		
E 100	Lunghezza totale mass. 615 mm																		
E 80	Lunghezza totale mass. 3.600 mm																		
Z 80	Lunghezza totale mass. 1.000 mm																		
E 800	Lunghezza totale mass. 3.600 mm																		

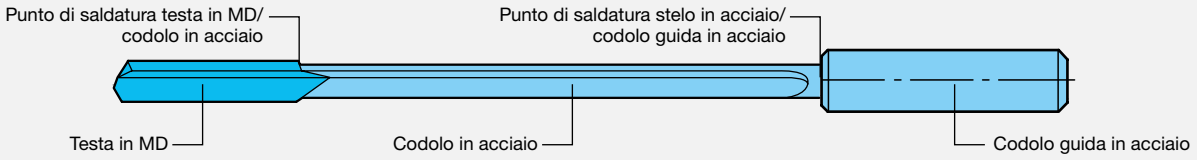
E 100 M



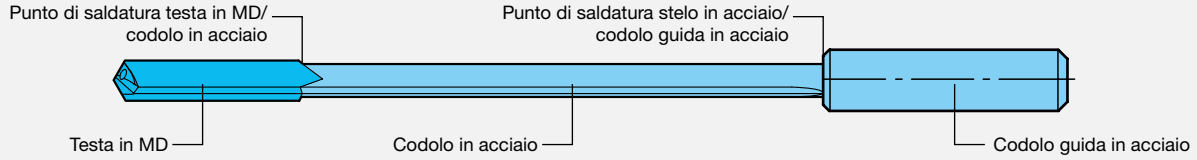
E 100



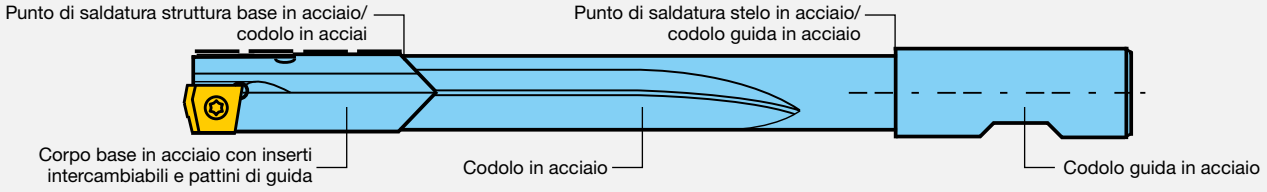
E 80



Z 80

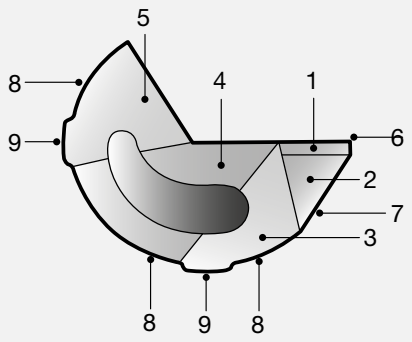


E 800

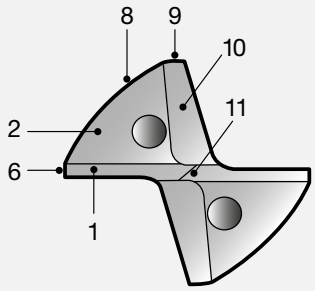


Proprietà

Caratteristiche – affilatura E



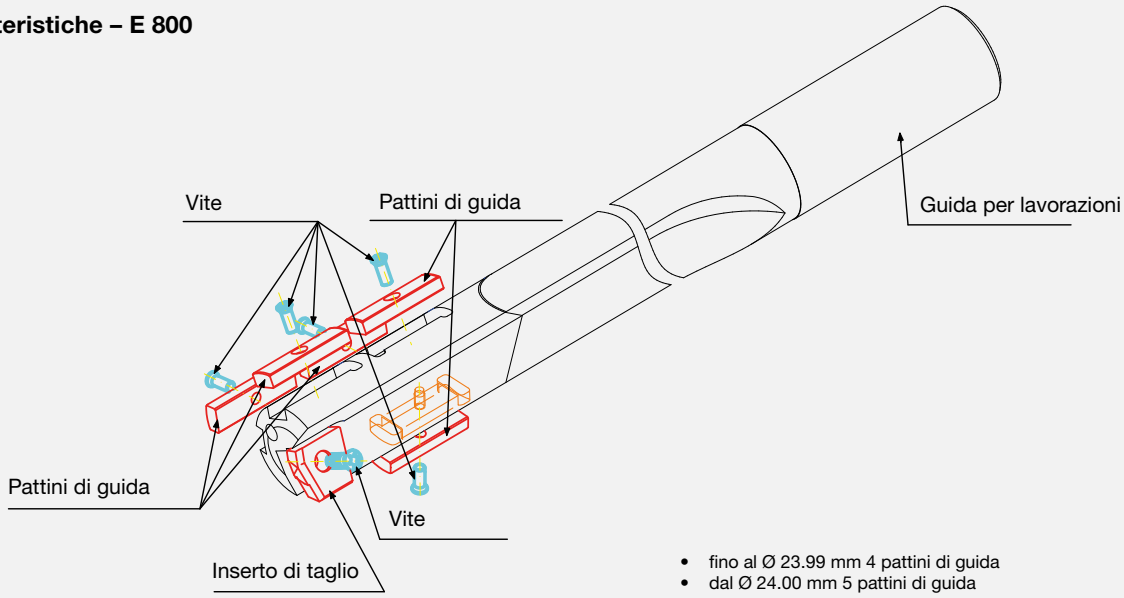
Caratteristiche – affilatura Z



Dichiarazione:

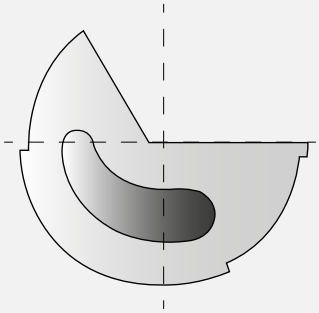
1 – Tagliente esterno 1. Fianco
2 – Tagliente esterno 2. Fianco
3 – Zona del fianco affilatura frontale
4 – Tagliente interno
5 – Vano olio
6 – Tagliente secondaria (smusso circolare)
7 – Taglienti spogliati (Vano olio)
8 – Diametro posteriore
9 – Pattini di supporto (Forme taglienti)
10 – Assottigliamento
11 – Tagliente trasversale

Caratteristiche – E 800



- fino al Ø 23.99 mm 4 pattini di guida
- dal Ø 24.00 mm 5 pattini di guida

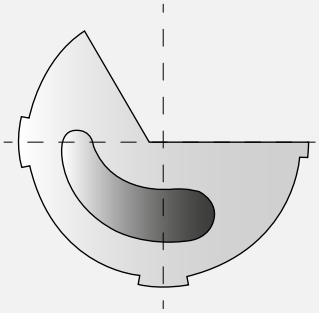
Forme taglienti standard



Forma tagliente G

Forma tagliente standard. Ideale per la maggior parte dei materiali e delle operazioni di foratura. In questa forma il diametro dell'utensile non è più misurabile dopo la produzione.

- per quasi tutti le operazioni di foratura
- per tutti i materiali
- ridotta deviazione dal centro del foro
- bassa tendenza al bloccaggio
- strette tolleranze del foro

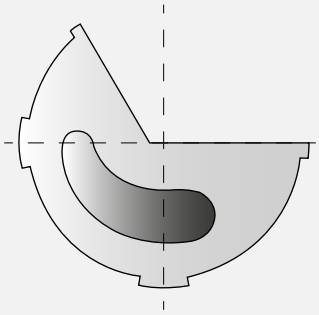


Forma tagliente C

Questa forma tagliente viene preferita in caso di tolleranze ristrette del foro in relazione al diametro e alla superficie.

- per tutti i materiali
- acciai, acciai inossidabili, alluminio
- ridotta deviazione dal centro del foro
- bassa tendenza al bloccaggio

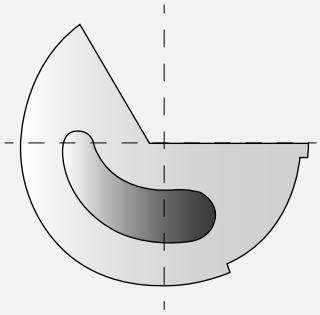
Forme taglienti speciali



Forma tagliente A

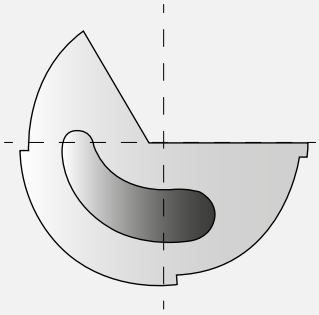
Forma tagliente per condizioni di foratura sfavorevoli o foratura trasversale. Lavorazione di materiali morbidi e/o scarso effetto lubrificante del lubrorefrigerante.
Utilizzato per tolleranze ridotte del foro, nonché come guida per teste di taglio troppo lunghe.

- alluminio
- rame



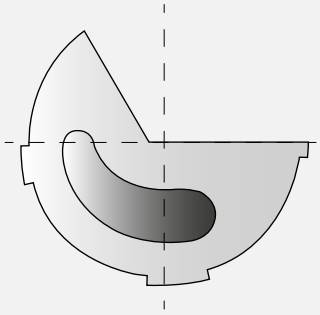
Forma tagliente D

Questa forma tagliente viene utilizzata quasi esclusivamente per materiali morbidi come GG, grafite ecc., soprattutto in combinazione con tolleranze ristrette del foro.



Forma tagliente E

Adatto a tutti i materiali, ma per tolleranze del foro maggiori.



Forma tagliente F

Forma tagliente per materiali più morbidi, attrito ridotto e guida stabile, come ad esempio l'alluminio.

Questa è solo una piccola parte delle nostre forme taglienti speciali. Altre forme taglienti specifiche per la vostra applicazione sono disponibili su richiesta.

Punte a cannone standard

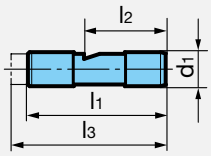
Qui di seguito trovate una parte delle bussole che abbiamo disponibili. Naturalmente noi produciamo anche bussole di massima precisione a disegno del cliente.

Attenzione! Per E 100 sono necessarie bussole con perno di allineamento. Informazioni a richiesta.

Bussole per E 80

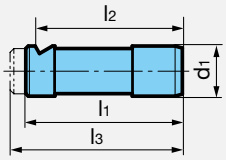
Bussole per forature profonde

1



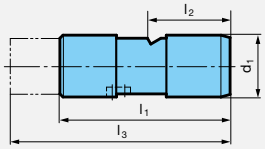
Codice	d_1	l_1	l_2	l_3
1.1	10	40	24	-
1.2	10	40	24	45
1.3	10	40	24	55
1.4	16	45	31,2	-
1.5	25	70	34	-
1.6	25	70	34	78

2



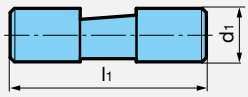
Codice	d_1	l_1	l_2	l_3
2.1	16	50	47	-
2.2	16	50	47	55
2.3	16	50	47	70

3



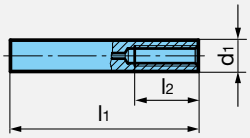
Codice	d_1	l_1	l_2	l_3
3.1	25	70	34	-
3.2	25	70	34	100
3.3	25	70	34	105

4



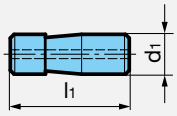
Codice	d_1	l_1
4.1	19,05	70
4.2	12,7	70
4.3	25,4	70
4.4	31,75	70
4.5	38,1	70

5



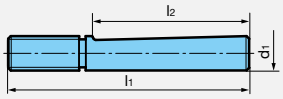
Codice	d_1	l_1	l_2
5.1	10	60	20
5.2	16	80	28
5.3	25	100	50
5.4	10	100	20
5.5	10	110	24

6



Codice	d_1	l_1
6.1	12,7	38
6.2	19,05	70
6.3	38,1	70

7

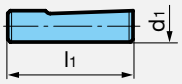


Codice	d_1	l_1	l_2
7.1	16	112	73
7.2	20	126	82

Bussole a DIN 1835

9

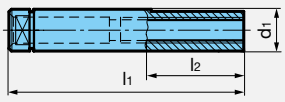
Forma HE



Codice	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

Bussole a VDI-progetto

12

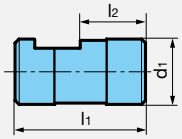


Codice	d_1	l_1	l_2
12.1	10	68	40
12.2	16	90	40
12.3	25	112	50

utilizzabile anche per macchine per foratura profonda

Bussole a sistema Speed-Bit

13



Codice	d_1	l_1	l_2
13.1	16	40	14
13.2	25	50	25
13.3	35	60	20

utilizzabile anche per macchine per foratura profonda

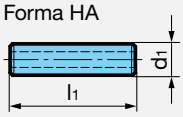
Punte a cannone standard

Bussole per E 80

Bussole aDIN 6535

10

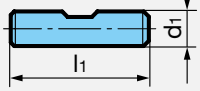
Forma HA



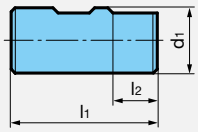
Codice	d_1	l_1
10.1	8	36
10.2	10	40
10.3	12	45
10.4	16	48
10.5	20	50
10.6	25	56
10.7	32	60
10.8	25	70
10.9	40	70

8

Forma HB



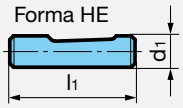
desde codice 8.6



Codice	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

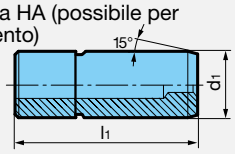
Forma HE



Codice	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

sim. forma HA (possibile per calettamento)

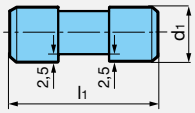
16



Codice	d_1	l_1
16.1	10	50
16.2	16	64
16.3	20	70
16.4	25	81
16.5	32	92

sim. forma HE

17



Codice	d_1	l_1
17.1	19,05	70
17.2	25,4	70
17.3	31,75	70
17.4	38,1	70

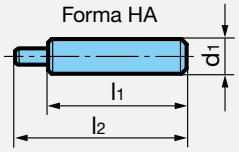
utilizzabile anche per macchine per foratura profonda

Bussole per E 100

Bussole con perni di allineamento a DIN 6535

18

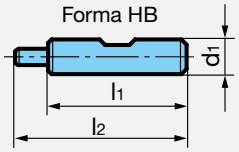
Forma HA



Codice	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

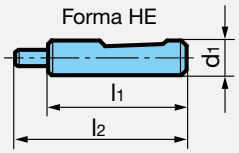
Forma HB



Codice	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

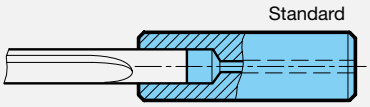
Forma HE



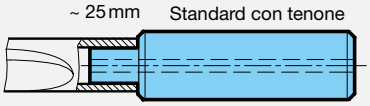
Codice	d_1	l_1	l_2
4	4	28	40
6	6	36	51
10	10	40	55
12	12	45	60
16	16	48	63

Varianti di produzione delle bussole di serraggio in punte a cannone con codolo a tubo

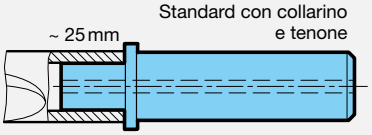
Prevalentemente per Ø nominale < Ø bussola
(la differenza deve essere di circa 6 mm):
codolo a tubo si accoppia alla bussola di serraggio



Prevalentemente per Ø nominale ≠ Ø bussola
(max fino a pareggio):
codolo tubo di accoppia tramite il tenone



Prevalentemente per Ø nominale > Ø bussola:
codolo a tubo si accoppia tramite tenone,
il cui Ø interno
è > al Ø della bussola, e chiude a livello con il collarino



Riaffilatura e ricopertura

Anche gli utensili moderni ad alte prestazioni si usurano ad un certo punto a causa degli enormi carichi che devono sopportare. Hartner ripristina le prestazioni degli utensili mediante una riaffilatura professionale.

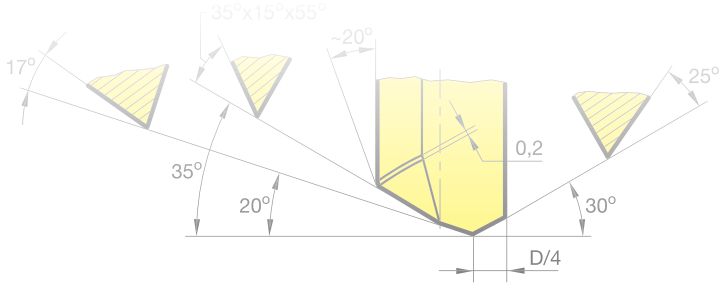
Utilizzando gli stessi macchinari in tutti i centri di riaffilatura, si garantisce uno standard di qualità uniforme.

Le punte a cannone in MDI o le punte a cannone con testa saldobrasata possono essere riaffilate fino a 10 volte, a seconda della lunghezza della testa e della larghezza dell'usura.

Osservare i seguenti punti:

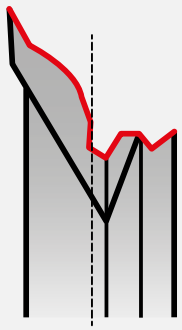
- L'utensile deve essere riaffilato in modo pulito, cioè privo di tracce di usura.
- Dopo la riaffilatura, l'utensile è lucido sul lato frontale.
- Su richiesta, gli utensili possono essere rivestiti.
- Le punte a cannone con testa saldobrasata possono essere ricondizionate in caso di forte usura o danneggiamento.
- La concentricità delle punte con perni di allineamento viene controllata ed eventualmente adattata dopo la riaffilatura.
- Valori indicativi per lunghezza minima della testa per riaffilatura per garantire i requisiti di qualità del foro:

Gamma di diametri	min. lunghezza testa
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

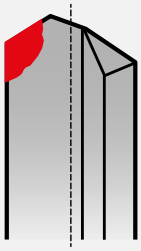
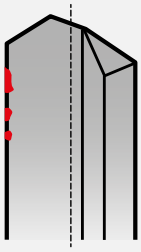


	-	+	+	
1	- 25°	+ 30°	0°	
2	+ 20°	+ 17°	0°	D/4
3	+ 35°	+ 15°	+ 55°	

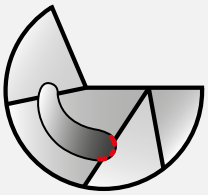
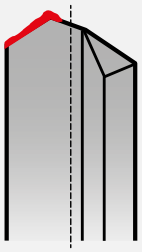
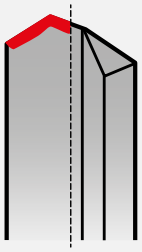
Istruzioni per l'uso / Risoluzione dei problemi

Errore	Possibile causa		Contromisure
1. Rottura utensile durante l'operazione di centraggio	Utensile	- tagliente smussato - affilatura inadeguata - avanzamento troppo elevato - centraggio con corsa rapida - utensile danneggiato (rotture ecc.) - rapporto lunghezza x diametro troppo alto (LxD)	- riaffilare - correggere l'affilatura - ridurre l'avanzamento - selezionare avanzamento per il centraggio - riaffilare, se occorre nuovo utensile - utilizzare più utensili / utilizzare sostegno
	Foro pilota	- diametro troppo piccolo - diametro troppo grande - qualità del foro troppo scarsa (utensile usurato) - metodo di inserimento errato	- utensile diverso (diametro maggiore) - utensile diverso (Ø inferiore) - utilizzare utensile nuovo - correggere programma
	Bussola di guida	- usurata - rottura - pressione di contatto troppo bassa / si solleva durante la foratura e i trucioli si incastrono - spazio tra bussola e pezzo / trucioli si incastrono / intasamenti trucioli	- nuova bussola di guida - nuova bussola di guida - aumentare pressione di contatto - correggere posizione della bussola di guida
	Pezzo	- serraggio non adeguato	- serraggio corretto del pezzo
	Lubrorefrigerante	- pressione lubrorefrigerante troppo bassa, intasamento truccioli - medio troppo contaminato --> intasamento	- aumentare pressione del lubrorefrigerante - controllare filtraggio
2. Rottura dell'utensile sul codolo (Bussole di serraggio)	Utensile	- rapporto lunghezza x diametro troppo alto (LxD)	- utilizzare più utensili / utilizzare sostegno
	Pezzo	- posizione asse del foro non corretta	- controllare serraggio pezzo
	Macchina	- offset tra macchina e pezzo - profondità foro troppo grande (errore di programmazione)	- controllare offset e se occorre correggerlo - controllare programmazione

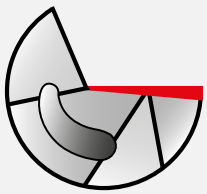
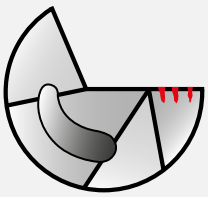
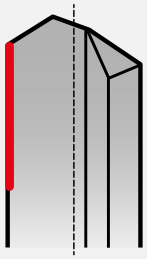
Istruzioni per l'uso / Risoluzione dei problemi

Errore	Possibile causa		Contromisure
3. Tubo piegato / spostato	Utensile	- rapporto lunghezza x diametro troppo alto (LxD) - forza di taglio troppo elevata (momento torcente spec.)	- utilizzare più utensili / utilizzare sostegno - ridurre dati di taglio
	Lubrorefrigerante	- pressione lubrorefrigerante troppo bassa, intasamento truccioli	- aumentare pressione del lubrorefrigerante
4. Rottura dell'utensile / si sfalda 	Utensile	- surriscaldato durante l'affilatura - tagliente laterale troppo smussato (smusso circolare) - l'utensile non è fissato correttamente, si muove assialmente - utensile si incastra, si sfalda durante la corsa di ritorno - durata massima dell'utensile è superata - volume di truciolo asportato troppo alto - taglio interrotto - errore di circolarità troppo grande	- correggere parametri durante l'affilatura - controllare spigoli arrotondati del tagliente secondario - ottimizzare serraggio dell'utensile - cambiare geometria o forma tagliente - accorciare gli intervalli di cambio utensile - ridurre dati di taglio - ridurre valori di avanzamento - controllare circolarità / se possibile correggerla
	Foro pilota	- diametro troppo grande (gioco troppo grande)	- utensile diverso (Ø inferiore)
	Bussola di guida	- diametro troppo grande (gioco troppo grande)	- nuova bussola di guida (Ø inferiore)
	Pezzo	- serraggio insufficiente	- serraggio corretto del pezzo
5. Rotture sullo smusso circolare 	Utensile	- taglio interrotto	- ridurre valori di avanzamento
	Foro pilota	- diametro troppo grande (gioco troppo grande)	- utensile diverso (Ø inferiore)
	Bussola di guida	- diametro troppo grande (gioco troppo grande) - distanza tra bussola di guida e pezzo troppo grande	- bussola di guida (Ø inferiore) - ridurre distanza (idealmente la bussola di guida dovrebbe esssere a filo)
	Pezzo	- condizioni instabili / insufficiente serraggio del pezzo - fori trasversali non tappati (perdita di lubrorefrigerante)	- serraggio corretto del pezzo - tappare i fori trasversali (Tappi di chiusura Hartner)
	Lubrorefrigerante	- lubrorefrigerante sfavorevole per materiale abrasivo	- scegliere un lubrorefrigerante idoneo, aumentare il contenuto di olio dell'emulsione / utilizzare l'olio

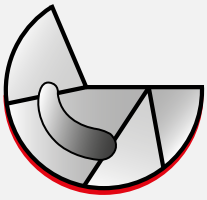
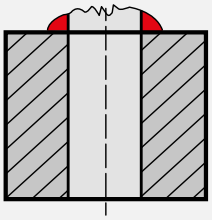
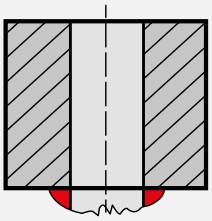
Istruzioni per l'uso / Risoluzione dei problemi

Errore	Possibile causa		Contromisure
6. Rotture sul canale di refrigerazione 	Utensile	- angolo spoglia inferiore troppo piccolo - angolo del vano olio troppo stretto (troppo poco flusso d'olio) - accumulo di materiale sulla fronte	- aumentare angolo spoglia inferiore - aumentare / adattare angolo per vano olio - rivestire utensile se necessario
	Lubrorefrigerante	- lubrorefigerante non idoneo, olio non idoneo (viscosità) o emulsione magra (accumulo di materiale) - lubrorefrigerante impuro a causa di piccoli trucioli o altre contaminazioni	- scegliere un lubrorefrigerante idoneo, aumentare il contenuto di olio dell'emulsione / utilizzare l'olio - controllare filtraggio del lubrorefrigerante, se necessario migliorare / perfezionare
7. Tagliente di riporto 	Utensile	- velocità di taglio troppo bassa - riduzione / arrotondamento tagliente troppo grande - taglienti lucidi - materiale da taglio poco adatto - rivestimento non idoneo	- ridurre velocità di taglio - diminuire riduzione / arrotondamento del tagliente - rivestire utensile se necessario - materiale da taglio adatto - scegliere un altro rivestimento
	Lubrorefrigerante	- lubrorefrigerante non idoneo, olio non idoneo (viscosità) o emulsione magra	- scegliere un lubrorefrigerante idoneo, aumentare il contenuto di olio dell'emulsione / utilizzare l'olio
8. Forte usura per craterizzazione 	Utensile	- velocità di taglio troppo elevata - forma del truciolo poco adatta - materiale da taglio poco adatto	- ridurre velocità di taglio - correggere l'affilatura - scegliere materiale da taglio idoneo, se necessario rivestimento
	Lubrorefrigerante	- lubrorefrigerante non idoneo, olio non idoneo (viscosità) o emulsione magra - pressione lubrorefrigerante / portata di flusso troppo bassa	- scegliere un lubrorefrigerante idoneo, aumentare il contenuto di olio dell'emulsione / utilizzare l'olio - aumentare pressione lubrorefrigerante / portata di flusso

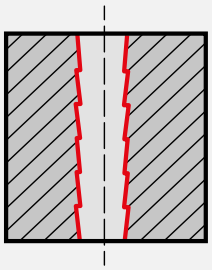
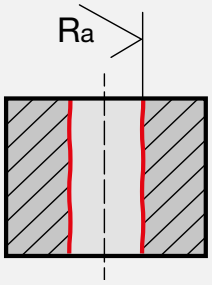
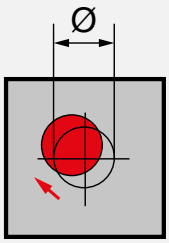
Istruzioni per l'uso / Risoluzione dei problemi

Errore	Possibile causa		Contromisure
9. Usura sul fianco 	Utensile	- velocità di taglio troppo elevata - Truccioli frenano troppo forte sulla zona di taglio - avanzamento troppo basso - angolo spoglia inferiore troppo piccolo	- ridurre velocità di taglio - rimuovere rivestimento sulla zona di taglio - aumentare l'avanzamento - aumentare angolo spoglia inferiore
	Lubrorefrigerante	- lubrorefrigerante non idoneo, olio non idoneo (viscosità) o emulsione magra	- scegliere un lubrorefrigerante idoneo, aumentare il contenuto di olio dell'emulsione / utilizzare l'olio
10. Usura delle flange / scheggiatura 	Utensile	- elevata forza di taglio - taglio interrotto - metallo duro errato - temperatura di lavoro troppo alta	- ridurre dati di taglio - ridurre l'avanzamento - selezionare altro metallo duro - ridurre dati di taglio / cambiare geometria (angolo vano olio)
	Lubrorefrigerante	- lubrorefrigerante non idoneo, olio non idoneo (viscosità) o emulsione magra (temperature troppo elevate a causa di una lubrificazione insufficiente)	- scegliere un lubrorefrigerante idoneo, aumentare il contenuto di olio dell'emulsione / utilizzare l'olio
11. Usura dello smusso circolare 	Utensile	- errore di circolarità troppo grande - assottigliamento troppo piccolo - riduzione / Arrotondamento tagliente troppo grande - angolo del vano olio non idoneo (troppo poco flusso d'olio)	- controllare circolarità / se possibile correggerla - aumentare l'assottigliamento - diminuire riduzione / arrotondamento del tagliente - adattare affilatura vano olio (angolo / fissare / scanalatura / 2. superficie)
	Pezzo	- condizioni instabili / insufficiente serraggio del pezzo	- serraggio corretto del pezzo
	Lubrorefrigerante	- lubrorefrigerante non idoneo, olio non idoneo (viscosità) o emulsione magra	- scegliere un lubrorefrigerante idoneo, aumentare il contenuto di olio dell'emulsione / utilizzare l'olio

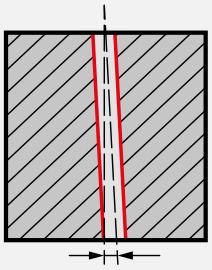
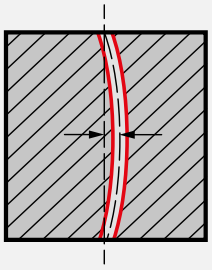
Istruzioni per l'uso / Risoluzione dei problemi

Errore	Possibile causa		Contromisure
12. Usura della forma tagliente 	Utensile	- errore di circolarità troppo grande - taglio interrotto - metallo duro errato - assottigliamento troppo piccolo - rivestimento errato	- controllare circolarità / se possibile correggerla - ridurre valori di avanzamento - correggere selezione del metallo duro - aumentare l'assottigliamento - correggere selezione del rivestimento
	Pezzo	- condizioni instabili / insufficiente serraggio del pezzo	- serraggio corretto del pezzo
	Lubrorefrigerante	- lubrorefrigerante sfavorevole per materiale abrasivo	- scegliere un lubrorefrigerante idoneo, aumentare il contenuto di olio dell'emulsione / utilizzare l'olio
13. Bava di foratura troppo forte 	Utensile	- avanzamento troppo alto durante l'operazione di centraggio - durata massima dell'utensile è superata (utensile smussato) - riduzione / arrotondamento tagliente troppo grande - angolo spoglia inferiore troppo piccolo	- ridurre avanzamento durante l'operazione di centraggio - accorciare gli intervalli di cambio utensile - diminuire riduzione / arrotondamento del tagliente - aumentare angolo spoglia inferiore
	Foro pilota	- diametro troppo grande (gioco troppo grande)	- utensile diverso (Ø inferiore)
	Bussola di guida	- diametro troppo grande (gioco troppo grande)	- altra bussola di guida (Ø inferiore)
14. Bava di foratura forte 	Utensile	- avanzamento troppo alto durante l'operazione di centraggio - durata massima dell'utensile è superata (utensile smussato) - riduzione / arrotondamento tagliente troppo grande	- ridurre avanzamento durante l'operazione di foratura - accorciare gli intervalli di cambio utensile - diminuire riduzione / arrotondamento del tagliente

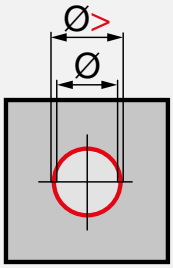
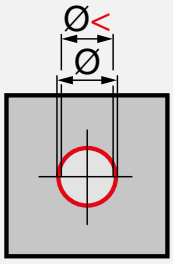
Istruzioni per l'uso / Risoluzione dei problemi

Errore	Possibile causa		Contromisure
15. Utensile produce gradini 	Utensile	- la testa della punta non è posizionata assialmente diritta sul tubo di foratura (E 80 / E 800) - coassialità testa-codolo troppo grande	- saldare la testa nuovamente / nuovo utensile - controllare coassialità / utilizzare nuovo utensile
	Macchina	- spostamento dell'asse tra il supporto del mandrino e le bussole di guida o foro pilota troppo grande	- correggere spostamento dell'asse, l'ottimale è un offset di 0,02 mm
	Lubrorefrigerante	- pressione del lubrorefrigerante troppo alta	- ridurre pressione del lubrorefrigerante
16. Scarsa qualità superficiale 	Utensile	- tagliente rotto - smusso del tagliente secondaria (smusso circolare) troppo largo - smusso di invito insufficiente - troppa poca pressione sul pattine di guida posteriore - errore di circolarità troppo grande - rivestimento errato	- riaffilare utensile - correggere geometria dell'utensile - ottimizzare smusso di invito - aumentare pressione tramite geometria di affilatura oppure smusso di pelatura/ raggio d'angolo - controllare / correggere circolarità - correggere selezione del rivestimento
	Pezzo	- condizioni instabili / insufficiente serraggio del pezzo	- serraggio corretto del pezzo
	Lubrorefrigerante	- tipo lubrorefrigerante / emulsione non sufficiente - quantità lubrorefrigerante insufficiente	- se possibile utilizzare olio - aumentare quantità del lubrorefrigerante(Volume / pressione)
17. Offset 	Utensile	- errore di circolarità troppo grande	- controllare circolarità / se possibile correggere
	Foro pilota	- operazione di centraggio su superficie inclinata - geometria utensile errata	- fare foro pilota con fresa - ottimizzare LxD / controllare Ø dell'utensile
	Bussola di guida	- operazione di centraggio su superficie inclinata - bussola di guida usurata	- utilizzare bussola di guida adattata - utilizzare nuova bussola di guida
	Pezzo	- condizioni instabili / insufficiente serraggio del pezzo	- serraggio corretto del pezzo
	Macchina	- spostamento dell'asse tra il supporto del mandrino e le bussole di guida o foro pilota troppo grande	- correggere spostamento dell'asse, l'ottimale è un offset di 0,02 mm

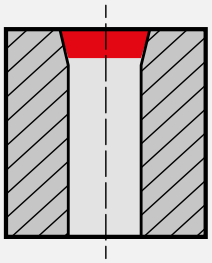
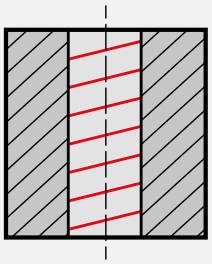
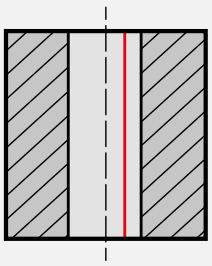
Istruzioni per l'uso / Risoluzione dei problemi

Errore	Possibile causa		Contromisure
18. Ampio percorso di foratura	Utensile	- tagliente smussato - affilatura inadeguata - forma tagliente errata - avanzamento troppo elevato - guida insufficiente - errore di circolarità troppo grande	- riaffilare - correggere l'affilatura - correggere forma tagliente - ridurre l'avanzamento - utilizzare la sezione lunga della testa - controllare circolarità / se possibile correggere
	Foro pilota	- spostamento del foro pilota - foro pilota non circolare	- controllare foro pilota se necessario utensile diverso - adattare utensili pilota
	Bussola di guida	- bussola di guida difettosa / bussola di guida non idonea per supporto bussola	- sostituire la bussola di guida se necessario anche il supporto della bussola
	Pezzo	- condizioni instabili / insufficiente serraggio del pezzo - posizione di foratura sfavorevole / pareti molto sottili - pezzo surriscaldato (forte aumento della temperatura)	- serraggio corretto del pezzo - considerare posizione di foratura / se necessario cambiarla - ridurre dati di taglio
	Macchina	- spostamento dell'asse tra il supporto del mandrino e le bussole di guida o foro pilota troppo grande	- correggere spostamento dell'asse, l'ottimale è un offset di 0,02 mm
19. Insoddisfacente rettilineità del foro	Utensile	- tagliente smussato - affilatura inadeguata - forma tagliente errata - avanzamento troppo elevato - guida insufficiente - errore di circolarità troppo grande - rivestimento errato - rapporto lunghezza x diametro troppo alto (LxD)	- riaffilare - correggere l'affilatura - correggere forma tagliente - ridurre l'avanzamento - utilizzare la testata lunga - controllare circolarità / se possibile correggere - correggere selezione del rivestimento - utilizzare più utensili / utilizzare sostegno
	Pezzo	- condizioni instabili / insufficiente serraggio del pezzo - posizione di foratura sfavorevole / pareti molto sottili - pezzo surriscaldato (forte aumento della temperatura)	- serraggio corretto del pezzo - considerare posizione di foratura / se necessario cambiarla - ridurre dati di taglio
	Macchina	- pezzo senza rotazione in senso antiorario - spostamento dell'asse tra il supporto del mandrino e le bussole di guida o foro pilota troppo grande	- se meccanicamente possibile utilizzare foratura convenzionale - correggere spostamento dell'asse, l'ottimale è un offset di 0,02 mm

Istruzioni per l'uso / Risoluzione dei problemi

Errore	Possibile causa		Contromisure
20. Foro troppo grande 	Utensile	- troppa pressione sul tagliente laterale - errore di circolarità troppo grande	- cambiare geometria dell'affilatura / ridurre pressione sul tagliente secondario (cambiare D / 4 in D / 3) - controllare circolarità / se possibile correggerla
	Lubrorefrigerante	- pressione del lubrorefrigerante troppo alta	- ridurre pressione del lubrorefrigerante
21. Foro troppo stretto 	Utensile	- poca pressione sul tagliente laterale - forma tagliente errata - utensile riaffilato troppe volte (spesso), assottigliamento	- cambiare geometria dell'affilatura / aumentare pressione sul tagliente secondario (cambiare D / 3 in D / 4) - correggere forma tagliente (forma „C") - utilizzare utensile nuovo
22. Intasamento trucioli / utensile si blocca	Utensile	- il rapporto tra velocità di taglio e avanzamento non è adatto - geometria affilatura non idonea - truciolo continuo - truciolo continuo con utensili rivestiti - angolo del vano olio non idoneo (troppo poco flusso d'olio) - serraggio utensile non corretto (perdità lubrorefrigerante)	- correggere / adattare rapporto velocità di taglio-avanzamento - adattare geometria dell'affilatura per rottura ottimale dei trucioli, - se necessario programmare il pecking - rimuovere rivestimento sulla zona di taglio - adattare affilatura vano olio (angolo / fissare / scanalatura / 2. superficie) - ottimizzare serraggio dell'utensile
	Lubrorefrigerante	- quantità lubrorefrigerante insufficiente	- aumentare quantità del lubrorefrigerante(Volume / pressione)

Istruzioni per l'uso / Risoluzione dei problemi

Errore	Possibile causa		Contromisure
23. Ampia larghezza di centraggio 	Utensile	- avanzamento troppo alto durante l'operazione di centraggio	- ridurre avanzamento durante l'operazione di centraggio
	Foro pilota	- il foro non è diritto / non è circolare	- controllare foro pilota, se necessario utilizzare nuovo utensile
	Bussola di guida	- bussola di guida difettosa / bussola di guida non idonea per alloggiamento bussola	- cambiare bussola di guida, se necessario anch l'alloggiamento della bussola
	Pezzo	- condizioni instabili / serraggio pezzo insufficiente, vibrazioni durante il centraggio	- serraggio corretto del pezzo
24. Utensile crea fori non circolari 	Utensile	- volume di truciolo asportato troppo alto - tagliente smussato - la testa della punta non è posizionata assialmente diritta sul tubo di foratura (E 80 / E 800) - coassialità testa-codolo troppo grande - forma tagliente errata	- ridurre dati di taglio - riaffilare utensile / se necessario cambiarlo - saldare la testa nuovamente / nuovo utensile - controllare coassialità / utilizzare nuovo utensile - correggere forma tagliente
	Pezzo	- condizioni di lavorazione instabili / serraggio pezzo insufficiente, vibrazioni durante il centraggio	- serraggio corretto del pezzo / Inserire lo smorzatore di vibrazioni
25. Rigature in tirata 	Utensile	- avanzamento troppo elevato durante la corsa di ritorno - taglienti troppo affilati - errore di circolarità troppo grande - forma tagliente errata	- ridurre l'avanzamento - arrotondamento taglienti - controllare circolarità / se possibile correggerla - correggere forma tagliente
	Pezzo	- condizioni instabili / insufficiente serraggio pezzo insufficiente	- serraggio corretto del pezzo
	Macchina	- spostamento dell'asse tra il supporto del mandrino e le bussole di guida o foro pilota troppo grande	- correggere spostamento dell'asse, l'ottimale è un offset di 0,02 mm

HARTNER

Precision Cutting Tools

MICROPUNTE

in metallo duro e HSS-E-PM
lucide e ricoperte

Micropunte

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	Profondità di foro	d1/mm	Articolo n.	Pagina
Micropunte senza canali di refrigerazione															
●	●	●	●	○		DIN 1899	N	HSS-E-PM	◯	destra	cil.	~5xD	0,050 - 1,900	**87011**	329
●	●	●	●	○		DIN 1899	N	HSS-E-PM	◯	sinistro	cil.	~5xD	0,160 - 1,450	**87016**	331
●	●	●	●	○		DIN 1899	N	HSS-E-PM	(T)	destra	cil.	~5xD	0,200 - 1,500	**84810**	332
●		●				Norma di fab.	N	MDI	(A)	destra	cil.		0,100 - 3,000	**86402**	333
●	●	●	○	○		Norma di fab.	N	MDI	(A)	destra	cil.	4xD	0,500 - 3,000	**86400**	334
●	○	●	○	○	○	Norma di fab.	N	MDI	◯	destra	cil.	~5xD	0,200 - 1,300	**89281**	335
●	●	●	○	○		Norma di fab.	N	MDI	(A)	destra	cil.	7xD	0,500 - 3,000	**86401**	336
Micropunte con canali di refrigerazione															
●	●	●	○	○		Norma di fab.	N	MDI	(A)	destra	cil.	5xD	1,400 - 3,000	**86405**	337
●	●	●	○	○		Norma di fab.	N	MDI	(A)	destra	cil.	8xD	1,400 - 3,000	**86408**	338
●	●	●	○	○		Norma di fab.	N	MDI	(A)	destra	cil.	15xD	1,400 - 3,000	**86412**	339

HARTNER

Micropunte senza canali di refrigerazione

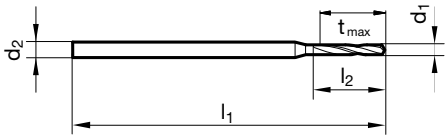
Articolo n. 87011

P	M	K	N	S	H
●	●	●	●	○	

HSS-E-PM | ○ | N | ~5xD | DIN 1899 | 118° | 0/-0,004 | R | Cyl

affilatura su piani • < Ø 0,15 mm acciaio HSS legato al Co • con codolo rinforzato
acciai legati in alta percentuale

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



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

Micropunte senza canali di refrigerazione

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				

HARTNER

Micropunte senza canali di refrigerazione

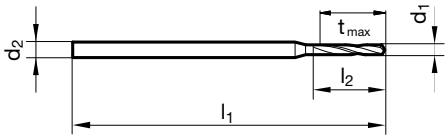
Articolo n. 87016

P	M	K	N	S	H
●	●	●	●	○	

HSS-E-PM | N | ~5xD | DIN 1899 | 118° | 0/-0,004 | L | Cyl

affilatura su piani • < Ø 0,15 mm acciaio HSS legato al Co • con codolo rinforzato
acciai legati in alta percentuale

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



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				

Micropunte senza canali di refrigerazione

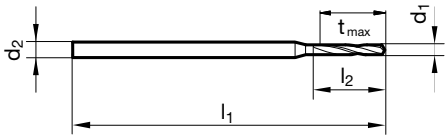
Articolo n. 84810

P	M	K	N	S	H
●	●	●	●	○	

HSS-E-PM | T | N | ~5xD | DIN 1899 | 118° | 0/-0,004 | R | Cyl

affilatura su piani • con codolo rinforzato • massima resistenza all'usura
acciai legati in alta percentuale

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



d1 mm	d2 mm	l1 mm	l2 mm	d1 mm	d2 mm	l1 mm	l2 mm
0,200	1,000	25,000	1,500	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

Micropunte senza canali di refrigerazione

Articolo n. 86402

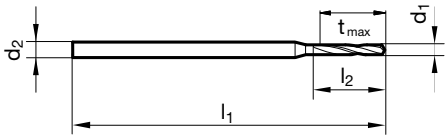
P	M	K	N	S	H
•		•			

VHM | A | N | WN | 140° | h7 | R | Cyl

assott. del nocc. ≥ Ø 0,800 • affilatura su piani • unitaria codolo 3 mm • lunghezza unitaria 38 mm totale

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • ghise • lavorazione delle schede di circuiti elettronici

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



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

HARTNER

Micropunte senza canali di refrigerazione

Articolo n. 86400

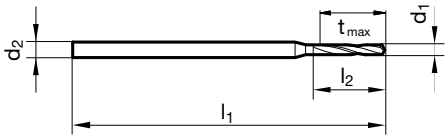
P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 4xD | WN | 140° | m7 | R | Cyl

assott. del nocc. ≥ Ø 0,500 • affilatura su piani • forma del tagliente principale diritta • correzione tagliente affilato

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm
0,500		3,000	47,000	3,000
0,550		3,000	47,000	3,300
0,600		3,000	47,000	3,600
0,650		3,000	47,000	3,900
0,700		3,000	47,000	4,200
0,750		3,000	47,000	4,500
0,800		3,000	47,000	4,800
0,850		3,000	47,000	5,100
0,900		3,000	47,000	5,400
0,950		3,000	47,000	5,700
1,000		3,000	47,000	6,000
1,050		3,000	47,000	6,300
1,100		3,000	47,000	6,600
1,150		3,000	47,000	6,900
1,200		3,000	47,000	7,200
1,250		3,000	47,000	7,500
1,300		3,000	47,000	7,800
1,350		3,000	47,000	8,100
1,400		3,000	47,000	8,400
1,450		3,000	47,000	8,700
1,500		3,000	47,000	9,000
1,550		3,000	47,000	9,300
1,590		3,000	47,000	9,600
1,600		3,000	47,000	9,600
1,650		3,000	47,000	9,900
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

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

Micropunte senza canali di refrigerazione

Articolo n. 89281

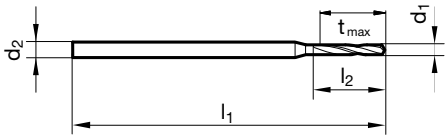
P	M	K	N	S	H
●	○	●	○	○	○

VHM | N | ~5xD | WN | 130° | 0/-0,004 | R | Cyl

assott. del nocc. ≥ Ø 0,800 • affilatura su piani • forma del tagliente principale diritta

acciai da costruzione e da cementazione • ghise • bronzo, ottone • alluminio e leghe di alluminio • magnesio e leghe di magnesio • materie sintetiche e materie sintetiche a fibre rinforzate

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



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

Micropunte senza canali di refrigerazione

Articolo n. 86401

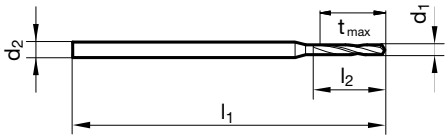
P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 7xD | WN | 140° | m7 | R | Cyl

assott. del nocc. ≥ Ø 0,500 • affilatura su piani • forma del tagliente principale diritta • correzione tagliente affilato

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



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

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm
1,950		3,000	52,000	17,600
1,980		4,000	63,000	18,000
2,000		4,000	63,000	18,000
2,050		4,000	63,000	18,500
2,100		4,000	63,000	18,900
2,150		4,000	63,000	19,400
2,200		4,000	63,000	19,800
2,250		4,000	63,000	20,300
2,300		4,000	63,000	20,700
2,350		4,000	63,000	21,200
2,380		4,000	63,000	21,600
2,400		4,000	63,000	21,600
2,450		4,000	63,000	22,100
2,500		4,000	63,000	22,500
2,550		4,000	63,000	23,000
2,600		4,000	67,000	23,400
2,650		4,000	67,000	23,900
2,700		4,000	67,000	24,300
2,750		4,000	67,000	24,800
2,780		4,000	67,000	25,200
2,800		4,000	67,000	25,200
2,850		4,000	67,000	25,700
2,900		4,000	67,000	26,100
2,950		4,000	67,000	26,600
3,000		4,000	67,000	27,000

HARTNER

Micropunte con canali di refrigerazione

Articolo n. 86405

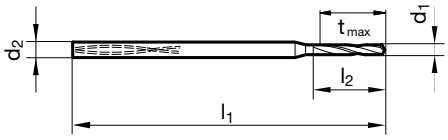
P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 5xD | WN | 140° | m7 | R | Cyl

assott. del nocc. ≥ Ø 1,400 • affilatura su piani • forma del tagliente principale diritta • correzione tagliente affilato

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm
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					

Micropunte con canali di refrigerazione

Articolo n. 86408

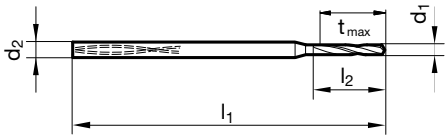
P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 8xD | WN | 135° | h7 | R | Cyl

assott. del nocc. ≥ Ø 1,400 • affilatura su piani • forma del tagliente principale diritta • correzione tagliente affilato

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



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

Micropunte con canali di refrigerazione

Articolo n. 86412

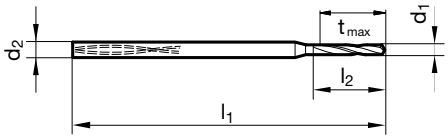
P	M	K	N	S	H
●	●	●	○	○	

VHM | A | N | 15xD | WN | 135° | h7 | R | Cyl

assott. del nocc. ≥ Ø 1,400 • affilatura su piani • forma del tagliente principale diritta • correzione tagliente affilato

acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm² • acciai inossidabili • ghise

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



d1 mm	d2 h6 mm	l1 mm	l2 mm
1,400	4,000	62,000	25,000
1,500	4,000	62,000	27,000
1,600	4,000	62,000	29,000
1,700	4,000	70,000	31,000
1,800	4,000	70,000	32,000
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

d1 mm	d2 h6 mm	l1 mm	l2 mm
2,600	4,000	87,000	47,000
2,700	4,000	87,000	48,000
2,800	4,000	87,000	50,000
2,900	4,000	87,000	52,000
3,000	4,000	87,000	54,000

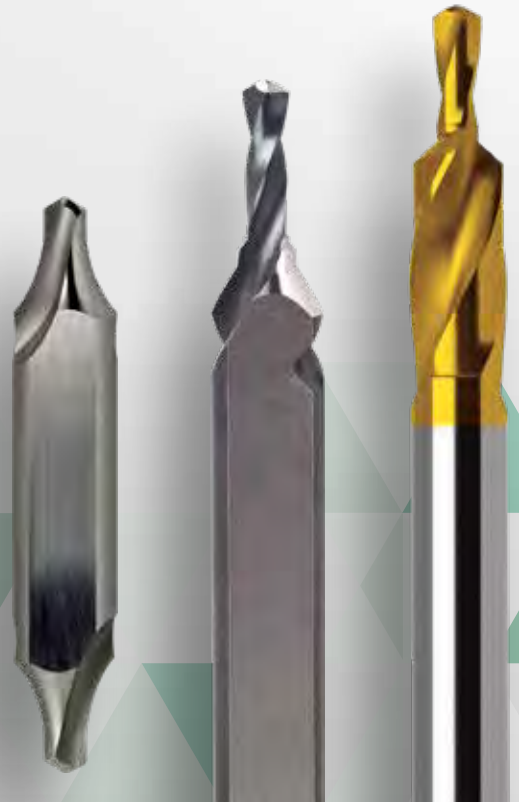
HARTNER

Precision Cutting Tools

PUNTE A GRADINO / PUNTE A CENTRARE

Punte a gradino corte, punte a gradino ad eliche indipendenti, in HSS e metalo duro

Punte a centrare in HSS, HSS-E e metalo duro lucide e ricoperte



Punte a gradino
Punte a centrare

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	angolo di svasatura / forma	d1/mm	Articolo n.	Pagina
Punte a gradino per fori centraggio a DIN 332															
●	○	●	●	○		Norma di fab.	N	HSS	●	destra	cil.	90	8,000 - 40,000	**85910**	345
●	○	●	●	○		Norma di fab.	N	HSS	●	destra	cil.	90	8,000 - 40,000	**85911**	345
●	○	●	●			Norma di fab.	N	HSS	●	destra	cil.	90	8,000 - 20,000	**85912**	346
●	○	●	●	●		Norma di fab.	N	HSS	●	destra	CM	90	14,000 - 40,000	**85914**	347
Punte a gradino corte, cil.															
●	○	●	●			Norma di fab.	N	HSS	T	destra	cil.	90	3,400 - 13,500	**84445**	348
●	○	●	●	●		Norma di fab.	N	HSS	○	destra	cil.	90	6,000 - 19,000	**85916**	349
●	○	●	●	●		Norma di fab.	N	HSS	○	destra	cil.	90	6,600 - 21,500	**85917**	350
●	○	●	●	●		Norma di fab.	N	HSS	○	destra	cil.	180	6,000 - 18,000	**85918**	351
●	○	●	●	●		Norma di fab.	N	HSS	○	destra	cil.	90	3,400 - 13,500	**85920**	352
○	○	○	●	○		Norma di fab.	N	MDI	○	destra	HE	90	5,500 - 9,000	**89254**	353
Punte a gradini ad eliche indipendenti, cil.															
●	○	●	○			DIN 8374	N	HSS	●	destra	cil.	90	6,000 - 19,000	**85010**	354
●	○	●	○			DIN 8374	N	HSS	●	destra	cil.	90	7,500 - 19,000	**85218**	355

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	angolo di svasatura / forma	d1/mm	Articolo n.	Pagina
Punte a gradini ad eliche indipendenti, cil.															
●	○	●	○			DIN 8376	N	HSS	●	destra	cil.	180	6,000 - 18,000	**85210**	356
●	○	●	○			DIN 8378	N	HSS	●	destra	cil.	90	3,400 - 13,500	**85310**	357
●	○	●	○			Norma di fab.	N	HSS	●	destra	cil.	90	6,600 - 17,200	**85110**	358
●	○	●	○			Norma di fab.	N	HSS	●	destra	cil.	180	5,900 - 16,500	**85216**	359
○	○	○	○	●	○		N	MDI	○	destra	cil.	180	6,000 - 11,000	**89252**	360
Punte a gradino ad eliche indipendenti, CM															
●	○	●	○			DIN 8375	N	HSS	●	destra	CM	90	12,000 - 23,000	**85619**	361
●	○	●	○			DIN 8377	N	HSS	●	destra	CM	180	10,000 - 33,000	**85610**	362
●	○	●	○			DIN 8379	N	HSS	●	destra	CM	90	9,000 - 22,000	**85710**	363
●	○	●	○			Norma di fab.	N	HSS	●	destra	CM	90	11,000 - 26,000	**85510**	364
●	○	●	○			Norma di fab.	N	HSS	●	destra	CM	180	9,400 - 33,000	**85616**	365
Punte a centrare senza piano															
●	○	●	●	○		DIN 333	N	HSS	○	destra	cil.	A	0,500 - 12,500	**83100**	366
●	○	●	●	○		DIN 333	N	HSS	T	destra	cil.	A	0,500 - 12,500	**84450**	366

Punte a centrare senza piano

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	angolo di svasatura / forma	d1/mm	Articolo n.	Pagina
●	○	●	●	○		DIN 333	N	HSS	◯	sinistro	cil.	A	0,500 - 4,000	**83105**	367
●	○	●	●	○		DIN 333	N	HSS	◯	destra	cil.	R	0,500 - 10,000	**83000**	368
●	○	●	●	○		DIN 333	N	HSS	T	destra	cil.	R	0,500 - 10,000	**84448**	368
●	○	●	●	○		DIN 333	N	HSS	◯	destra	cil.	A	1,000 - 10,000	**83300**	369
●	○	●	●	○		DIN 333	N	HSS	◯	destra	cil.	B	1,000 - 10,000	**83200**	370
●	○	●	●	○		DIN 333	N	HSS	◯	sinistro	cil.	R	1,000 - 4,000	**83005**	371
●	○	●	●	○		Norma di fab.	N	HSS	◯	destra	cil.	A	1,000 - 3,150	**83110**	372
●	●	●	●	○		DIN 333	N	HSS-E	◯	destra	cil.	A	1,000 - 4,000	**83101**	373
●	●	●	○	●		DIN 333	N	HSS-E	F	destra	cil.	A	0,500 - 4,000	**83102**	374
○	○	○	○	○	○	Norma di fab.	N	MDI	◯	destra	cil.	A	0,500 - 6,300	**83370**	375

Punte a centrare con piano

●	○	●	●	○		DIN 333	N	HSS	◯	destra	cil.	A	1,600 - 10,000	**83600**	376
●	○	●	●	○		DIN 333	N	HSS	◯	destra	cil.	R	1,600 - 10,000	**83500**	376
●	○	●	●	○		DIN 333	N	HSS	◯	destra	cil.	B	1,600 - 8,000	**83700**	377

Punte a gradino per fori centraggio a DIN 332

Articolo n. 85910

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 118° | h8 | R | Cyl | D

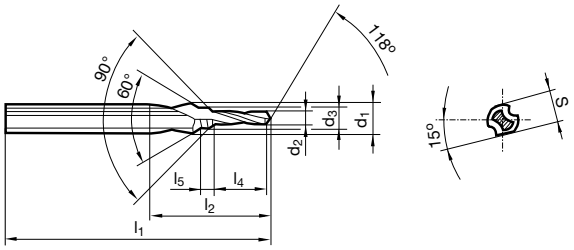
assott. del nocc. ≥ Ø 8,000 • spoglia sul cono tagliente • con pianetto sul codolo • angolo di svasatura 60° • per fori filettati secondo DIN 332, foglio 2, forma D • uso con macchine automatiche

Articolo n. 85911

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 118° | h8 | R | Cyl | R

assott. del nocc. ≥ Ø 8,000 • spoglia sul cono tagliente • con pianetto sul codolo • angolo di svasatura 60° • per fori filettati secondo DIN 332, foglio 2, forma DR • uso con macchine automatiche



d1 h7 mm	d3 h11 mm	d2 h8 mm	S mm	l1 mm	l2 mm	l4 mm	l5 mm	per filettatura
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

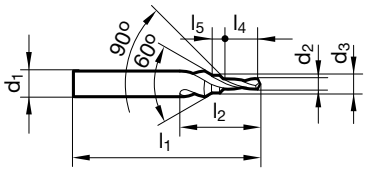
Punte a gradino per fori centraggio a DIN 332

Articolo n. 85912

P	M	K	N	S	H
●	○	●	●		

HSS | N | WN | 118° | h8 | R | Cyl | D

assott. del nocc. ≥ Ø 8,000 • spoglia sul cono tagliente • angolo di svasatura 60° • per fori filettati secondo DIN 332, foglio 2, forma D



d1 h7 mm	d3 h11 mm	d2 h8 mm	l1 mm	l2 mm	l4 mm	l5 mm	per filettatura
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

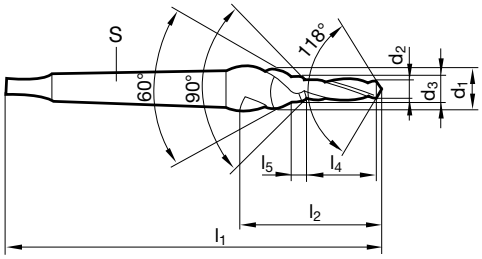
Punte a gradino per fori centraggio a DIN 332

Articolo n. 85914

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 118° | h8 | R | MK | D

assott. del nocc. ≥ Ø 14,000 • spoglia sul cono tagliente • angolo di svasatura 60° • per fori filettati secondo DIN 332, foglio 2, forma D



d1 h7 mm	d3 h11 mm	d2 h8 mm	S	l1 mm	l2 mm	l4 mm	l5 mm	per filettatura
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

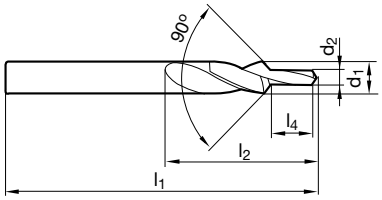
Punte a gradino corte, cil.

Articolo n. 84445

P	M	K	N	S	H
●	○	●	●		

HSS | T | N | WN | 118° | h6 | R | Cyl

assott. del nocc. ≥ Ø 3,400 • spoglia sul cono tagliente • grande stabilità alla torsione • per machine CNC e CN • per fori filettati secondo DIN 336 • per svasature a 90° corrispondenti a fori passanti secondo DIN EN 20273, serie media • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

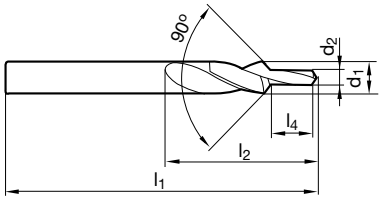
Punte a gradino corte, cil.

Articolo n. 85916

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 118° | h6 | R | Cyl

assott. del nocc. ≥ Ø 6,000 • spoglia sul cono tagliente • grande stabilità alla torsione • per machine CNC e CN • per fori passanti a DIN EN 20273, serie fine • per svasature per teste di viti 90° • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

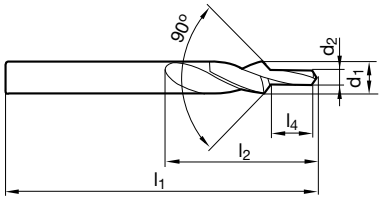
Punte a gradino corte, cil.

Articolo n. 85917

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 118° | h6 | R | Cyl

assott. del nocc. ≥ Ø 6,600 • spoglia sul cono tagliente • grande stabilità alla torsione • per machine CNC e CN • per fori passanti a DIN EN 20273, serie media • per svasature per teste di viti 90° a DIN 74, forma A • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

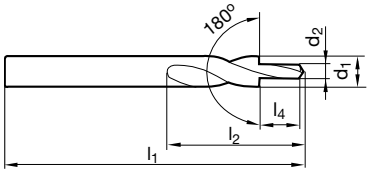
Punte a gradino corte, cil.

Articolo n. 85918

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 118° | h6 | R | Cyl

assott. del nocc. ≥ Ø 6,000 • spoglia sul cono tagliente • grande stabilità alla torsione • per machine CNC e CN • per fori passanti a DIN EN 20273, serie media • per svasature per teste di viti 180° secondo DIN 974-1, serie 1 • per viti secondo DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

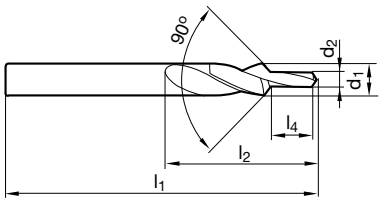
Punte a gradino corte, cil.

Articolo n. 85920

P	M	K	N	S	H
●	○	●	●	●	

HSS | N | WN | 118° | h6 | R | Cyl

assott. del nocc. ≥ Ø 3,400 • spoglia sul cono tagliente • grande stabilità alla torsione • per machine CNC e CN • per fori filettati secondo DIN 336 • per svasature a 90° corrispondenti a fori passanti secondo DIN EN 20273, serie media • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h6 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

Punte a gradino corte, cil.

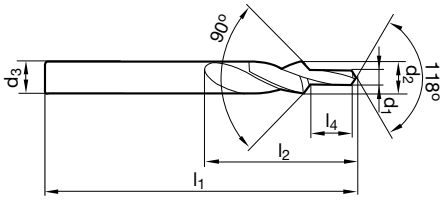
Articolo n. 89254

P	M	K	N	S	H
○	○	○	●	○	

VHM | N | WN | 118° | h7 | R | HE

assott. del nocc. ≥ Ø 3,400 • affilatura su piani • grande stabilità alla torsione • per machine CNC e CN • per fori filettati secondo DIN 336 • per svasature a 90° corrispondenti a fori passanti secondo DIN EN 20273, serie media • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore

ghisa acciaiosa, ghisa grigia
ghisa in conchiglia • acciai al manganese, bronzi • metalli leggeri e non ferrosi • materiali abrasivi (leghe di AlSi) • materie sintetiche a fibre rinforzate • altri materiali che esercitano un'azione abrasiva sui taglienti e sulle fasi della punta



d1 h7 mm	d2 h9 mm	d3 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

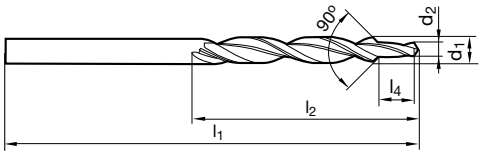
Punte a gradini ad eliche indipendenti, cil.

Articolo n. 85010

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8374 | 118° | h8 | R | Cyl | A

assott. del nocc. ≥ Ø 6,000 • spoglia sul cono tagliente • per fori passanti a DIN EN 20273, serie fine • per svasature per teste di viti 90° • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

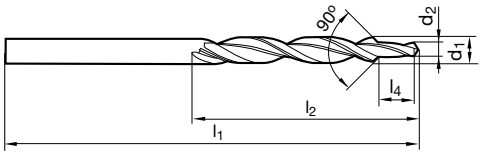
Punte a gradini ad eliche indipendenti, cil.

Articolo n. 85218

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8374 | 118° | h8 | R | Cyl | B

assott. del nocc. ≥ Ø 7,500 • spoglia sul cono tagliente • per fori passanti a DIN EN 20273, serie media • per svasature per teste di viti 90° a DIN 74, forma A e F • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

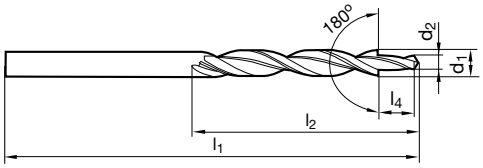
Punte a gradini ad eliche indipendenti, cil.

Articolo n. 85210

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8376 | 118° | h8 | R | Cyl

assott. del nocc. ≥ Ø 6,000 • spoglia sul cono tagliente • per fori passanti a DIN EN 20273, serie media • per svasature per teste di viti 180° secondo DIN 974-1, serie 1 • per viti secondo DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 e DIN 7513, 7516, 7500-1 • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

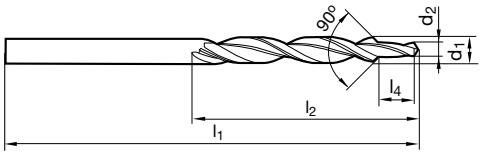
Punte a gradini ad eliche indipendenti, cil.

Articolo n. 85310

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8378 | 118° | h8 | R | Cyl

assott. del nocc. ≥ Ø 3,400 • spoglia sul cono tagliente • per fori filettati secondo DIN 336 • per svasature a 90° corrispondenti a fori passanti secondo DIN EN 20273, serie media • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

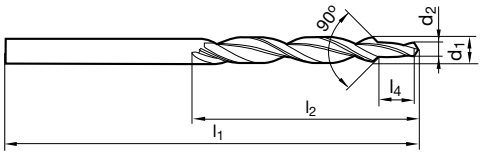
Punte a gradini ad eliche indipendenti, cil.

Articolo n. 85110

P	M	K	N	S	H
●	○	●	○		

HSS | N | WN | 118° | h8 | R | Cyl

assott. del nocc. ≥ Ø 6,600 • spoglia sul cono tagliente • per fori passanti a DIN EN 20273, serie media • per svasature per teste di viti 90° secondo DIN 74 parte 1 (ediz. 12.1980), forma A e B, esecuzione media • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

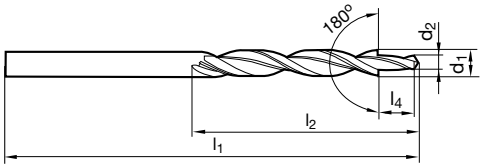
Punte a gradini ad eliche indipendenti, cil.

Articolo n. 85216

P	M	K	N	S	H
●	○	●	○		

HSS | N | WN | 118° | h8 | R | Cyl

assott. del nocc. ≥ Ø 5,900 • spoglia sul cono tagliente • per foratura passante con vecchie svasature forma H, J, K secondo DIN 75 Parte 2 (ediz. 04.1968), esecuzione media e fine • per viti a DIN 84, 912, 6712 • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

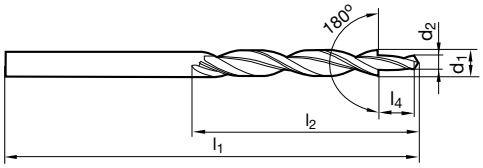
Punte a gradini ad eliche indipendenti, cil.

Articolo n. 89252

P	M	K	N	S	H
○	○	○	○	●	○

VHM | N | 118° | h8 | R | Cyl

assott. del nocc. ≥ Ø 8,000 • spoglia sul cono tagliente • per fori passanti a DIN EN 20273, serie media • per svasature per teste di viti 180° secondo DIN 974-1, serie 1 • per viti secondo DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 e DIN 7513, 7516, 7500-1 • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	l1 mm	l2 mm	l4 mm	per filettatura
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

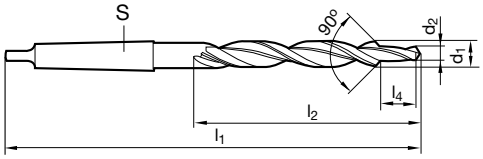
Punte a gradino ad eliche indipendenti, CM

Articolo n. 85619

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8375 | 118° | h8 | R | MK

assott. del nocc. ≥ Ø 12,000 • spoglia sul cono tagliente • per fori passanti a DIN EN 20273, serie fine • per svasature per teste di viti 90° a DIN 74, forma A e F • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	per filettatura
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

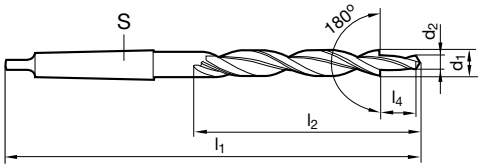
Punte a gradino ad eliche indipendenti, CM

Articolo n. 85610

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8377 | 118° | h8 | R | MK

assott. del nocc. ≥ Ø 10,000 • spoglia sul cono tagliente • per fori passanti a DIN EN 20273, serie media • per svasature per teste di viti 180° secondo DIN 974-1, serie 1 • per viti secondo DIN 6912, 7984, 34821, DIN EN ISO 1207, 4762, 14579, 14580 e DIN 7513, 7516, 7500-1 • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	per filettatura
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

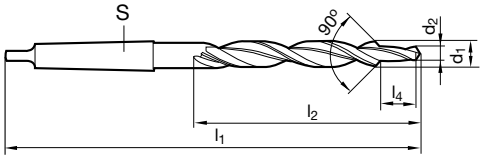
Punte a gradino ad eliche indipendenti, CM

Articolo n. 85710

P	M	K	N	S	H
●	○	●	○		

HSS | N | DIN 8379 | 118° | h8 | R | MK

assott. del nocc. ≥ Ø 9,000 • spoglia sul cono tagliente • per fori filettati secondo DIN 336 • per svasature a 90° corrispondenti a fori passanti secondo DIN EN 20273, serie media • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	per filettatura
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

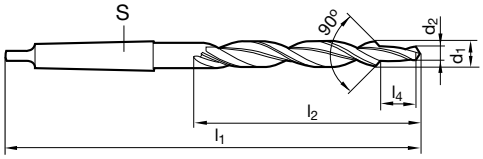
Punte a gradino ad eliche indipendenti, CM

Articolo n. 85510

P	M	K	N	S	H
●	○	●	○		

HSS | N | WN | 118° | h8 | R | MK

assott. del nocc. ≥ Ø 11,000 • spoglia sul cono tagliente • per fori passanti a DIN EN 20273, serie media • per svasature per teste di viti 90° secondo DIN 74 parte 1 (ediz. 12.1980), forma A e B, esecuzione media • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	per filettatura
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

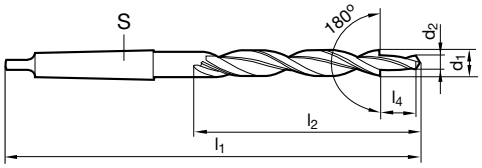
Punte a gradino ad eliche indipendenti, CM

Articolo n. 85616

P	M	K	N	S	H
●	○	●	○		

HSS | N | WN | 118° | h8 | R | MK

assott. del nocc. ≥ Ø 9,400 • spoglia sul cono tagliente • per foratura passante con vecchie svasature forma H, J, K secondo DIN 75 Parte 2 (ediz. 04.1968), esecuzione media e fine • per viti a DIN 84, 912, 6712 • l'avanz. si basa sul diametro inferiore • vc si basa sul diametro maggiore



d1 h8 mm	d2 h9 mm	S	l1 mm	l2 mm	l4 mm	per filettatura
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

Punte a centrare senza piano

Articolo n. 83100

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | DIN 333 | 118° | R | Cyl | A

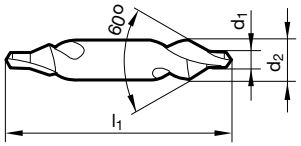
assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • senza smusso di protezione • per fori a centrare secondo DIN 332, foglio 1, forma A • d1 ≤ 0,8 mm: 1 solo lato tagliente

Articolo n. 84450

P	M	K	N	S	H
●	○	●	●	○	

HSS | T | N | DIN 333 | 118° | R | Cyl | A

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • senza smusso di protezione • per fori a centrare secondo DIN 332, foglio 1, forma A • d1 ≤ 0,8 mm: 1 solo lato tagliente • massima resistenza all'usura



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			

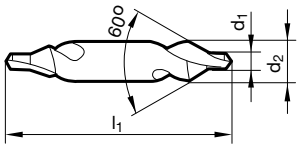
Punte a centrare senza piano

Articolo n. 83105

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | DIN 333 | 118° | L | Cyl | A

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • senza smusso di protezione • per fori a centrare secondo DIN 332, foglio 1, forma A • d1 ≤ 0,8 mm: 1 solo lato tagliente



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			

Punte a centrare senza piano

Articolo n. 83000

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | DIN 333 | 118° | R | Cyl | R

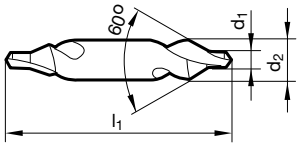
assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • corretto posizionamento fra le contropunte • per fori a centrare a DIN 332 parte 1, forma R • d1 ≤ 0,8 mm: 1 solo lato tagliente

Articolo n. 84448

P	M	K	N	S	H
●	○	●	●	○	

HSS | T | N | DIN 333 | 118° | R | Cyl | R

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • corretto posizionamento fra le contropunte • per fori a centrare a DIN 332 parte 1, forma R • d1 ≤ 0,8 mm: 1 solo lato tagliente • massima resistenza all'usura



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			

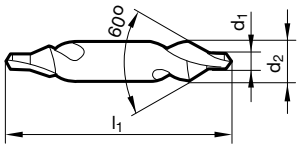
Punte a centrare senza piano

Articolo n. 83300

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | DIN 333 | 118° | R | Cyl | A

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • maggiore resistenza alla rottura grazie al rigonfiamento • senza smusso di protezione • la cavità tra la svasatura e il foro serve da contenitore addizionale di lubrificante • per fori a centrare secondo DIN 332, foglio 1, forma A



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

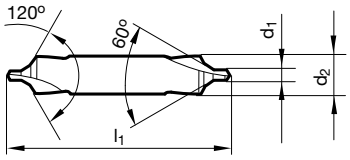
Punte a centrare senza piano

Articolo n. 83200

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | DIN 333 | 118° | R | Cyl | B

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • per fori a centrare secondo DIN 332, foglio 1, forma B • con smusso di protezione 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			

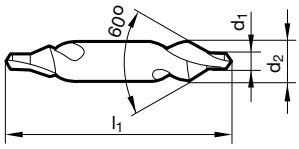
Punte a centrare senza piano

Articolo n. 83005

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | DIN 333 | 118° | L | Cyl | R

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • corretto posizionamento fra le contropunte • per fori a centrare a DIN 332 parte 1, forma R • d1 ≤ 0,8 mm: 1 solo lato tagliente



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			

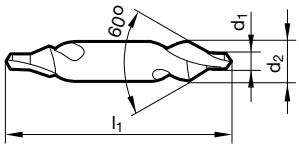
Punte a centrare senza piano

Articolo n. 83110

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | WN | 118° | R | Cyl | A

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • punte a centrare extra lunghe • senza smusso di protezione • per fori a centrare simili a DIN 332 foglio 1, forma A • per centrature molto profonde



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			

Punte a centrare senza piano

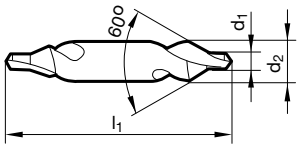
Articolo n. 83101

P	M	K	N	S	H
●	●	●	●	○	

HSS-E | N | DIN 333 | 118° | R | Cyl | A

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • senza smusso di protezione • massima resistenza all'usura • per fori a centrare secondo DIN 332, foglio 1, forma A

materiali con R superiore a 800 N/mm² • acciai al CrNi inossidabili e resistenti al calore



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			

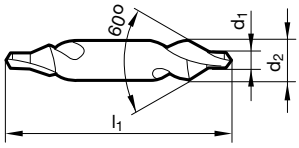
Punte a centrare senza piano

Articolo n. 83102

P	M	K	N	S	H
●	●	●	○	●	

HSS-E | F | N | DIN 333 | 118° | R | Cyl | A

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • senza smusso di protezione • per fori a centrare secondo DIN 332, foglio 1, forma A • d1 ≤ 0,8 mm: 1 solo lato tagliente



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			

Punte a centrare senza piano

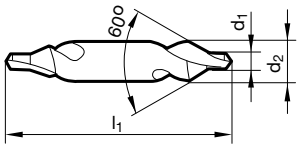
Articolo n. 83370

P	M	K	N	S	H
○	○	○	○	○	○

VHM | N | WN | 118° | R | Cyl | A

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • senza smusso di protezione • per fori a centrare secondo DIN 332, foglio 1, forma A • d1 ≤ 0,8 mm: 1 solo lato tagliente

l'idoneità del materiale universale



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			

Punte a centrare con piano

Articolo n. 83600

P	M	K	N	S	H
●	○	●	●	○	

HSS | ○ | N | DIN 333 | 118° | R | Cyl | A

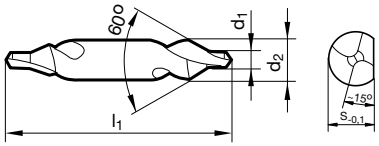
assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • per fori a centrare secondo DIN 332, foglio 1, forma A • senza smusso di protezione

Articolo n. 83500

P	M	K	N	S	H
●	○	●	●	○	

HSS | ○ | N | DIN 333 | 118° | R | Cyl | R

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • corretto posizionamento fra le contropunte • per fori a centrare a DIN 332 parte 1, forma R



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

HARTNER

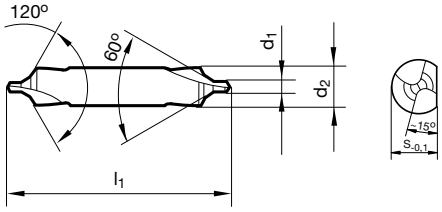
Punte a centrare con piano

Articolo n. 83700

P	M	K	N	S	H
●	○	●	●	○	

HSS | N | DIN 333 | 118° | R | Cyl | B

assott. del nocc. ≥ Ø 2,000 • spoglia sul cono tagliente • per fori a centrare secondo DIN 332, foglio 1, forma B • con smusso di protezione 120°



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

HARTNER

Precision Cutting Tools

UTENSILI PER SVASARE & UTENSILI SBAVATORI

in HSS, HSS-E, metallo duro
lucide e ricoperte

Utensili per svas.
Utensili sbavatori

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	angolo di svasatura / forma	d1/mm	Articolo n.	Pagina

Svasatori cilindrici 90°

●	○	●	●	○		DIN 335		HSS	◯	destra	cil.	C	4,300 - 31,000	**88200**	382

Svasatori cilindrici 90°, taglienti elicoidali

●	●	●	○	○		DIN 335		HSS-E	A	destra	cil.	C	6,300 - 31,000	**88201**	383

Kit svasatori cilindrici a 90°

●	○	●	●	○		DIN 335		HSS	◯	destra	cil.	C		**88021**	384

Kit svasatori cilindrici a 90°, taglienti elicoidali

●	●	●	○	○		DIN 335		HSS-E	A	destra	cil.	C		**88022**	385

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Forma del codolo	angolo di svasatura / forma	d1/mm	Articolo n.	Pagina
Sbavatore a forcella															
●	●	●	○	●	○	Norma di fab.	TS 100 EG	**MDI**	◯	destra	cil.			**84100**	386
●	●	●	○	●	○	Norma di fab.	TS 100 EG	**MDI**	◯	destra	HA			**84101**	387
Sbavatori a 90° in spinta e trazione															
●	●	●	○	●	○	Norma di fab.	TS 100 VR	**MDI**	ⓐ	destra	~HA		3,000 - 12,000	**80495**	388

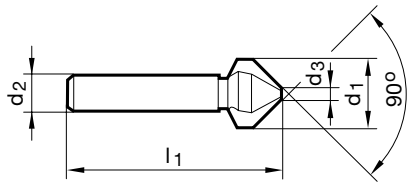
Svasatori cilindrici 90°

Articolo n. 88200

P	M	K	N	S	H
●	○	●	●	○	

HSS | DIN 335 | 90° | R | Cyl | C

spogliati radialmente • a tre taglienti



d1 mm	d2 h9 mm	d3 mm	l1 mm	Z	Codice
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

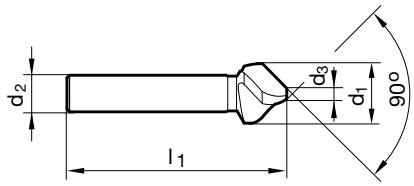
Svasatori cilindrici 90°

Articolo n. 88201

P	M	K	N	S	H
●	●	●	○	○	

HSS-E | A | DIN 335 | 90° | R | Cyl | C

3 taglienti a passo variabile • processi di taglio a bassa vibrazione • per una svasatura circolare e senza vibrazioni • forza notevolmente ridotta • per impiego universale • diametro del foro più piccolo per consentire la svasatura vedi &quot “Raccomandazioni per l’utilizzo di svasatori”



d1 mm	d2 h9 mm	d3 mm	l1 mm	Z	Codice
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

Svasatori cilindrici 90°

Articolo n. 88021

P	M	K	N	S	H
●	○	●	●	○	

HSS | DIN 335 | 90° | R | Cyl | C

kit in cassette, costituito da art. 88200 • spogliati radialmente • a tre taglienti

d1 mm	mm	Pezzi/set	Codice
6,30-20,50	6.3/8.3/10.4/12.4/16.5/20.5	6	7,000

Svasatori cilindrici 90°

Articolo n. 88022

P	M	K	N	S	H
●	●	●	○	○	

HSS-E | A | DIN 335 | 90° | R | Cyl | C

kit in cassette, costituito da art. 88201 • 3 taglienti a passo variabile • processi di taglio a bassa vibrazione • per una svasatura circolare e senza vibrazioni • forza notevolmente ridotta • per impiego universale • diametro del foro più piccolo per consentire la svasatura vedi &quot “Raccomandazioni per l’utilizzo di svasatori”

d1 mm	mm	Pezzi/set	Codice
6,30-20,50	6.3/8.3/10.4/12.4/16.5/20.5	6	1,000

HARTNER

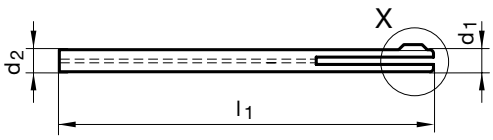
Sbavatore a forcella

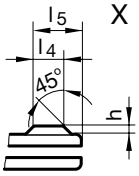
Articolo n. 84100

P	M	K	N	S	H
●	●	●	○	●	○

VHM | TS 100 EG | WN | R | Cyl

con refrigerazione interna • con codolo cilindrico passante per impiego con pinze di serraggio
per sbavatura interna ed esterna • di impiego universale su macchine utensili, fresatrici, torni e robots





Inclusi Ø	d1 mm	d2 mm	l1 mm	l4 mm	l5 mm	h mm	Codice
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

HARTNER

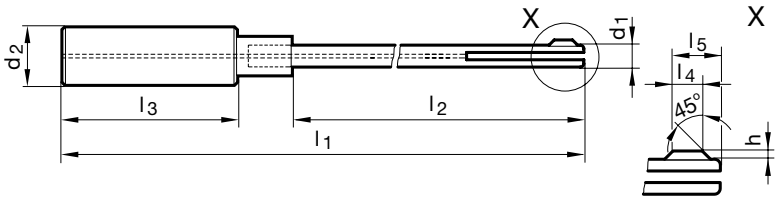
Sbavatore a forcella

Articolo n. 84101

P	M	K	N	S	H
●	●	●	○	●	○

VHM | TS 100 EG | WN | R | HA

per impiego in mandrini a espansione idraulica e per calettamento • con codolo a DIN 6535 • con refrigerazione interna
per sbavatura interna ed esterna • di impiego universale su macchine utensili, fresatrici, torni e robots



Inclusi Ø	d1 mm	d2 mm	l1 mm	l2 mm	l3 mm	l4 mm	l5 mm	h mm	Codice
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

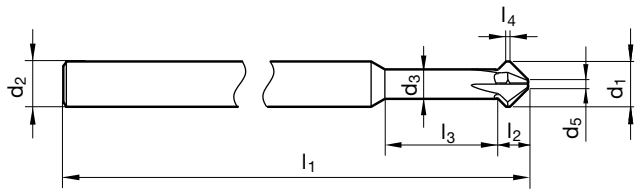
Sbavatori a 90° in spinta e trazione

Articolo n. 80495

P	M	K	N	S	H
●	●	●	○	●	○

VHM | a | TS 100 VR | WN | 90° | R | ~HA

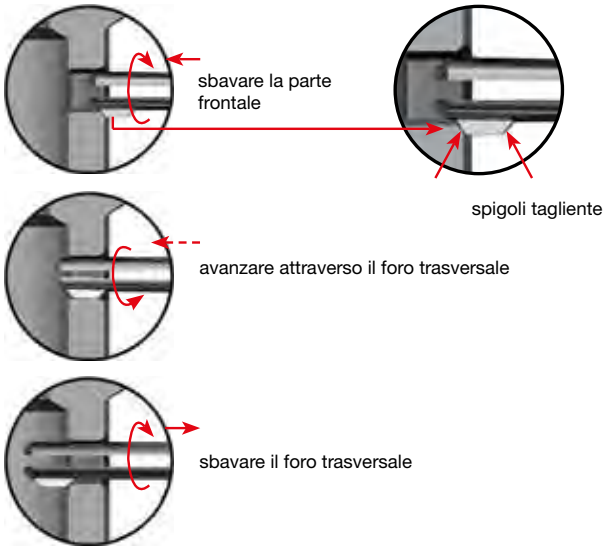
con codolo a DIN 6535 • per impiego in mandrini a espansione idraulica e per calettamento per sbavatura interna ed esterna • per sbavatura di fori e contorni



d1 mm	d2 h6 mm	d3 mm	d5 mm	l1 mm	l2 mm	l3 mm	l4 mm	Z	Codice
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

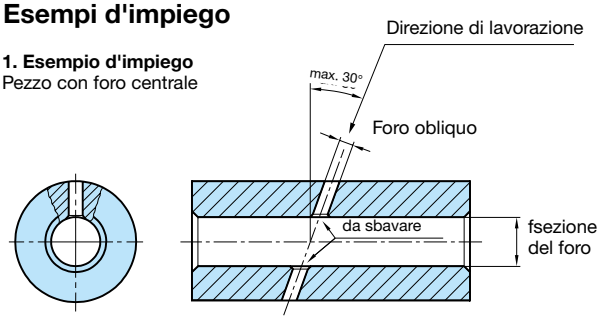
Forchetta per sbavare in MD TS 100 EG

La lavorazione



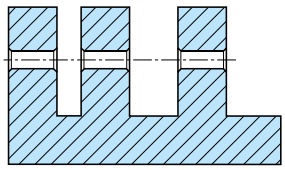
Esempi d'impiego

1. Esempio d'impiego
Pezzo con foro centrale



Con pezzi da lavorare con fori trasversali tenete presente che:
- il diametro del foro trasversale deve essere max. 35% del diametro del foro centrale
- il diametro del foro centrale deve essere 40% più grande della lunghezza tagliente l_4

2. Esempio d'impiego
Pezzo con foro interrotto più volte



Passo per passo:
La sbavatura meccanica interna ed esterna con la forchetta TS 100 EG è una semplice ed economica alternativa all'attuale laboriosa operazione manuale. Con un unico utensile si eseguono tutte le operazioni di lavoro.

Utilizzo universale:
Con la nuova forchetta per sbavare in MD integrale si possono sbavare pezzi con fori obliqui e con fori interrotti più volte. Il risultato è in ogni caso la perfetta sbavatura interna ed esterna.

Ø-misura (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

Attenzione:
I valori di taglio sono solo indicativi. Possono essere aumentati o diminuiti a seconda delle condizioni di lavoro.

Utensili a sbavare per entrata ed uscita TS 100 VR

Valori di taglio sbavatore in entrata ed uscita TS 100 VR

Gruppi di materiali	Resistenza Durezza MPa (N/mm²)	v_c (m/min)	Col. avanz.
Acciai	< 850	*120 - 200*	71
	850-1200	*100 - 180*	71
	> 1200	*80 - 140*	71
Acciai temprati	< 54 HRC	*60 - 120*	71
	54-60 HRC	*40 - 80*	71
Acciai inossidabili	< 850	*80 - 120*	71
Leghe a base di nichel	< 1300	*30 - 60*	71
Leghe di titanio	< 1300	*50 - 100*	71
Ghise	< 240 HB30	*120 - 180*	72
	> 240 HB30	*100 - 160*	72
Alu per lav. plastiche < 3% Si		*150 - 250*	72
Leghe di ghisa-alu > 3% Si		*100 - 200*	72
Leghe di magnesio		*150 - 250*	72
Leghe a base non ferrosa	< 850	*30 - 200*	72

Codice colonna avanz. (mm/giro)

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

Attenzione:
I valori di taglio sono solo indicativi. Possono essere aumentati o diminuiti a seconda delle condizioni di lavoro.

HARTNER

Precision Cutting Tools

MULTIPLEX
MULTIPLEX HPC

Punte elicoidali con inserti intercambiabili con refrigerazione
Inserti intercambiabili in HSS-E, HSS-E PM, metallo duro
lucide e ricoperte

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Refrige-razione interna	Profondi-tà di foro	d1/mm	Articolo n.	Pagina

Corpo portaplacchette con attacco cilindrico

	Norma di fab.		Ni	destra	con	3xD	**86612**	399

	Norma di fab.		Ni	destra	con	5xD	**86622**	400

	Norma di fab.		Ni	destra	con	7xD	**86624**	401

	Norma di fab.		Ni	destra	con		**86628**	402

Corpo portaplacchette con attacco cono morse

	Norma di fab.		Ni	destra	con		**86630**	404

	Norma di fab.		Ni	destra	con		**86650**	405

	Norma di fab.		B	destra	con		**86670**	406

	Norma di fab.		B	destra	con		**86680**	407

	Norma di fab.		Ni	destra	con		**86678**	408

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Refrige-razione interna	Profondi-tà di foro	d1/mm	Articolo n.	Pagina

Inserti intercambiabili

●	○	●	○			Norma di fab.		HSS-E-PM	T	destra			10,000 - 25,000	86602	411

○	●	○	●	●		Norma di fab.		HSS-E	T	destra			25,000 - 102,000	86605	412

●	○	●	○			Norma di fab.		HSS-E-PM	F	destra			10,000 - 25,000	86608	413

●	○	●	○			Norma di fab.		HSS-E-PM	A	destra			25,000 - 210,000	86609	414

●	○	●	○			Norma di fab.		HSS-E-PM	A	destra			10,000 - 65,000	86611	415

●	○	●	○			Norma di fab.		MDI	F	destra			10,000 - 35,000	86701	417

●	○	●	○			Norma di fab.		MDI	F	destra			10,000 - 35,000	86702	418

●	○	●	○			Norma di fab.		MDI	T	destra			10,000 - 35,000	86708	419

●	○	●	○			Norma di fab.		MDI	T	destra			9,920 - 35,000	86709	420

			●			Norma di fab.		MDI	○	destra			10,000 - 65,000	86711	421

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Refrige-razione interna	Profondi-tà di foro	d1/mm	Articolo n.	Pagina

Alimentatori per punte con fori di refrigerazione

						Norma di fab.								**86690**	422

Tubi di adduzione

						Norma di fab.			●					**82571**	423

Attacco rapido

						Norma di fab.								**82578**	424

Giravite Torx

						Norma di fab.								**86842**	425

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Refrige-razione interna	Profondi-tà di foro	d1/mm	Articolo n.	Pagina

Mandrino di adduzione refrigerante per Multiplex

Norma di fab.	B		**86691**	426

Norma di fab.	B		**86692**	427

Norma di fab.	B		**86693**	428

Norma di fab.	B		**86694**	429

Bussole di riduzione per attacchi cilindrici

Norma di fab.	B		**86699**	430

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Refrige-razione interna	Profondi-tà di foro	d1/mm	Articolo n.	Pagina

Corpo portaplacchette Multiplex-HPC

						Norma di fab.	HPC		Ni	destra	con	1xD	11,000 - 36,005	**86681**	432

						Norma di fab.	HPC		Ni	destra	con	1,5xD	11,000 - 39,005	**86682**	433

						Norma di fab.	HPC		Ni	destra	con	3xD	11,000 - 39,005	**86683**	435

						Norma di fab.	HPC		Ni	destra	con	5xD	11,000 - 39,000	**86684**	437

						Norma di fab.	HPC		Ni	destra	con	7xD	11,000 - 31,505	**86685**	439

						Norma di fab.	HPC		Ni	destra	con	10xD	11,000 - 31,505	**86686**	441

Inserti intercambiabili per Multiplex HPC

○	○	○	○	○	○	Norma di fab.	HPC	**MDI**	a	destra			11,000 - 40,000	**86721**	443

●	○	○				Norma di fab.	HPC	**MDI**	F	destra			11,000 - 40,000	**86722**	446

○		●				Norma di fab.	HPC	**MDI**	Y	destra			11,000 - 40,000	**86723**	449

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Refrige-razione interna	Profondi-tà di foro	d1/mm	Articolo n.	Pagina
Inserti intercambiabili per Multiplex HPC															
			●			Norma di fab.	HPC	**MDI**	◯	destra			11,000 - 40,000	**86724**	452
○	●			○	○	Norma di fab.	HPC	**MDI**	a	destra			11,000 - 40,000	**86725**	455
●						Norma di fab.		**MDI**	F	destra			12,000 - 40,000	**86729**	458
Inserti a svasare Multiplex HPC															
○		●				Norma di fab.		**MDI**	A	neutro			52,020 - 93,080	**86726**	459
			●			Norma di fab.		**MDI**	◯	destra			52,020 - 93,080	**86727**	459
●	○	○		○	○	Norma di fab.		**MDI**	T	destra			52,020 - 93,080	**86728**	460
Viti di serraggio per placchette 1.5-10xD															
						Norma di fab.								**86843**	461
Giraviti dinamometrici															
						Norma di fab.								**86844**	462

P	M	K	N	S	H	Norma	Tipo	Materiale da taglio	Superficie	Direzione di taglio	Refrige-razione interna	Profondi-tà di foro	d1/mm	Articolo n.	Pagina

Inserti Torx

						Norma di fab.								**86845**	463

Viti di serraggio per svasatori Multiplex HPC

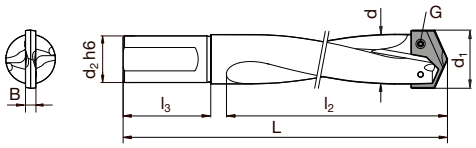
						Norma di fab.								**86846**	464

HARTNER

Corpo portaplacchette con attacco cilindrico

Articolo n. 86612

nichelato • Corpo per placchette. Il corpo con codolo cilindrico ha un'alimentazione di refrigerante interna. Larghe scanalature garantiscono una evacuazione del truciolo ottimale. Sostituzione degli inserti semplice grazie alle viti di arresto. Non è necessario alcun aggiustamento delle placchette. La punta con gli inserti può essere utilizzata nel materiale pieno. Questo utensile non é adatto per finire forature ricavate da fusione oppure per allargare fori preesistenti.i. Comprese viti di serraggio art. n. 86807.

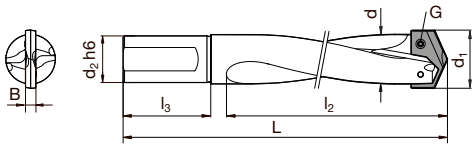


d1 mm	d mm	d2 h6 mm	L mm	l2 mm	l3 mm	B mm	G	Codice
10.00-11.7	9,500	20,000	108,000	50,000	40,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	20,000	109,000	53,000	40,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	20,000	116,000	60,000	40,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	20,000	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**

Corpo portaplacchette con attacco cilindrico

Articolo n. 86622

nichelato • Corpo per placchette. Il corpo con codolo cilindrico ha un'alimentazione di refrigerante interna. Larghe scanalature garantiscono una evacuazione del truciolo ottimale. Sostituzione degli inserti semplice grazie alle viti di arresto. Non è necessario alcun aggiustamento delle placchette. La punta con gli inserti può essere utilizzata nel materiale pieno. Questo utensile non é adatto per finire forature ricavate da fusione oppure per allargare fori preesistenti.i. Comprese viti di serraggio art. n. 86807.



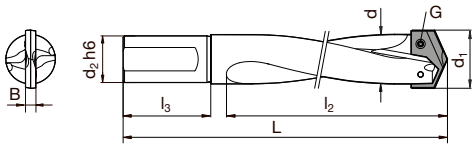
d1 mm	d mm	d2 h6 mm	L mm	l2 mm	l3 mm	B mm	G	Codice
10.00-11.7	9,500	20,000	140,000	83,000	40,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	20,000	150,000	94,000	40,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	20,000	160,000	104,000	40,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	20,000	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

Corpo portaplacchette con attacco cilindrico

Articolo n. 86624

nichelato • Corpo per placchette. Il corpo con codolo cilindrico ha un'alimentazione di refrigerante interna. Larghe scanalature garantiscono una evacuazione del truciolo ottimale. Sostituzione degli inserti semplice grazie alle viti di arresto. Non è necessario alcun aggiustamento delle placchette. La punta con gli inserti può essere utilizzata nel materiale pieno. Questo utensile non é adatto per finire forature ricavate da fusione oppure per allargare fori preesistenti.i. Comprese viti di serraggio art. n. 86807.



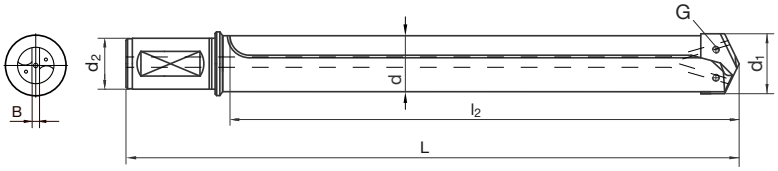
d1 mm	d mm	d2 h6 mm	L mm	l2 mm	l3 mm	B mm	G	Codice
10.00-11.7	9,500	20,000	180,000	123,000	40,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	20,000	190,000	134,000	40,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	20,000	210,000	155,000	40,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	20,000	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

Corpo portaplacchette con attacco cilindrico

Articolo n. 86628

nichelato • Supporto per placchette. Il supporto extra lungo con codolo cilindrico ha un'alimentazione di refrigerante interna. Larghe scanalature garantiscono un trasporto del truciolo ottimale. Sostituzione degli inserti semplice grazie alle viti di arresto. Non è necessario alcun aggiustamento delle placchette. La punta con gli inserti può essere utilizzata in materiale solido. Questo utensile non é adatto per foratura di fori pre-fusi o pre-forati. Comprese viti di serraggio art. n. 86807.



d1 mm	d mm	d2 h6 mm	L mm	l2 mm	B mm	G	Codice
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**

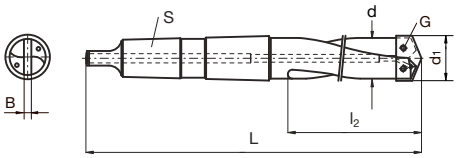
Corpo portaplacchette con attacco cilindrico

d1 mm	d mm	d2 h6 mm	L mm	l2 mm	B mm	G	Codice
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**

Corpo portaplacchette con attacco cono morse

Articolo n. 86630

nichelato • Supporto per placchette in esecuzione corta. Il supporto con codolo conico ha un'alimentazione di refrigerante interna. Larghe scanalature garantiscono un trasporto del truciolo ottimale. Sostituzione degli inserti semplice grazie alle viti di arresto. Non è necessario alcun aggiustamento delle placchette. La punta con gli inserti può essere utilizzata in materiale solido. Questo utensile non é adatto per foratura di fori pre-fusi o pre-forati. Alimentazione refrigerante: assiale (radiale su richiesta). Comprese viti di serraggio art. n. 86807.



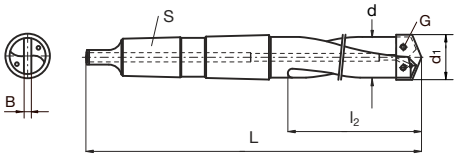
d1 mm	d mm	S	L mm	l2 mm	B mm	G	Codice
10.00-11.7	9,500	MK-2	139,000	56,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	MK-2	141,000	58,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	MK-2	148,000	63,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	MK-2	150,000	67,000	3,500	86807 2.501	**16,000**
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

Corpo portaplacchette con attacco cono morse

Articolo n. 86650

nichelato • Supporto per placchette in esecuzione lunga. Il supporto con codolo conico ha un'alimentazione di refrigerante interna. Larghe scanalature garantiscono un trasporto del truciolo ottimale. Sostituzione degli inserti semplice grazie alle viti di arresto. Non è necessario alcun aggiustamento delle placchette. La punta con gli inserti può essere utilizzata in materiale solido. Questo utensile non é adatto per foratura di fori pre-fusi o pre-forati.
Alimentazione refrigerante: assiale (radiale su richiesta).
Comprese viti di serraggio art. n. 86807.

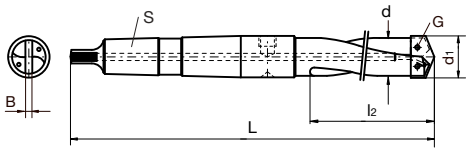


d1 mm	d mm	S	L mm	l2 mm	B mm	G	Codice
10.00-11.7	9,500	MK-2	186,000	103,000	2,500	86807 2.000	**9,500**
11,71-13,4	11,500	MK-2	191,000	108,000	2,500	86807 2.000	**11,500**
13,41-16,4	13,000	MK-2	210,000	125,000	3,500	86807 2.500	**13,000**
16,41-18,9	16,000	MK-2	218,000	135,000	3,500	86807 2.501	**16,000**
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**

Corpo portaplacchette con attacco cono morse

Articolo n. 86670

≤ Ø 28 mm: nichelato; Ø 28 mm: brunito • Corpo per placchette in esecuzione corta con sede per anello di alimentazione refrigerante. Il corpo con codolo conico ha un'alimentazione del refrigerante interna. Larghe scanalature garantiscono una evacuazione del truciolo ottimale. Sostituzione degli inserti semplice grazie alle viti di arresto. Non è necessario alcun aggiustamento delle placchette. La punta con gli inserti può essere utilizzata nel materiale pieno. Questo utensile non é adatto per finire forature ricavate da fusione oppure per allargare fori preesistenti.
Alimentazione refrigerante: radiale (assiale su richiesta).
Da Ø corpo 63,0 mm: esecuzione diritta.
Dimensione codolo CM 5: con trascinatore.
Comprese viti di serraggio art. n. 86807.

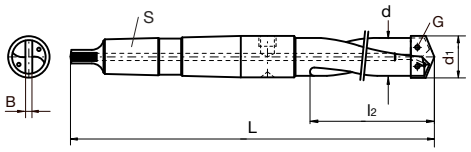


d1 mm	d mm	S	L mm	l2 mm	B mm	G	Codice
25.01-29.0	24,000	MK-4	279,000	108,000	5,000	86807 3.500	**24,000**
29,01-35,0	28,000	MK-4	279,000	108,000	5,000	86807 3.500	**28,000**
35,01-45,0	34,000	MK-4	324,000	152,000	7,000	86807 4.001	**34,000**
45,01-55,0	44,000	MK-4	324,000	152,000	7,000	86807 4.001	**44,000**
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**

Corpo portaplacchette con attacco cono morse

Articolo n. 86680

≤ Ø 28 mm: nichelato; Ø 28 mm: brunito • Supporto per placchette in esecuzione lunga con superficie circolare per anello con alimentazione refrigerante. Il supporto con codolo conico ha un'alimentazione di refrigerante interna. Larghe scanalature garantiscono un trasporto del truciolo ottimale. Sostituzione degli inserti semplice grazie alle viti di arresto. Non è necessario alcun aggiustamento delle placchette. La punta con gli inserti può essere utilizzata in materiale solido. Questo utensile non é adatto per foratura di fori pre-fusi o pre-forati.
Alimentazione refrigerante: radiale (assiale su richiesta).
Da supporto Ø 63,0 mm: dritto.
Dimensione codolo CM 5: con chiavetta trasversale.
Comprese viti di serraggio art. n. 86807.

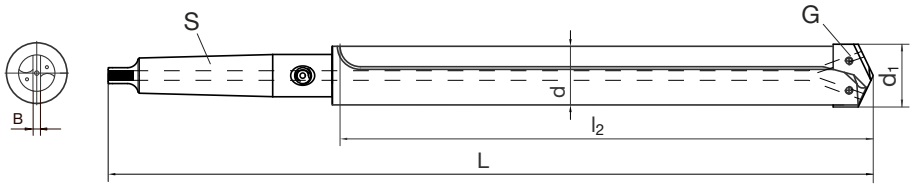


d1 mm	d mm	S	L mm	l2 mm	B mm	G	Codice
25.01-29.0	24,000	MK-4	379,000	208,000	5,000	86807 3.500	**24,000**
29,01-35,0	28,000	MK-4	379,000	208,000	5,000	86807 3.500	**28,000**
35,01-45,0	34,000	MK-4	429,000	257,000	7,000	86807 4.001	**34,000**
45,01-55,0	44,000	MK-4	429,000	257,000	7,000	86807 4.001	**44,000**
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**

Corpo portaplacchette con attacco cono morse

Articolo n. 86678

superficie ≤ 1000 mm lunghezza totale nichelata; > 1000 mm lunghezza totale brunita • Supporto per placchette. Il supporto extra lungo con codolo cilindrico ha un'alimentazione di refrigerante interna. Larghe scanalature garantiscono un trasporto del truciolo ottimale. Sostituzione degli inserti semplice grazie alle viti di arresto. Non è necessario alcun aggiustamento delle placchette. La punta con gli inserti può essere utilizzata in materiale solido. Questo utensile non é adatto per foratura di fori pre-fusi o pre-forati.
Alimentazione refrigerante: radiale (assiale su richiesta).
Comprese viti di serraggio art. n. 86807.



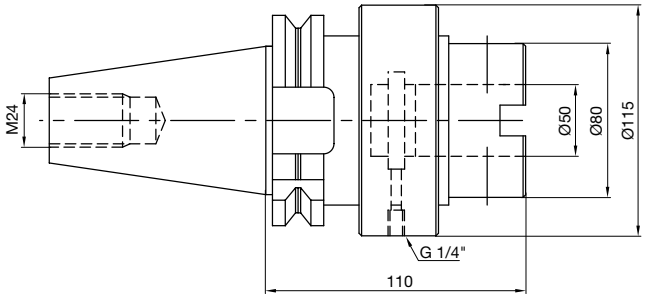
d1 mm	d mm	S	L mm	l2 mm	B mm	G	Codice
35,01-45,0	34,000	MK-4	566,000	393,000	7,000	86807 4.001	**34,393**
35,01-45,0	34,000	MK-4	716,000	543,000	7,000	86807 4.001	**34,543**
35,01-45,0	34,000	MK-4	1016,000	843,000	7,000	86807 4.001	**34,843**
45,01-55,0	44,000	MK-4	566,000	394,500	7,000	86807 4.001	**44,395**
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**

Programma speciale Multiplex sistema modulare Ø 97 mm fino 210 mm

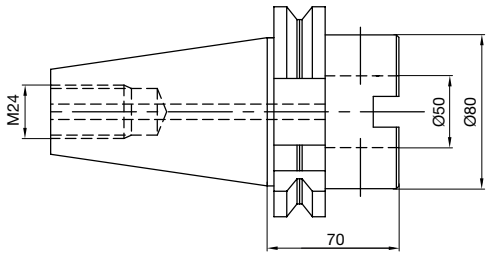
Mandrini

Sono fornibili a richiesta le seguenti esecuzioni:

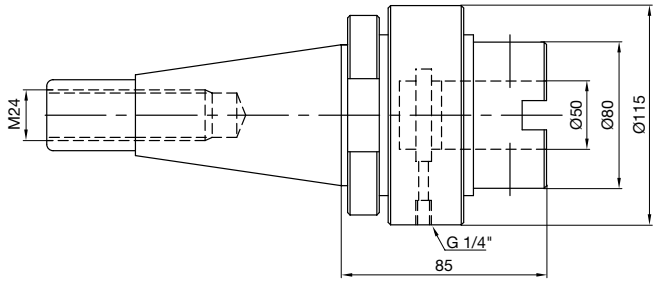
- SK50 DIN 69871 con anello adduttore



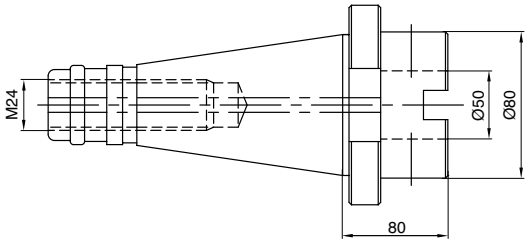
- SK50 DIN 69871 senza anello adduttore



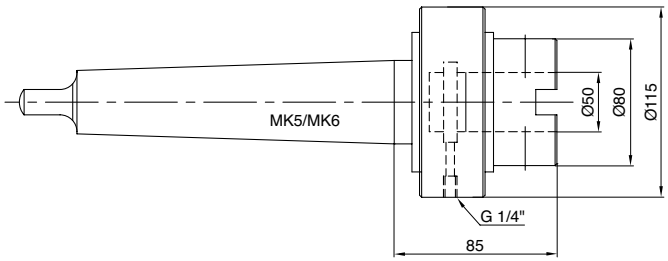
- SK50 DIN 2080 con anello adduttore



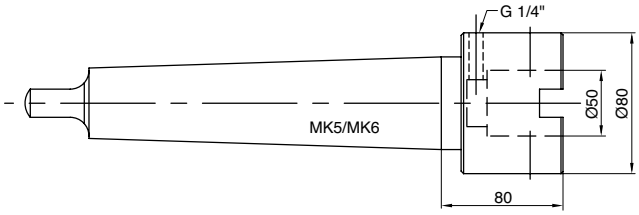
- SK50 DIN 2080 senza anello adduttore



- CM 5/CM 6 con anello adduttore

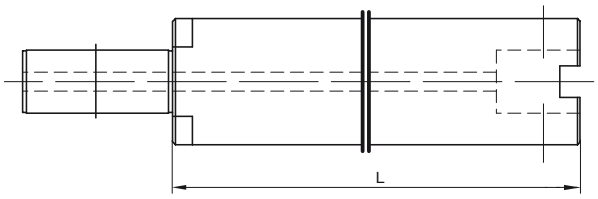


- CM 5/CM 6 senza anello adduttore



Programma speciale Multiplex sistema modulare Ø 97 mm fino 210 mm

Prolunghe per testa foratrice



Prolunghe per testa foratrice
Ø 97 mm - Ø 130 mm
L = 186 mm
L = 300 mm

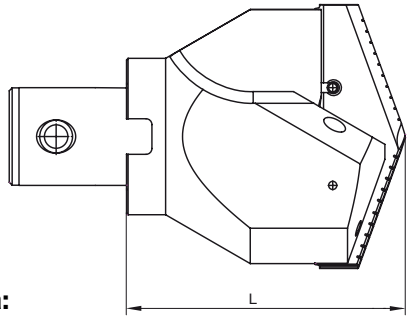
Prolunghe per testa foratrice
Ø 131 mm - Ø 165 mm und Ø 164 mm - Ø 210 mm
L = 204 mm
L = 300 mm
L = 500 mm

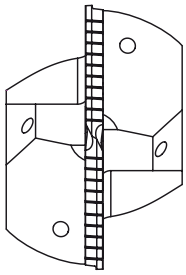
Trascinatore

piccolo, per testa foratrice
Ø 97 mm - Ø 130 mm,
larghezza 14 mm

grande, per testa foratrice Ø 131 mm - Ø 165 mm
e Ø 164 mm - Ø 210 mm, larghezza 16 mm

Teste foratrici





Le seguenti grandezze sono fornibili a richiesta:
- Ø 97 mm fino Ø 130 mm, L = 118,5 mm
- Ø 131 mm fino Ø 165 mm, L = 142,5 mm
- Ø 164 mm fino Ø 210 mm, L = 142,5 mm

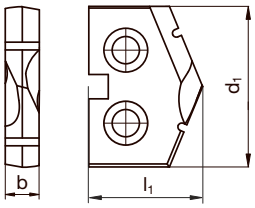
Inserti intercambiabili

Articolo n. 86602

P	M	K	N	S	H
●	○	●	○		

HSS-E-PM | T | WN | 135° | R | 0/+0,05

assott. del nocc. ≥ Ø 9,800 • inserti con scanalature truciolo divise. Angolo di affilatura 135°. Per utilizzo universale.



d1 mm	l1 mm	b mm	Codice
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**

d1 mm	l1 mm	b mm	Codice
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**

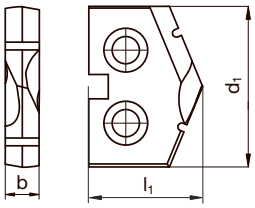
Inserti intercambiabili

Articolo n. 86605

P	M	K	N	S	H
○	●	○	●	●	

HSS-E | T | WN | 132° | R | 0/+0,05

assott. del nocc. ≥ Ø 25,000 • Inserto intercambiabile con scanalature truciolo divise Geometria VA per acciai inossidabili, leghe di alluminio e metalli non ferrosi
angolo di affilalatura:
≥ Ø 25,0 mm = 132°
> Ø 66,0 mm = 140°



d1 mm	l1 mm	b mm	Codice
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	Codice
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**

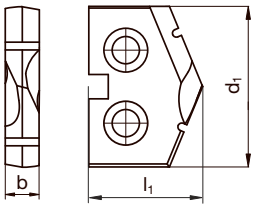
Inserti intercambiabili

Articolo n. 86608

P	M	K	N	S	H
●	○	●	○		

HSS-E-PM | F | WN | 135° | R | 0/+0,05

assott. del nocc. ≥ Ø 10,000 • inserti con scanalature truciolo divise. Angolo di affilatura 135°. Per utilizzo universale.



d1 mm	l1 mm	b mm	Codice
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	Codice
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**

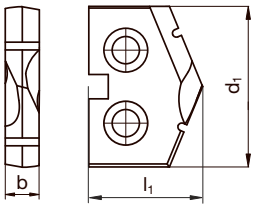
Inserti intercambiabili

Articolo n. 86609

P	M	K	N	S	H
●	○	●	○		

HSS-E-PM | A | WN | 132° | R | 0/+0,05

assott. del nocc. ≥ Ø 25,000 • inserti con scanalature truciolo divise. Per utilizzo universale.
angolo di affilatura:
≥ Ø 25,0 mm = 132°
> Ø 66,0 mm = 140°
> Ø 190,0 mm = 150°
materiale da taglio:
≤ Ø 66,0 mm HSS-E-PM
> Ø 66,0 mm HSS-E



d1 mm	l1 mm	b mm	Codice
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	Codice
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**

HARTNER

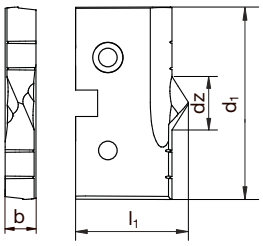
Inserti intercambiabili

Articolo n. 86611

P	M	K	N	S	H
●	○	●	○		

HSS-E-PM | A | WN | 180° | R | -0,02/ -0,07

assott. del nocc. ≥ Ø 10,000 • Inserto intercambiabile con scanalature rompitruciolo. Per impiego universale.
Angolo della punta di centraggio:
≤ Ø 35,0 mm = 120°
> Ø 35,0 mm = 140°



d1 mm	l1 mm	b mm	Codice	d1 mm	l1 mm	b mm	Codice
10,000	10,000	2,500	**10,000**	23,000	15,000	4,000	**23,000**
10,500	10,000	2,500	**10,500**	23,500	15,000	4,000	**23,500**
11,000	10,000	2,500	**11,000**	24,000	15,000	4,000	**24,000**
11,500	10,000	2,500	**11,500**	24,500	15,000	4,000	**24,500**
11,750	10,000	2,500	**11,750**	24,750	15,000	4,000	**24,750**
12,000	10,000	2,500	**12,000**	25,000	15,000	4,000	**25,000**
12,500	10,000	2,500	**12,500**	25,000	18,500	5,000	**25,001**
12,700	10,000	2,500	**12,700**	25,400	18,500	5,000	**25,400**
12,750	10,000	2,500	**12,750**	25,500	18,500	5,000	**25,500**
13,000	10,000	2,500	**13,000**	26,000	18,500	5,000	**26,000**
13,250	10,000	2,500	**13,250**	26,500	18,500	5,000	**26,500**
13,500	13,000	3,500	**13,500**	27,000	18,500	5,000	**27,000**
13,750	13,000	3,500	**13,750**	28,000	18,500	5,000	**28,000**
14,000	13,000	3,500	**14,000**	29,000	18,500	5,000	**29,000**
14,250	13,000	3,500	**14,250**	29,500	18,500	5,000	**29,500**
14,500	13,000	3,500	**14,500**	30,000	18,500	5,000	**30,000**
14,750	13,000	3,500	**14,750**	31,000	18,500	5,000	**31,000**
15,000	13,000	3,500	**15,000**	32,000	18,500	5,000	**32,000**
15,250	13,000	3,500	**15,250**	33,000	18,500	5,000	**33,000**
15,500	13,000	3,500	**15,500**	34,000	18,500	5,000	**34,000**
15,750	13,000	3,500	**15,750**	35,000	18,500	5,000	**35,000**
16,000	13,000	3,500	**16,000**	36,000	25,500	7,000	**36,000**
16,500	13,000	3,500	**16,500**	37,000	25,500	7,000	**37,000**
17,000	13,000	3,500	**17,000**	38,000	25,500	7,000	**38,000**
17,500	13,000	3,500	**17,500**	39,000	25,500	7,000	**39,000**
17,750	13,000	3,500	**17,750**	40,000	25,500	7,000	**40,000**
18,000	13,000	3,500	**18,000**	41,000	25,500	7,000	**41,000**
18,250	13,000	3,500	**18,250**	42,000	25,500	7,000	**42,000**
18,500	13,000	3,500	**18,500**	43,000	25,500	7,000	**43,000**
18,750	13,000	3,500	**18,750**	44,000	25,500	7,000	**44,000**
19,000	15,000	4,000	**19,000**	45,000	25,500	7,000	**45,000**
19,500	15,000	4,000	**19,500**	46,000	25,500	7,000	**46,000**
19,750	15,000	4,000	**19,750**	47,000	25,500	7,000	**47,000**
20,000	15,000	4,000	**20,000**	48,000	25,500	7,000	**48,000**
20,250	15,000	4,000	**20,250**	49,000	25,500	7,000	**49,000**
20,500	15,000	4,000	**20,500**	50,000	25,500	7,000	**50,000**
21,000	15,000	4,000	**21,000**	51,000	25,500	7,000	**51,000**
21,250	15,000	4,000	**21,250**	52,000	25,500	7,000	**52,000**
21,500	15,000	4,000	**21,500**	53,000	25,500	7,000	**53,000**
21,750	15,000	4,000	**21,750**	54,000	25,500	7,000	**54,000**
22,000	15,000	4,000	**22,000**	55,000	25,500	7,000	**55,000**
22,500	15,000	4,000	**22,500**	56,000	25,500	7,000	**56,000**

Inserti intercambiabili

d1 mm	l1 mm	b mm	**Codice**	d1 mm	l1 mm	b mm	**Codice**
57,000	25,500	7,000	**57,000**	65,000	25,500	7,000	**65,000**
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**				

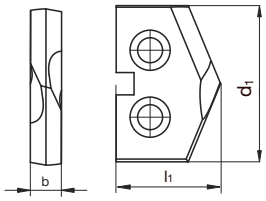
Inserti intercambiabili

Articolo n. 86701

P	M	K	N	S	H
●	○	●	○		

VHM | F | WN | 135° | R | 0/+0,05

assott. del nocc. ≥ Ø 10,000 • Inserti senza scanalature truciolo divise. Per materiale fino a 600 N/mm². Per utilizzo universale.
Angolo di affilatura:
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°
senza smusso (vedi consigli per l'utilizzo Multiplex/parte tecnica)



d1 mm	l1 mm	b mm	Codice	d1 mm	l1 mm	b mm	Codice
10,000	8,700	2,500	**10,000**	18,000	11,700	3,500	**18,000**
10,200	8,700	2,500	**10,200**	18,250	11,700	3,500	**18,250**
10,500	8,700	2,500	**10,500**	18,500	11,700	3,500	**18,500**
11,000	8,700	2,500	**11,000**	19,000	13,700	4,000	**19,000**
11,500	8,700	2,500	**11,500**	19,500	13,700	4,000	**19,500**
12,000	8,700	2,500	**12,000**	20,000	13,700	4,000	**20,000**
12,500	8,700	2,500	**12,500**	20,500	13,700	4,000	**20,500**
12,750	8,700	2,500	**12,750**	21,000	13,700	4,000	**21,000**
13,000	8,700	2,500	**13,000**	21,500	13,700	4,000	**21,500**
13,500	11,700	3,500	**13,500**	22,000	13,700	4,000	**22,000**
13,750	11,700	3,500	**13,750**	23,000	13,700	4,000	**23,000**
14,000	11,700	3,500	**14,000**	24,000	13,700	4,000	**24,000**
14,500	11,700	3,500	**14,500**	24,500	13,700	4,000	**24,500**
14,750	11,700	3,500	**14,750**	25,000	13,700	4,000	**25,000**
15,000	11,700	3,500	**15,000**	26,000	17,300	5,000	**26,000**
15,500	11,700	3,500	**15,500**	27,000	17,300	5,000	**27,000**
15,750	11,700	3,500	**15,750**	28,000	17,300	5,000	**28,000**
16,000	11,700	3,500	**16,000**	29,000	17,300	5,000	**29,000**
16,250	11,700	3,500	**16,250**	30,000	17,300	5,000	**30,000**
16,500	11,700	3,500	**16,500**	31,000	17,300	5,000	**31,000**
16,750	11,700	3,500	**16,750**	32,000	17,300	5,000	**32,000**
17,000	11,700	3,500	**17,000**	33,000	17,300	5,000	**33,000**
17,500	11,700	3,500	**17,500**	34,000	17,300	5,000	**34,000**
17,750	11,700	3,500	**17,750**	35,000	17,300	5,000	**35,000**

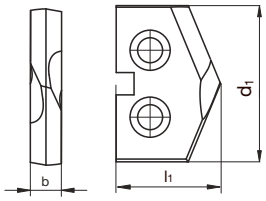
Inserti intercambiabili

Articolo n. 86702

P	M	K	N	S	H
●	○	●	○		

VHM | F | WN | 135° | R | 0/+0,05

assott. del nocc. ≥ Ø 10,000 • Inserti senza scanalature truciolo divise. Per materiale fino a 600 N/mm². Per utilizzo universale.
Angolo di affilatura:
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°
con smusso (vedi consigli per l'utilizzo Multiplex/parte tecnica)



d1 mm	l1 mm	b mm	Codice
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	Codice
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**

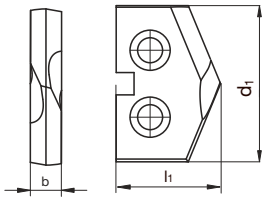
Inserti intercambiabili

Articolo n. 86708

P	M	K	N	S	H
●	○	●	○		

VHM | T | WN | 135° | R | 0/+0,05

assott. del nocc. ≥ Ø 9,800 • Inserti senza scanalature truciolo divise. Per materiale fino a 600 N/mm². Per utilizzo universale.
Angolo di affilatura:
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°
con smusso (vedi consigli per l'utilizzo Multiplex/parte tecnica)



d1 mm	l1 mm	b mm	Codice
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	Codice
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**

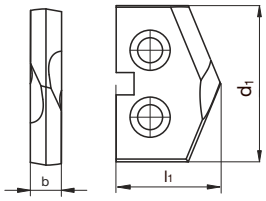
Inserti intercambiabili

Articolo n. 86709

P	M	K	N	S	H
●	○	●	○		

VHM | T | WN | 135° | R | 0/+0,05

assott. del nocc. ≥ Ø 9,800 • Inserti senza scanalature truciolo divise. Per materiale fino a 600 N/mm². Per utilizzo universale.
Angolo di affilatura:
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°
senza smusso (vedi consigli per l'utilizzo Multiplex/parte tecnica)



d1 mm	l1 mm	b mm	Codice
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	Codice
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**

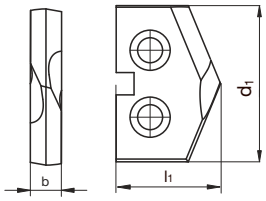
Inserti intercambiabili

Articolo n. 86711

P	M	K	N	S	H
			•		

VHM | WN | 135° | R | 0/+0,05

assott. del nocc. ≥ Ø 10,000 • Inserto intercambiabile con scanalature rompitruciolo.
Geometria per alluminio, leghe di alluminio, metalli non ferrosi e plastiche:
≤ Ø 25,4 mm = 135°
> Ø 25,4 mm = 132°



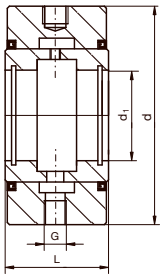
d1 mm	l1 mm	b mm	Codice	d1 mm	l1 mm	b mm	Codice
10,000	8,700	2,500	**10,000**	24,000	13,700	4,000	**24,000**
10,200	8,700	2,500	**10,200**	24,250	13,700	4,000	**24,250**
10,500	8,700	2,500	**10,500**	24,500	13,700	4,000	**24,500**
11,000	8,700	2,500	**11,000**	25,000	13,700	4,000	**25,000**
11,500	8,700	2,500	**11,500**	25,400	17,300	5,000	**25,400**
12,000	8,700	2,500	**12,000**	26,000	17,300	5,000	**26,000**
12,250	8,700	2,500	**12,250**	27,000	17,300	5,000	**27,000**
12,500	8,700	2,500	**12,500**	28,000	17,300	5,000	**28,000**
12,700	8,700	2,500	**12,700**	29,000	17,300	5,000	**29,000**
12,750	8,700	2,500	**12,750**	30,000	17,300	5,000	**30,000**
13,000	8,700	2,500	**13,000**	31,000	17,300	5,000	**31,000**
13,500	11,700	3,500	**13,500**	32,000	17,300	5,000	**32,000**
13,750	11,700	3,500	**13,750**	34,000	17,300	5,000	**34,000**
14,000	11,700	3,500	**14,000**	35,000	17,300	5,000	**35,000**
14,250	11,700	3,500	**14,250**	36,000	24,000	7,000	**36,000**
14,500	11,700	3,500	**14,500**	37,000	24,000	7,000	**37,000**
14,750	11,700	3,500	**14,750**	38,000	24,000	7,000	**38,000**
15,000	11,700	3,500	**15,000**	39,000	24,000	7,000	**39,000**
15,500	11,700	3,500	**15,500**	40,000	24,000	7,000	**40,000**
15,750	11,700	3,500	**15,750**	41,000	24,000	7,000	**41,000**
16,000	11,700	3,500	**16,000**	42,000	24,000	7,000	**42,000**
16,250	11,700	3,500	**16,250**	43,000	24,000	7,000	**43,000**
16,500	11,700	3,500	**16,500**	44,000	24,000	7,000	**44,000**
16,750	11,700	3,500	**16,750**	45,000	24,000	7,000	**45,000**
17,000	11,700	3,500	**17,000**	46,000	24,000	7,000	**46,000**
17,500	11,700	3,500	**17,500**	47,000	24,000	7,000	**47,000**
17,750	11,700	3,500	**17,750**	48,000	24,000	7,000	**48,000**
18,000	11,700	3,500	**18,000**	49,000	24,000	7,000	**49,000**
18,250	11,700	3,500	**18,250**	50,000	24,000	7,000	**50,000**
18,500	11,700	3,500	**18,500**	51,000	24,000	7,000	**51,000**
19,000	13,700	4,000	**19,000**	52,000	24,000	7,000	**52,000**
19,500	13,700	4,000	**19,500**	53,000	24,000	7,000	**53,000**
19,750	13,700	4,000	**19,750**	54,000	24,000	7,000	**54,000**
20,000	13,700	4,000	**20,000**	55,000	24,000	7,000	**55,000**
20,500	13,700	4,000	**20,500**	56,000	24,000	7,000	**56,000**
21,000	13,700	4,000	**21,000**	57,000	24,000	7,000	**57,000**
21,500	13,700	4,000	**21,500**	58,000	24,000	7,000	**58,000**
22,000	13,700	4,000	**22,000**	59,000	24,000	7,000	**59,000**
22,500	13,700	4,000	**22,500**	60,000	24,000	7,000	**60,000**
22,750	13,700	4,000	**22,750**	62,000	24,000	7,000	**62,000**
23,000	13,700	4,000	**23,000**	64,000	24,000	7,000	**64,000**
23,500	13,700	4,000	**23,500**	65,000	24,000	7,000	**65,000**

Alimentatori per punte con fori di refrigerazione

Articolo n. 86690

WN

Anello di alimentazione del refrigerante per per corpo con attacco CM e sede per anello art. 86670 e 86680 (senza set avvitatura).

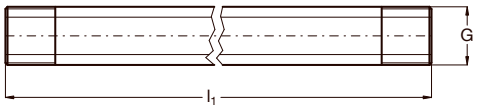


per	d1 mm	d mm	G	L mm	**Codice**
MK 4	31,750	80,000	G1/4	45,000	**31,750**
MK 5	63,500	127,000	G1/2	60,000	**63,500**

Tubi di adduzione

Articolo n. 82571

Tubo di adduzione refrigerante per anello di alimentazione del refrigerante Art. n. 86690



G	l1 mm	Codice
G1/4	200,000	**13,160**
G1/2	200,000	**20,960**

Attacco rapido

Articolo n. 82578

WN

raccordo rapido di uscita per articolo n. 82571

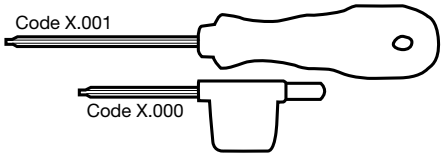
G	d mm	l1 mm	**Codice**
G1/4	9,000	118,000	**9,000**
G1/2	13,000	118,000	**13,000**

Giravite Torx

Articolo n. 86842

WN

Giravite Torx



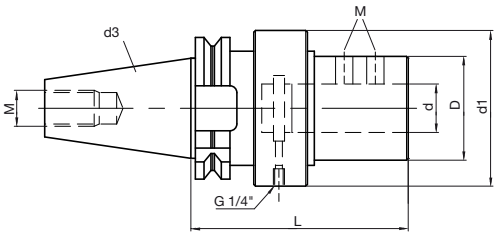
Torx	l1 mm	**Codice**
T5	130,000	**5,001**
T6	69,000	**6,000**
T6	150,000	**6,001**
T7	74,000	**7,000**
T7	150,000	**7,001**
T8	150,000	**8,001**
T9	150,000	**9,001**
T10	170,000	**10,001**
T15	80,000	**15,000**
T15	190,000	**15,001**
T20	205,000	**20,001**
T25	207,000	**25,001**

Mandrino di adduzione refrigerante per Multiplex

Articolo n. 86691

B WN SK

Mandrino di alimentazione del refrigerante con attacco SK secondo DIN ISO 7388-1 e attacco per utensili con codolo cilindrico. Per codoli di Ø più piccoli utilizzare le bussole di riduzione.



d3	d mm	D mm	D1 mm	L mm	M	 kg	Codice
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**

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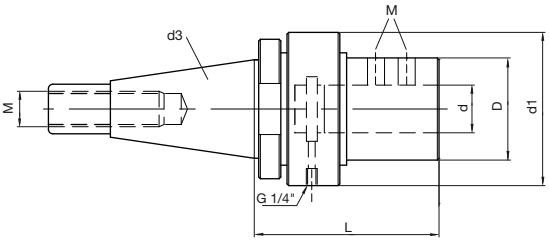
Mandrino di adduzione refrigerante per Multiplex

Articolo n. 86692

B WN SK

Mandrino con alimentazione di refrigerante con SK a DIN 2080 e foratura cilindrica. Per codolo con differenti Ø utilizzo con bussola di riduzione.



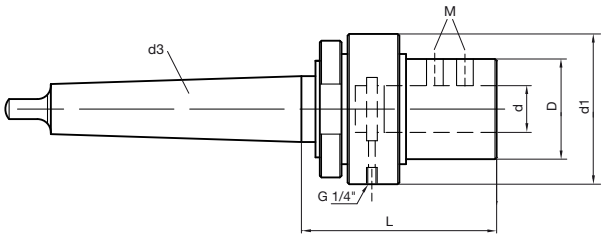
d3	d mm	D mm	D1 mm	L mm	M	 kg	Codice
SK 40	32,000	65,000	88,000	110,000	M16	0,931	**32,040**
SK 50	40,000	65,000	98,000	120,000	M24	5,825	**40,050**
SK 50	50,000	90,000	123,000	145,000	M24	9,116	**50,050**

Mandrino di adduzione refrigerante per Multiplex

Articolo n. 86693

B WN MK

Mandrino per adduzione refrigerante con CM a DIN 228 B e foratura cilindrica. Per codolo con differenti Ø utilizzo con bussola di riduzione.



d3	d mm	D mm	D1 mm	L mm	M	 kg	Codice
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**

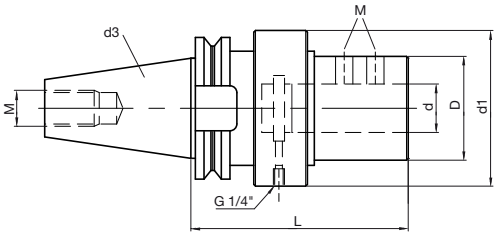
HARTNER

Mandrino di adduzione refrigerante per Multiplex

Articolo n. 86694

B WN MAS-BT

Mandrino per alimentazione del refrigerante con attacco MAS BT secondo DIN ISO 7388-2 e attacco per utensili con codolo cilindrico.
Per codoli di Ø più piccoli utilizzare le bussole di riduzione.



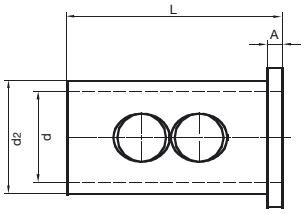
d3	d mm	D mm	D1 mm	L mm	M	 kg	Codice
BT 40	32,000	65,000	88,000	125,000	M16	0,872	**32,040**
BT 50	40,000	65,000	98,000	145,000	M24	6,800	**40,050**
BT 50	50,000	90,000	123,000	170,000	M24	10,183	**50,050**

Bussole di riduzione per attacchi cilindrici

Articolo n. 86699

B WN Cyl

Bussola di riduzione per mandrino di alimentazione del refrigerante con attacco cilindrico



d mm	d2 mm	L mm	A mm	**Codice**
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

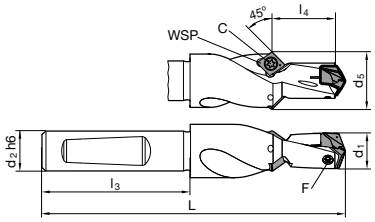
Corpo portaplacchette Multiplex-HPC

Articolo n. 86681

Ni | HPC | 1xD | WN | R | HE

particolarmente resistente all'usura • forma della scanalatura ottimizzata • uscita del lubrificante ottimizzata • viti art. n. 86843 e 86846 comprese • giravite Art. n. 86842 compreso

per foro pilota e svasatura a 45°



Dimensione mm	d1	d2 h6 mm	d5 mm	L mm	l3 mm	l4 mm	F	C	Codice
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**

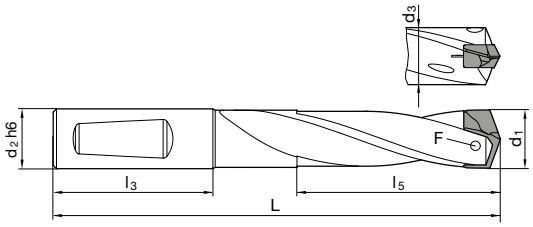
HARTNER

Corpo portaplacchette Multiplex-HPC

Articolo n. 86682

Ni HPC 1,5xD WN R HE

particolarmente resistente all'usura • forma della scanalatura ottimizzata • uscita del lubrificante ottimizzata • viti art. n. 86843 comprese • giravite Art. n. 86842 compreso



Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
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**

Corpo portaplacchette Multiplex-HPC

Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
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**

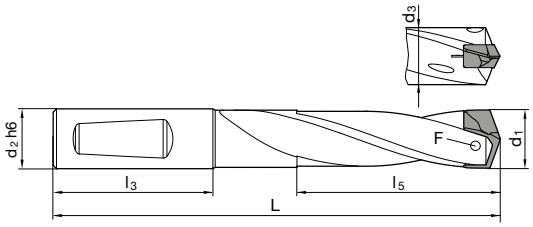
HARTNER

Corpo portaplacchette Multiplex-HPC

Articolo n. 86683

Ni HPC 3xD WN R HE

particolarmente resistente all'usura • forma della scanalatura ottimizzata • stabilità elevata • viti art. n. 86843 comprese • giravite Art. n. 86842 compreso



Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
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**

Corpo portaplacchette Multiplex-HPC

Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
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**

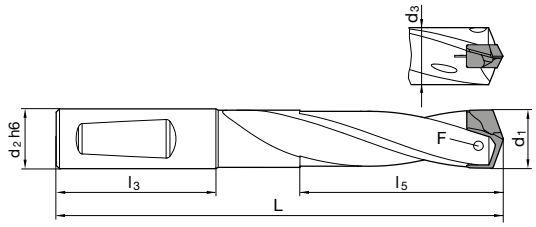
HARTNER

Corpo portaplacchette Multiplex-HPC

Articolo n. 86684

Ni HPC 5xD WN R HE

particolarmente resistente all'usura • forma della scanalatura ottimizzata • stabilità elevata • viti art. n. 86843 comprese • giravite Art. n. 86842 compreso



Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
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**

Corpo portaplacchette Multiplex-HPC

Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
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**

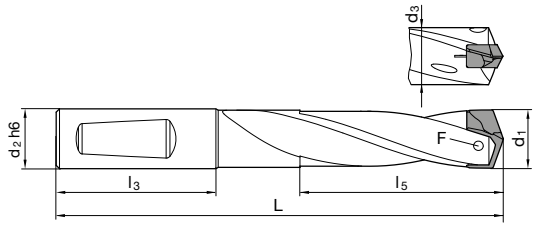
HARTNER

Corpo portaplacchette Multiplex-HPC

Articolo n. 86685

Ni HPC 7xD WN R HE

particolarmente resistente all'usura • forma della scanalatura ottimizzata • stabilità elevata • viti art. n. 86843 comprese • giravite Art. n. 86842 compreso



Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
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**

Corpo portaplacchette Multiplex-HPC

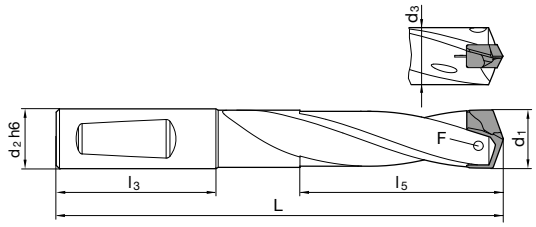
Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
215	21,50-21,99	25,000	21,200	251,000	56,000	158,100	86843 4.500	**21,500**
215	21,50-21,99	25,400	21,200	251,000	56,000	158,100	86843 4.500	**21,505**
220	22,00-22,49	25,000	21,700	255,000	56,000	161,700	86843 5.000	**22,000**
220	22,00-22,49	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

Corpo portaplacchette Multiplex-HPC

Articolo n. 86686

particolarmente resistente all'usura • forma della scanalatura ottimizzata • stabilità elevata • viti art. n. 86843 comprese • giravite Art. n. 86842 compreso



Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
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**

Corpo portaplacchette Multiplex-HPC

Dimensione mm	d1	d2 h6 mm	d3 mm	L mm	l3 mm	l5 mm	F	Codice
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**

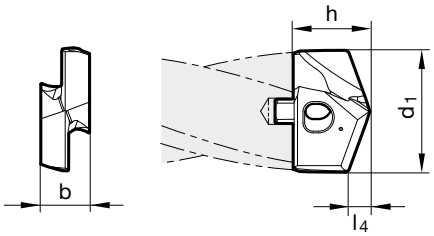
Inserti intercambiabili per Multiplex HPC

Articolo n. 86721

P	M	K	N	S	H
○	○	○	○	○	○

VHM | a | HPC | WN | 145° | m7 | R

assott. del nocc. ≥ Ø 11,000 • affilatura su piani • tagliente principale forma diritta (dopo correzione) • viti art. n. 86843 comprese per fori pilota in tutti i materiali



Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	 inch	l4 mm	b mm	h mm	Codice
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**

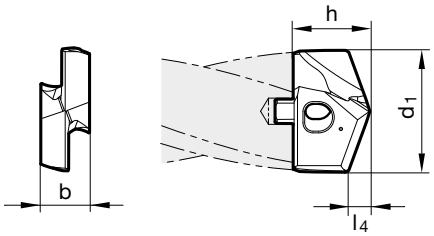
Inserti intercambiabili per Multiplex HPC

Articolo n. 86722

P	M	K	N	S	H
●	○	○			

VHM | F | HPC | WN | 140° | h7 | R

assott. del nocc. ≥ Ø 11,000 • affilatura su piani • tagliente principale forma diritta (dopo correzione) • viti art. n. 86843 comprese
acciai da costruzione e da cementazione • acciai automatici, acciai da bonifica • acciai legati e non legati con R fino a 1200 N/mm²



Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	 inch	l4 mm	b mm	h mm	Codice
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**

HARTNER

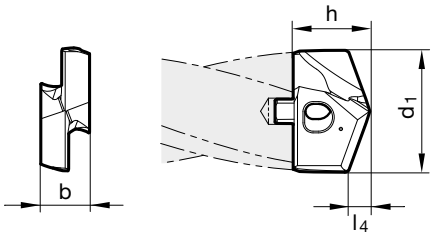
Inserti intercambiabili per Multiplex HPC

Articolo n. 86723

P	M	K	N	S	H
○		●			

VHM | Y | HPC | WN | 140° | m7 | R

assott. del nocc. ≥ Ø 11,000 • affilatura su piani • tagliente principale forma diritta (dopo correzione) • viti art. n. 86843 comprese
ghisa verimicolare GGV • ghisa grigia, ghisa malleabile, ghisa sferoidale



Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	 inch	l4 mm	b mm	h mm	Codice
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**

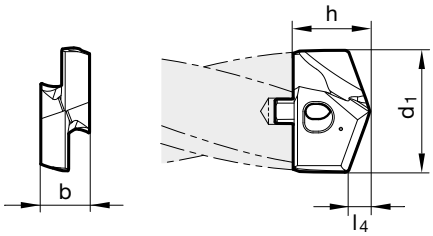
Inserti intercambiabili per Multiplex HPC

Articolo n. 86724

P	M	K	N	S	H
			•		

VHM | HPC | WN | 140° | h7 | R

assott. del nocc. ≥ Ø 11,000 • spoglia sul cono tagliente • viti art. n. 86843 comprese • tagliente principale forma concava
alluminio e leghe di alluminio • metalli non ferrosi



Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	 inch	l4 mm	b mm	h mm	Codice
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**

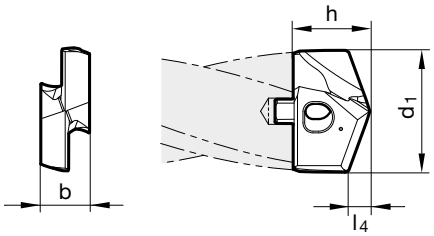
Inserti intercambiabili per Multiplex HPC

Articolo n. 86725

P	M	K	N	S	H
○	●			○	○

VHM | a | HPC | WN | 140° | h7 | R

assott. del nocc. ≥ Ø 11,000 • spoglia sul cono tagliente • tagliente principale forma diritta (dopo correzione) • viti art. n. 86843 comprese acciai inossidabili



Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti intercambiabili per Multiplex HPC

Dimensione	d1 mm	 inch	l4 mm	b mm	h mm	Codice
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**

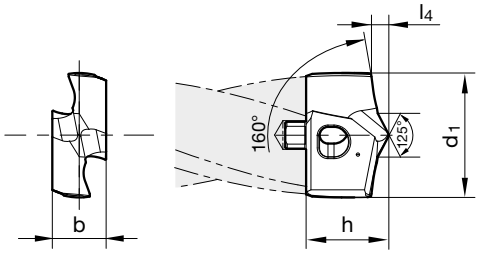
Inserti intercambiabili per Multiplex HPC

Articolo n. 86729

P	M	K	N	S	H
•					

VHM | F | WN | 160° 125° | h7 | R

affilatura su piani • tagliente principale forma concava • speciale geometria con angolo di punta a 160° e punto centrale a 125° • viti art. n. 86843 comprese



Dimensione	d1 mm	inch	l4 mm	b mm	h mm	Codice
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**

Inserti a svasare Multiplex HPC

Articolo n. 86726

P	M	K	N	S	H
○		●			

VHM A WN N

ghisa grigia, ghisa malleabile, ghisa sferoidale

ISO		Dimensione supporto	Codice
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**

Articolo n. 86727

P	M	K	N	S	H
			●		

VHM ○ WN R

alluminio e leghe di alluminio • metalli non ferrosi

ISO		Dimensione supporto	Codice
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**

Inserti a svasare Multiplex HPC

Articolo n. 86728

P	M	K	N	S	H
●	○	○		○	○

VHM T WN R

acciaio e ghisa acciaiosa (legati e non legati)

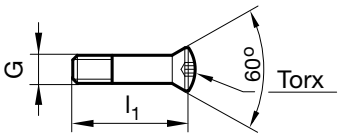
ISO		Dimensione supporto	Codice
CPGT050202F	R-P	110-140	**52,020**
CPGT050204F	R-P	110-140	**52,040**
CPGT060202F	R-P	160-280	**62,020**
CPGT060204F	R-P	160-280	**62,040**
CPGT09T308F	R-P	300-360	**93,080**

Viti di serraggio per placchette 1.5-10xD

Articolo n. 86843

WN

Coppie di serraggio per viti Torx vedi “Multiplex HPC - Tecnica e vantaggi”



G	l1 mm	Torx	**Codice**
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**

Giraviti dinamometrici

Articolo n. 86844

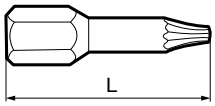
WN

Esagono	Momento torcente Nm	L mm	Tipo	**Codice**
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**

Inserti Torx

Articolo n. 86845

WN



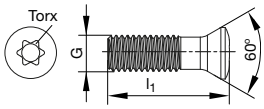
Esagono		Torx	L mm	**Codice**
1/4	esagonale	T5	25,000	**5,000**
1/4	esagonale	T7	25,000	**7,000**
1/4	esagonale	T8	25,000	**8,000**
1/4	esagonale	T9	25,000	**9,000**
1/4	esagonale	T10	25,000	**10,000**
1/4	esagonale	T15	25,000	**15,000**
1/4	esagonale	T20	25,000	**20,000**
1/4	esagonale	T25	25,000	**25,001**

Viti di serraggio per svasatori Multiplex HPC

Articolo n. 86846

WN

Coppie di serraggio per viti Torx vedi “Multiplex HPC - Tecnica e vantaggi”



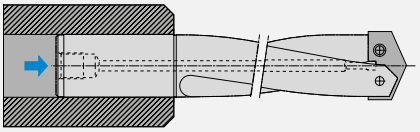
G	l1 mm	Torx	**Codice**
M 2	5,500	T6	**2,000**
M2,5	5,300	T7	**2,500**
M4	9,500	T15	**4,006**

Multiplex – L‘alternativa versatile

Ogni corpo portaplacchetta Multiplex dispone di un canale interno di refrigerazione, che garantisce un’alimentazione ottimale del lubrorefrigerante ai taglienti nella foratura sia orizzontale che verticale e ne prolunga la durata.
Al contempo il refrigerante provvedere anche a uno scarico ottimizzato dei trucioli dal foro.
La refrigerazione avviene in modo differente nelle diverse versioni di codolo:

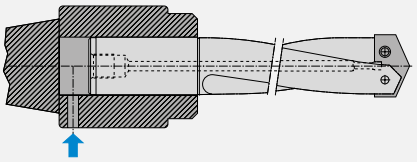
Foro di alimentazione sul lato anteriore del codolo

Per utensili **fissi** e **rotanti**:
Alimentazione assiale del refrigerante attraverso il portautensile.
Per corpi portaplacchetta con codolo cilindrico Ø foro 10 - 102 mm.
Corpo portaplacchetta Art. n. 86612/86622/86624/86730/86740/86750
e corpi extra lunghi



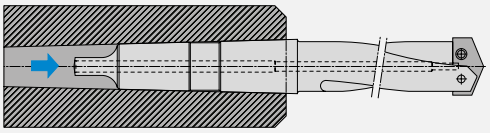
Foro di alimentazione sul lato anteriore del codolo con mandrino di alimentazione

Per utensili **rotanti**:
Alimentazione radiale del refrigerante attraverso il mandrino di alimentazione.
Per corpi portaplacchetta con codolo cilindrico e Ø foro 10 - 102 mm.
Corpo portaplacchetta Art. n. 86612/86622/86624/86730/86740/86750
e corpi extr a lunghi, mandrini SK40/50 int. cil. e MK4/5/6 int. cil.



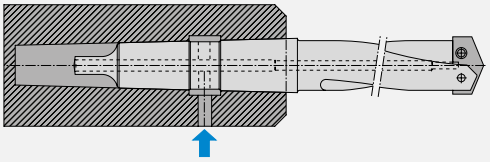
Foro di alimentazione sul dente di trascinamento

Per utensili **fissi** e **rotanti**:
Alimentazione assiale del refrigerante attraverso il portautensile.
Per corpi con codolo conico Morse e Ø foro 10 - 25 mm.
Corpo portaplacchetta Art. n. 86630/86650



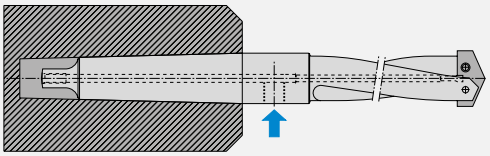
Foro di alimentazione laterale sul cono Morse

Per utensili **fissi**:
Alimentazione radiale del refrigerante attraverso il portautensile.
Per corpi portaplacchetta con codolo conico Morse e Ø foro 10 - 25 mm.
Corpi a richiesta



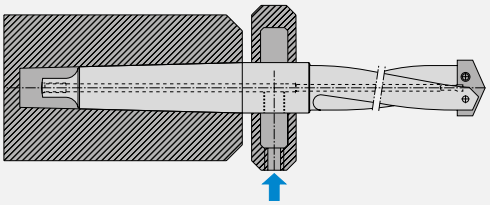
Foro di alimentazione laterale sulla sede della superficie di scorri-mento anulare

Per utensili **fissi**:
Alimentazione del refrigerante tramite raccordo diretto tubo flessibile/rigido con filettatura R1/4” e R1/2”. Per corpi portaplacchetta con codolo conico Morse e sede per anello alimentatore per Ø foro 25 - 102 mm.
Corpo portaplacchetta Art. n. 86670/86680 e corpi extra lunghi



Foro di alimentazione laterale sulla sede della superficie di scorri-mento anulare

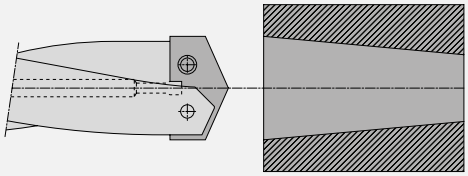
Per utensili **rotanti**:
Alimentazione radiale del refrigerante attraverso l’anello alimentatore.
Per corpi portaplacchetta con codolo conico Morse e superficie di scorrimento anulare per Ø foro da 25 mm.
Corpo portaplacchetta Art. n. 86670/86680 e corpi extra lunghi



Multiplex – Consigli e trucchi

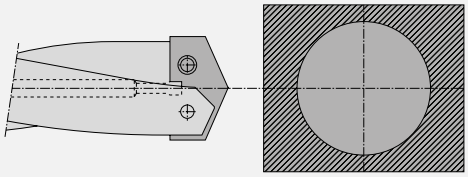
Allargatura di fori

Poiché il sistema Multiplex è guidato principalmente dal tagliente trasversale, non è idoneo per l'allargatura di fori prefusi o preforati. Se il sistema deve comunque essere utilizzato, è necessario ridurre i parametri d'impiego.



Foratura in sezione interrotta

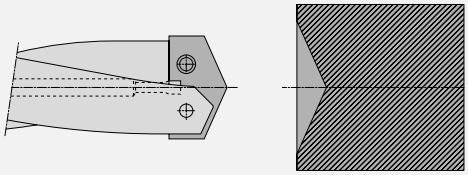
Il sistema Multiplex non è idoneo per la foratura in sezione interrotta (per es. fori trasversali che sono più grandi del diametro del foro).



Centraggio del foro

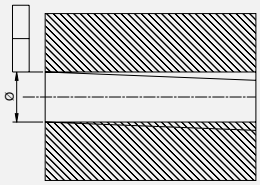
Le placchette di foratura del sistema Multiplex sono assottigliate in punta. Il centraggio è pertanto necessario soltanto a partire da profondità maggiori del foro. Qualora il centraggio sia necessario per motivi tecnici, l'angolo al vertice del centraggio deve essere uguale o maggiore dell'angolo al vertice della placchetta di taglio. Ciò corrisponde a: < d = 25,4 mm = 135°
< d = 66,0 mm = 132°
> d = 66,0 mm = 140°

Per l'alesatura può anche essere usato un corpo portaplacchetta corto (3xD).



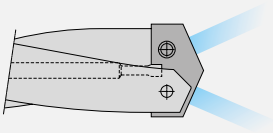
Andamento della punta

L'andamento della punta dipende da diversi fattori.
Come valore indicativo per profondità del foro fino a 7xD può essere assunto un valore di circa 0,1-0,16 mm.
Tuttavia in questo caso dovrebbe sempre essere impiegato il tipo di corpo più corto e quindi più stabile.



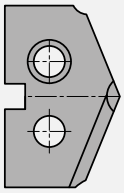
Pressione del refrigerante

Il refrigerante nel sistema Multiplex è estremamente importante per lo scarico trucioli. Può essere utilizzato a partire da una pressione di circa 5 bar. In generale vale tuttavia la seguente regola: più refrigerante c'è a disposizione, meglio è.
Tramite l'impiego di anelli o mandrini alimentatori, il sistema Multiplex può essere utilizzato anche con il raffreddamento esterno impiegato sulle macchine più vecchie.
L'applicazione prevista può comunque essere discussa in qualunque momento con i nostri tecnici.



Forte usura dei taglienti

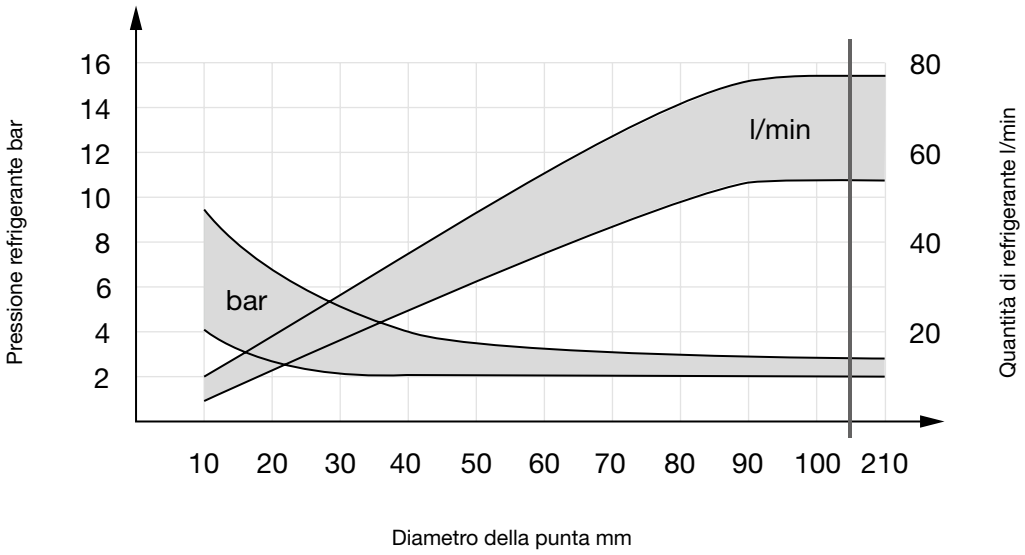
Quando sugli angoli dei taglienti si è formato un gradino, significa che la velocità di taglio è troppo elevata e deve essere ridotta. Misurate il diametro che si è consumato e calcolate nuovamente la velocità di taglio sulla base di questo valore. Sottraete il 10% da questo nuovo numero di giri e immettete il valore nella macchina.



Multiplex – Il gruppo refrigerante

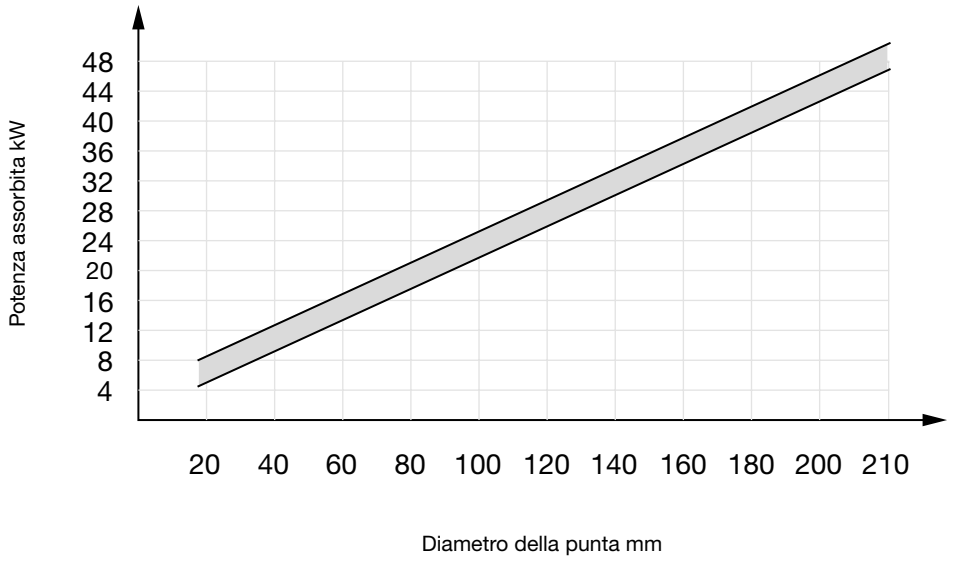
Un gruppo refrigerante efficiente ha un'importanza fondamentale. Qualora la pressione e la quantità del refrigerante non fossero sufficienti, ciò può produrre una superficie di foratura insoddisfacente oppure causare la rottura dell'utensile.
La dimensione delle particelle di solidi nel refrigerante non deve possibilmente superare 50 µm.

Per l'impiego degli utensili Multiplex e per placchette intercambiabili sia in acciaio rapido che in metallo duro, raccomandiamo di utilizzare come liquido di refrigerazione un'emulsione per foratura nel rapporto di miscelazione consueto di 1 : 20. Ancora più importanti della composizione dell'emulsione sono la pressione e la quantità del liquido di refrigerazione. Un gruppo refrigerante efficiente è pertanto un presupposto essenziale per un raffreddamento e una lubrificazione soddisfacenti.



Macchina e pezzo in lavorazione

Soltanto la stabilità di macchina, mandrino, serraggio del pezzo e pezzo in lavorazione consentono di impiegare il metallo duro come materiale dei taglienti. Una rigidità insufficiente provoca delle vibrazioni oppure uno stallo della punta nei fori passanti, quando il tagliente trasversale fuoriesce dal pezzo. Le conseguenze possono essere lunghezze di taglio ridotte o rottura della placchetta.



Multiplex – Geometrie speciali

Placchetta sagomata su disegno del cliente
(HSS-E/HSS-E-PM o MD)

Placchetta NC (HSS-E/HSS-E-PM o MD) con angolatura a 90° (l'angolo di 90° della punta viene deformato secondo il Ø della placchetta)

Placchetta raggiata
(HSS-E/HSS-E-PM o MD)

Placchetta a gradino
(HSS-E/HSS-E-PM o MD)

Geometria ottone (MD)
per la lavorazione dell'ottone e di materiali similari (MD)

Placchetta foro cieco* (HSS-E/PM HSS-E)
sin punta di centraggio

Superficie levigata per materie plastiche rinforzate con fibre (MD)

Placchetta raggiata* (HSS-E/PM, HSS-E)

* **Per utilizzo in fori ciechi e placche a modelli tenere presente quanto segue:**

- utilizzare soltanto corpi corti
- preforare con una normale placchetta Multiplex (stesso Ø oppure Ø più piccolo)
- solo in casi limitati adatte per forature dal pieno
- inviare possibilmente disegno del foro da eseguire

Geometrie speciali fornibili a richiesta con i diversi rivestimenti della nostra gamma.
Interpellateci. **Tempo di consegna circa 3 settimane**.

HARTNER

Multiplex HPC – Tecnologia e vantaggi

Con il sistema di foratura intercambiabile Multiplex HPC Hartner offre corpi portaplacchette e inserti intercambiabili ad alte prestazioni e costi contenuti per fori con Ø da mm 11 a mm 40, i quali garantiscono i seguenti vantaggi:

- **Alta resistenza all'usura**
  Grazie a speciali taglienti microlavorati e applicazioni orientate alla finitura delle superfici gli inserti ntercambiabili del sistema di foratura Multiplex HPC sono articolarmente resistenti all'usura. Anche il corpo portaplacchetta Multiplex HPC possiede una elevata resistenza all'usura. Ciò è possibile grazie a un'ottimizzazione del materiale del corpo, al trattamento di ricopertura al nickel e alla maggiorazione delle dimensioni del corpo nelle grandezze con passo mm 0,5 fino a Ø mm 31,99 e con passo mm 1 fino a Ø mm 32. Questo comporta una minore usura al corpo portaplacchetta.

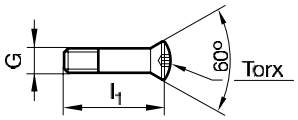
- **Scanalature ottimizzate**
  Grazie ad una ottimizzazione della sezione trasversale delle scanalature il supporto dell Multiplex HPC assicura una ottimale evacuazione del truciolo dal foro anche con grandi profondità di foratura.

- **Perfetta lubrificazione di raffreddamento**
  Una perfetta lubrificazione di raffreddamento è assicurata da condotti di lubrificazione con sezione trasversale massima, in uscita nelle scanalature. In tal modo è possibile un ottimale raffreddamento dei taglienti e un supporto addizionale all'evacuazione del truciolo dal foro.

- **Alta precisione e stabilità della sede dell'inserto**
  L'accurata esecuzione della sede consente il cambio inserto in pochi e semplici passaggi. Grazie all'ottimizzazione del materiale dei corpi portaplcchette del sistema di foratura Multiplex HPC, l'inserto può essere cambiato più frequentemente rispetto ai sistemi convenzionali, prima che il corpo stesso venga danneggiato dall'azione di usura sulla sede dell'inserto. Le viti di serraggio con chiusura a vite garantiscono un sicuro bloccaggio dell'inserto intercambiabile nel supporto anche con macchine soggette ad alti livelli di vibrazioni.

- **Supporti rigidi**
  La ridotta differenza di diametro con la dimensione del corpo non solo diminuisce l'usura. Attraverso una migliore guida dell'utensile nel foro essi aumentano la rigidità del sistema Multiplex HPC. Conseguentemente una maggiore vita utensile così come una migliore superficie del pezzo lavorato.

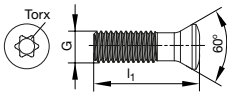
Scelta viti di serraggio per i corpi portaplacchette 1,5 - 10 x D 86843



per grandezza corpo	Torx	Codice No.
110/115	T7	2,200
120/125	T7	2,201
130/135	T8	2,500
140/145	T9	3,000
150/155	T9	3,001
160 - 175	T10	3,500
180 - 195	T15	4,000
200 - 215	T15	4,500

per grandezza corpo	Torx	Codice No.
220 - 235	T20	5,000
240 - 255	T20	5,001
260 - 295	T20	5,003
300 - 315	T25	6,000
320 - 350	T25	6,001
360 - 390	T25	6,002

per i corpi svasatori 86846



per grandezza corpo	Torx	Codice No.
110 - 140	T6	2,000
160 - 280	T7	2,500
300 - 360	T15	4,006

Quando verrà cambiato l'inserto raccomandiamo di cambiare anche la vite di bloccaggio!
Ogni supporto viene fornito con una vite di bloccaggio, art. 86843 e un giravite art. 86842.
Ogni inserto intercambiabile viene fornito con una vite di bloccaggio art. 86843.

Coppie di serraggio per vite di serraggio:

Gamma diametri	**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**
Filetto	M2,2	M2,5	M3	M3,5	M4	M4,5	M5	M6
Dimensioni Torx	T7	T8	T9	T10	T15	T15	T20	T25
Coppia di serraggio [Nm]	**0,8**	**1,0**	**1,7**	**2,7**	**4,0**	**6,0**	**8,0**	**14,0**

HARTNER

Precision Cutting Tools

PARTE TECNICA

Misure, Definizioni, Valori indicativi

Indice
Misure, definizioni

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HARTNER

Lunghezze
Punte elicoidali con codolo cilindrico

sino al diametro incluso	DIN 338		DIN 339		DIN 340		DIN 1897		DIN 1869 punte elicoidali in lunghezze speciali					
									grandezza 1		grandezza 2		grandezza 3	
	lung. totale	lung. elica	lung. totale	lung. elica	lung. totale	lung. elica	lung. totale	lung. elica	lung. totale	lung. elica	lung. totale	lung. elica	lung. totale	lung. elica
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						

a norma di fabbrica Hartner fornisce punte fino a 1000 mm di lunghezza totale Art. Nr. 81740, 81750, 81760

* Norma di fabbrica

HARTNER

Lunghezze
Punte elicoidali con codolo conico Morse

sino al diametro incluso	DIN 345			DIN 346			DIN 341			Punte per fori con bussola di guida con CM rinforzato*			Punte V/IS* per materiali difficili da lavorare			DIN 1870 punte elicoidali in lung. speciali grandezza 1			DIN 1870 punte elicoidali in lung. speciali grandezza 2		
	lung. totale	lung. elica	cono Morse	lung. totale	lung. elica	cono Morse	lung. totale	lung. elica	cono Morse	lung. totale	lung. elica	cono Morse	lung. totale	lung. elica	cono Morse	lung. totale	lung. elica	cono Morse	lung. totale	lung. elica	cono 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*																		

a norma di fabbrica Hartner fornisce punte fino a 1000 mm di lunghezza totale Art. Nr. 82467, 82468, 82469, 82466

* Norma di fabbrica

HARTNER

Acciai super rapidi per utensili Hartner

Produciamo utensili HSS solo con materiali taglienti di alto valore. Con la scelta mirata degli elementi di lega, i nostri utensili acquistano le proprietà ottimali per i singoli lavori.

Wolframio: aumenta la rinvenibilità e la resistenza all'usura.
Molibdeno: migliora la plasticità.
Vanadio: aumenta la resistenza all'usura per utensili di finitura.
Cobalto: consente superiori temperature nella tempera ed aumenta quindi la resistenza al calore.

Designazione Hartner	Tipo	Campo di impiego, proprietà
HSS	Acciaio super rapido convenzionale	Materiale tagliente standard per impiego universale
HSS-E	Acciaio super rapido al cobalto	Materiale tagliente con elevata durezza a caldo adatto a forti stress, in presenza di elevate temperature e condizioni sfavorevoli di raffreddamento
M42	Acciaio super rapido al cobalto 8%	Materiale tagliente con maggiore resistenza al calore e durezza, adatto per lavorare materiali di difficile truciolabilità
HSS-E-PM	Acciaio super rapido sinterizzato legato al cobalto	Materiale tagliente con struttura molto compatta e uniforme. Elevata durezza, resistenza al calore, elevata resistenza all'usura e stabilità degli spigoli dei taglienti

HARTNER

Le qualità di metallo duro più importanti per gli utensili Hartner

La tabella seguente mostra i principali metalli duri disponibili a magazzino presso Hartner per applicazioni di pforatura generiche. Altri tipi sono disponibili su richiesta.

In oltre l'80% di tutte le applicazioni a noi note, i risultati ottenuti con gli utensili in DK460UF in associazione a un rivestimento adeguato non sono stati superati da altri tipi di metallo duro anch'essi rivestiti. Questo, unito all'elevata disponibilità a magazzino di questo materiale, semplifica notevolmente la scelta dell'utensile. I nostri esperti potranno consigliarvi quando sia opportuno utilizzare un tipo diverso.

Tipo	Contenuto di Co [M-%]	Grandezza grana WC [µm]	Durezza [HV]	Classificazione ISO [ISO 513]	Caratteristiche
DK460UF K40UF	10	0,6	1620	K20-K40	Tipo per impiego molto vasto, che, prevalentemente ricoperto, si impiega per lavorare acciai, leghe tenere di Al, ghise, ma anche superleghe come inconel 718. Questo tipo rappresenta la colonna vertebrale della nostra produzione.
DK500UF K44UF	12	0,5	1690	K20-K30	Questo tipo è stato sviluppato specificatamente per la lavorazione di materiali temprati. Si distingue, rispetto al Dk 460 UF, per durezza superiore e grosse tolleranze di deformazione. Per l'elevato contenuto di Co si consiglia assolutamente di impiegarlo ricoperto.
DK255F	8	0,7	1720	K20	Questo tipo è consigliato per lavorare materiali temprati, tipi di ghise molto dure e leghe dure di Al-Si. E' possibile la lavorazione a secco. E' preferibile impiegarlo ricoperto.
DK120	6	1,3	1620	K15-K20	Questo tipo è adatto specialmente per l'impiego con ricopertura diamantata.
DK120UF	7	0,7	1850	K05-K10	Tipo a grana ultra fine con massima resistenza all'usura, adatto per macchine assolutamente stabili, preferito per alesatori.
K55SF	9	0,2-0,4	1920	K05-K10	Per l'impiego con materiali molto resistenti all'usura, acciai inossidabili, materiali compositi, come kevlar o fibre di vetro rinforzate, lavorazione ad alta velocità e lavorazione a secco.
DK400N	10	0,7	1580	K20-K40	Tipo molto plastico per la lavorazione di metalli resistenti alle alte temperature.
DK256EH	10	0,6	1750	K20	Questo tipo è particolarmente adatto per la lavorazione di leghe a base di nichel.
K6UF	6	0,6	1870	K05-K10	Tipo a grana ultra-sottile con massima resistenza all'usura. Particolarmente adatto per la lavorazione di materiali con alta resistenza all'usura, compositi, CFRP e Kevlar.
K5UF	5	0,5	2010	K05-K10	Tipo a elevata durezza di nuova concezione per foratura e alesatura. Particolarmente adatto per la lavorazione di materiali compositi e CFRP.

Rivestimenti e ricopertura

Superficie lucida

Appositamente concepite per la lavorazione di leghe di alluminio pressofuso e alluminio battuto con tenore di silicio moderato, le punte non rivestite garantiscono ottime prestazioni nell'asportazione di truciolo. Per contrastare l'usura da adesione (formazione del tagliente di riporto) qui dominante, questi utensili sono perfettamente adattati a questo campo d'impiego grazie a una speciale geometria combinata con eccellenti finiture superficiali in termini di affilatura, scanalatura e superfici di spoglia.

Superficie trattata a vapore/nitrurata

Le superfici trattate a vapore, grazie all'ossidazione mirata dell'area marginale (da 3 a 10 µm ca.), mostrano una migliore protezione dalla corrosione della superficie in acciaio e un comportamento tribologico degli utensili. Per applicazioni più abrasive si consiglia di nitrurare la superficie, aumentando così la durezza superficiale e dunque migliorando la resistenza dell'utensile all'usura.

Rivestimento TiN

Temperatura di applicazione max.: <600 °C
Colore: giallo oro
Struttura: monostrato
Durezza: 2300 HV 0,05

Lanciato da Hartner già all'inizio degli anni '80, il rivestimento TiN trova applicazione nella perforazione come rivestimento economico a nastro largo su HSS e metallo duro.

Rivestimento FIRE/nanoFIRE

Temperatura di applicazione max.: <800 °C
Colore: viola scuro
Struttura: multistrato
Durezza: 3300 HV 0,05

I rivestimenti FIRE e nanoFIRE, oltre al titanio e all'azoto, contengono anche alluminio. Questi rivestimenti sono stati introdotti già alla fine degli anni '90 e rappresentano un'evoluzione dei rivestimenti TiN. Sono caratterizzati da una maggiore durezza e da una buona resistenza termochimica e sono adatti sia per HSS che per metallo duro.

Rivestimenti e ricopertura

Rivestimento TiAlZrN

Temperatura di applicazione max.: <800 °C
Colore: oro
Struttura: multistrato
Durezza: 3300 HV 0,05

La struttura multistrato TiN/TiAlN del rivestimento TiAlZrN è responsabile delle buone prestazioni nella lavorazione degli acciai. Grazie a un ulteriore strato di copertura antiattrito a base di zirconio, è stato ora possibile migliorare ulteriormente le prestazioni anche per gli acciai aderenti (ad es. ferritici, austenitici e duplex).

Rivestimento TiAlN

Temperatura di applicazione max.: <800 °C
Colore: viola scuro
Struttura: monostrato
Durezza: 3300 HV 0,05

Il rivestimento TiAlN presenta proprietà simili ai rivestimenti FIRE e nanoFIRE e, grazie alla sua struttura monostrato, trova applicazione principalmente nel settore delle micropunte.

Rivestimento nano AlTiN

Temperatura di applicazione max.: <800 °C
Colore: viola blu
Struttura: multistrato, nanostrutturato
Durezza: 3300 HV 0,05

Il rivestimento nano AlTiN, anch'esso basato su TiAlN, si è dimostrato particolarmente efficace nella lavorazione dell'acciaio inossidabile, ma talvolta trova anche applicazione nella foratura di ghisa e leghe di titanio, a base di nichel e di cromo-cobalto. La sua struttura nano-strato ritarda la formazione di crepe. Inoltre, grazie alla composizione adattata, presenta una maggiore resistenza termochimica rispetto ad esempio al rivestimento TiAlN.

Rivestimento AlTiZrN

Temperatura di applicazione max.: <900 °C
Colore: oro
Struttura: multistrato, nanostrutturato
Durezza: 3400 HV 0,05

Il rivestimento AlTiZrN, essenzialmente a base di AlTiN, è particolarmente adatto per la lavorazione di acciai inossidabili. Grazie alla struttura nanostrutturata, mostra una buona durezza e resistenza. Lo strato di copertura in zirconio dovrebbe sostanzialmente impedire reazioni chimiche con il materiale e dunque favorire il flusso di truciolo.

Rivestimenti e ricopertura

Rivestimento TiAlSiIN

Temperatura di applicazione max.: <800 °C
Colore: bronzo
Struttura: nanocomposito multistrato
Durezza: 5500 HV 0,05

Il rivestimento TiAlSiN appartiene al gruppo dei cosiddetti nanocompositi. La microstruttura è caratterizzata da nanocristalli di TiAlN estremamente fini, incorporati in una matrice di nitruro di silicio simile al vetro e resistente alle alte temperature. Ne risulta un'elevata durezza, che rende il TiAlSiN il rivestimento di elezione soprattutto per acciai temprati e materiali fusi.

Rivestimento TiSiN

Temperatura di applicazione max.: <800 °C
Colore: rame
Struttura: nanocomposito multistrato
Durezza: 4000 HV 0,05

Il TiSiN, anch'esso un rivestimento della famiglia dei nanocompositi, è stato progettato in modo specifico per il taglio di acciai al carbonio, automatici e al manganese adattando la struttura dello strato.

Rivestimento ZrN

Temperatura di applicazione max.: <700 °C
Colore: oro
Struttura: multistrato, nanostrutturato
Durezza: 2500 HV 0,05

Il rivestimento ZrN nanostrutturato è stato appositamente ottimizzato per la lavorazione di leghe di titanio. La speciale struttura e la composizione contribuiscono alla significativa riduzione dell'usura tribochimica e lo rendono pertanto un vero specialista. Parallelamente offre anche buoni risultati nella foratura di leghe di alluminio pressofuso con tenore di silicio moderato.

Rivestimento CrN

Temperatura di applicazione max.: <1000 °C
Colore: grigio metallico
Struttura: multistrato
Durezza: 3500 HV 0,05

A base di titanio, alluminio e cromo, il rivestimento CrN è specializzato nella lavorazione di metalli non ferrosi, come ad es. leghe di rame, bronzo e ottone.

Rivestimenti e ricopertura

Rivestimento DLC

Temperatura di applicazione max.: <500 °C
Colore: grigio-nero
Struttura: monostrato
Durezza: 5000 HV 0,05

Il DLC appartiene al gruppo dei rivestimenti DLC (diamond like carbon). Questi rivestimenti in carbonio hanno proprietà simili al diamante. Data la sua composizione, ovvero 100% carbonio, e la sua struttura (ta-C), il rivestimento DLC mostra una durezza molto elevata. Questo spiega le eccellenti prestazioni nella foratura di metalli non ferrosi, come ad es. leghe di alluminio battuto e alluminio pressofuso (<12% Si), rame, ottone e bronzo. È inoltre un partner affidabile anche per le plastiche non rinforzate e il legno.

Rivestimento diamantato

Temperatura di applicazione max.: <600°C
Colore: grigio-nero
Struttura: monostrato
Durezza: 8000 HV 0,05

Il rivestimento diamantato, sotto forma di strato diamantato cristallino puro, non ha nulla da invidiare al diamante naturale. Oltre che per le sue interessanti proprietà fisiche, colpisce per la sua straordinaria durezza. Questo lo rende particolarmente adatto per la lavorazione di materiali altamente abrasivi, come ad es. plastiche rinforzate in fibra, ceramica, grafite e leghe di alluminio pressofuso con tenore di silicio elevato (>12%). Per motivi procedurali questo rivestimento può essere applicato solo su speciali tipi di metallo duro.

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Raccomandazioni di applicazione per rivestimenti Hartner

	Foratura		
	Metallo duro		HSS
	convenzionale	MQL	
Acciaio al DLCnio,	TiSiN	TiSiN	Fire
Automatici,	TiAlZrN	TiAlZrN	-
Acciai Mn	Fire	Fire	-
Acciao, basse leghe	Fire	Fire	Fire
	TiSiN	TiSiN	TiN
	TiAlZrN	TiAlZrN	
Acciaio legato	Fire	Fire	Fire
	TiAlSiN	TiAlSiN	TiN
	AlTiN nano	AlTiN nano	
Acciao temprato <55 HRC	TiAlSiN	TiAlSiN	-
	Fire	Fire	-
	TiAlN	TiAlN	-
Acciao temprato 55-65 HRC	TiAlSiN	TiAlSiN	-
	Fire	Fire	-
	TiAlN	TiAlN	-
Acciaio, inossidabile e resistente agli acidi	AlTiN nano	AlTiN nano	AlTiZrN
	AlTiZrN	AlTiZrN	Fire
	TiSiN	TiSiN	TiN
Ghisa	TiAlSiN	TiAlSiN	Fire
	Fire	Fire	-
	AlTiN nano	AlTiN nano	-
Lega di alluminio battuto	lucido	lucido	lucido
	DLC	DLC	DLC
	Diamant	Diamant	-
Pressofuso in lega di alluminio (<12% di silicio)	lucido	lucido	lucido
	ZrN	ZrN	ZrN
	DLC	DLC	DLC
Lega di alluminio (≥ 12% di silicio)	Diamant	Diamant	-
	-	-	-
	-	-	-
Leghe di nichel-base (per esempio, Inconel)	AlTiN nano	AlTiN nano	Fire
	TiAlSiN	TiAlSiN	-
	Fire	Fire	-
Leghe di titanio / titanio	ZrN	ZrN	Fire
	AlTiN nano	AlTiN nano	-
Rame / bronzo / ottone	CrN	CrN	TiN
	DLC	DLC	-
Leghe di cobalto-cromo	AlTiN nano	AlTiN nano	-
	TiAlSiN	TiAlSiN	-
	Fire	Fire	-
Metalli preziosi	AlTiN nano	AlTiN nano	-
Ceramica	Diamant	Diamant	-
Materie plastiche, non rinforzate	DLC	-	-
Materie plastiche rinforzate con fibre	Diamant	Diamant	-
	TiAlSiN	TiAlSiN	-

Nota:

Lo schema mostra le raccomandazioni generali dell'applicazione dei rivestimenti Hartner.
La priorità viene effettuata in ciascun caso da cima a fondo.

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Applicazione dei rivestimenti Hartner

		FORATURA			FRESATURA		
		METALLO DURO		HSS	METALLO DURO		HSS
		conv.	MQL		conv.	MQL	
Acciai al C, **Acciai automatici,** **Acciai al MN**	P	TiSiN TiAlZrN Fire	TiSiN TiAlZrN Fire	Fire – –	TiSiN Fire TiAlZrN	Fire TiSiN TiAlZrN	Fire – –
Acciai, legati in bassa percentuale	P	Fire TiSiN TiAlZrN	Fire TiSiN TiAlZrN	Fire TiN –	Fire TiAlSiN AlTiN nano	Fire TiAlSiN AlTiN nano	Fire TiCN –
Acciai, legati	P	Fire TiAlSiN AlTiN nano	Fire TiAlSiN AlTiN nano	Fire TiN –	Fire AlTiN nano TiAlSiN	Fire AlTiN nano TiAlSiN	Fire TiCN –
Acciai, temprati, <55 HRC	P	TiAlSiN Fire TiAlN	TiAlSiN Fire TiAlN	– – –	TiAlSiN AlTiN nano TiAlN	TiAlSiN AlTiN nano TiAlN	– – –
Acciai, temprati, 55–65 HRC	P	TiAlSiN Fire TiAlN	TiAlSiN Fire TiAlN	– – –	TiAlSiN SuperA AlTiN nano	TiAlSiN SuperA AlTiN nano	– – –
Acciai, inossidabili e resistenti agli acidi	M	AlTiN nano AlTiZrN TiSiN	AlTiN nano AlTiZrN TiSiN	AlTiZrN Fire TiN	AlTiN nano AlTiZrN Fire	AlTiN nano AlTiZrN Fire	Fire – –
Ghise	K	TiAlSiN Fire AlTiN nano	TiAlSiN Fire AlTiN nano	Fire – –	TiAlSiN Fire AlTiN nano	TiAlSiN Fire AlTiN nano	Fire TiCN –
Leghe a base di nickel (es. Inconel)	S	AlTiN nano TiAlSiN Fire	AlTiN nano TiAlSiN Fire	Fire – –	AlTiN nano TiAlSiN ZrN	AlTiN nano TiAlSiN –	Fire – –
Titanio/ leghe in titanio	S	ZrN AlTiN nano	ZrN AlTiN nano	Fire –	ZrN SuperA	ZrN SuperA	Fire –
Leghe al cobalto/cromo	S	AlTiN nano TiAlSiN Fire	AlTiN nano TiAlSiN Fire	– – –	AlTiN nano TiAlSiN Fire	AlTiN nano TiAlSiN Fire	– – –
Metalli preziosi	S	AlTiN nano	AlTiN nano	–	AlTiN nano	AlTiN nano	–
Leghe di alluminio per stampi	N	lucido DLC Diamante	lucido DLC Diamante	lucido DLC –	lucido DLC ZrN	lucido DLC ZrN	lucido DLC –
Leghe di alluminio e ghisa (<12% silicio)	N	lucido ZrN DLC	lucido ZrN DLC	lucido ZrN DLC	ZrN DLC Diamante	ZrN DLC Diamante	lucido DLC –
Leghe di alluminio e ghisa (≥12% silicio)	N	Diamante – –	Diamante – –	– – –	Diamante – –	Diamante – –	– – –
Rame/ bronzo/ ottone	N	CrN DLC	CrN DLC	TiN –	CrN DLC	CrN DLC	TiN –
Ceramica	N	Diamante	Diamante	–	Diamante	Diamante	–
Plastiche, non rinforzate	N	DLC	–	–	DLC	–	–
Plastiche, a fibre rinforzate	N	Diamante TiAlSiN	Diamante TiAlSiN	– –	Diamante TiAlSiN	Diamante TiAlSiN	– –
Grafite	N	–	Diamante	–	–	Diamante	–

Nota: *la panoramica mostra le raccomandazioni di applicazione generali dei rivestimenti Hartner. Il grado di priorità è sempre dall'alto verso il basso.*

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Applicazione dei rivestimenti Hartner

MASCHI			MASCHI A FRESARE		MASCHI A RULLARE			ALESARE		
METALLO DURO		HSS	METALLO DURO		METALLO DURO		HSS	METALLO DURO		HSS
conv.	MQL		conv.	MQL	conv.	MQL		conv.	MQL	
– – –	– – –	TiCN TiAlN TiN	TiCN – –	TiCN – –	TICN TiN –	TICN TiN –	TiCN TiN –	TiSiN AlTiN nano –	TiSiN AlTiN nano –	TiN – –
– – –	– – –	TiCN TiAlN TiN	TiCN – –	TiCN – –	TICN TiN –	TICN TiN –	TiCN TiN AlCrN	AlTiN nano TiSiN –	AlTiN nano TiSiN –	TiN – –
– – –	– – –	TiCN TiAlN TiN	TiCN – –	TiCN – –	TICN TiN –	TICN TiN –	TiCN TiN AlCrN	AlTiN nano TiSiN –	– – –	TiN – –
– – –	– – –	TiCN – –	TiAlN – –	TiAlN – –	– – –	– – –	– – –	AlTiN nano – –	AlTiN nano – –	– – –
TiCN – –	– – –	– – –	TiAlN – –	TiAlN – –	– – –	– – –	– – –	TiAlSiN – –	– – –	– – –
– – –	– – –	AlTiZrN1/TiAlN2 TiN –	TiCN – –	TiCN – –	TICN TiN –	TiCN TiN –	TiCN TiN –	AlTiN nano – –	AlTiN nano – –	TiN – –
TiAlN TiCN –	TiAlN – –	TiAlN TiCN TiN	TiCN – –	TiCN – –	TICN TiN –	TiCN TiN –	TiCN TiN –	TiAlSiN – –	TiAlSiN – –	TiN – –
– – –	– – –	TiCN TiAlN –	TiCN – –	TiCN – –	TiCN – –	TiCN – –	TiCN – –	AlTiN nano – –	– – –	TiN – –
– –	– –	TiCN TiAlN	TiCN –	TiCN –	TiCN –	TiCN –	TiCN –	ZrN AlTiN nano	– –	TiN –
lucido – –	– – –	lucido – –	TiCN – –	TiCN – –	– – –	– – –	– – –	AlTiN nano – –	– – –	TiN – –
–	–	–	–	–	–	–	–	AlTiN nano	AlTiN nano	TiN
lucido DLC –	lucido DLC –	lucido DLC –	lucido – –	lucido – –	DLC – –	DLC – –	DLC – –	DLC – –	– – –	– – –
TiCN DLC –	TiCN DLC –	TiCN DLC –	TiCN lucido –	TiCN lucido –	TiCN DLC –	TiCN DLC –	TiCN DLC –	DLC – –	DLC – –	– – –
TiCN Diamante –	TiCN – –	TiCN – –	TiCN Diamante –	TiCN – –	– – –	– – –	– – –	– – –	– – –	– – –
lucido DLC	lucido DLC	lucido DLC	lucido –	– –	DLC –	DLC –	DLC –	lucido –	– –	– –
–	–	–	–	–	–	–	–	–	–	–
lucido	–	lucido	lucido	lucido	–	–	–	–	–	–
TiCN –	TiCN –	– –	TiCN –	TiCN –	– –	– –	– –	– –	– –	– –
–	–	–	–	–	–	–	–	–	–	–

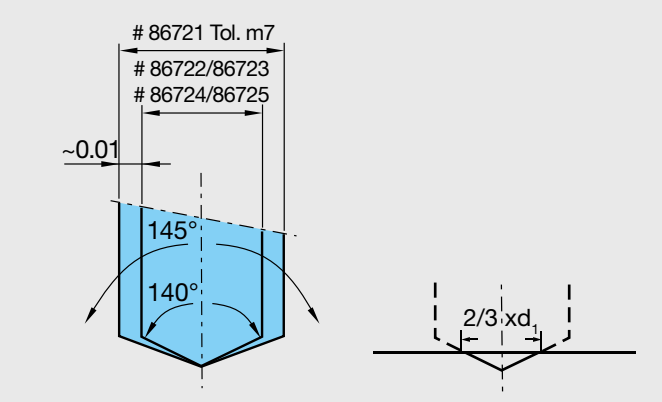
[1] per foro passante, [2] per foro ciechio

Centraggio e pilotaggio

Centraggio e pilotaggio nei sistemi di foratura Multiplex HPC

In generale, per i sistemi di foratura Multiplex HPC, consigliamo di centrare e/o pilotare a profondità di foratura superiori a 5xD.

Durante il semplice centraggio, il diametro di foratura deve essere circa 2/3 del diametro del foro da realizzare. Per il pilotaggio si consiglia una profondità di foratura di 1xD. Inoltre, l'angolo al vertice della punta e il diametro dell'utensile di pilotaggio devono essere maggiori dell'angolo al vertice della punta e del diametro della punta successiva. Per garantirlo, consigliamo di utilizzare le placchette di pilotaggio, appositamente progettate a questo scopo, cod. art. 86721, con angolo al vertice della punta di 145° e tolleranza del diametro m7, con lo stelo extra-corto cod. art. 86681.

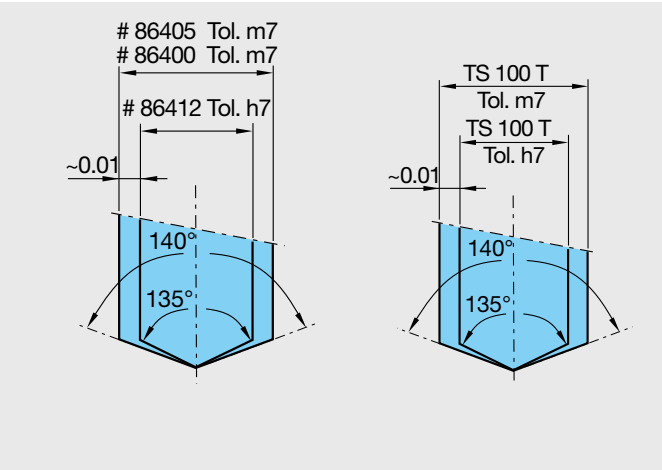


Centraggio e pilotaggio con utensili a forare in MDI

Quando si utilizzano punte in MDI per profondità di foratura da 7xD a 12xD, si consiglia di eseguire il centraggio o di realizzare un foro pilota con profondità da 1xD a 2xD. Per profondità di foratura superiori a 12xD è assolutamente necessario un foro pilota con profondità da 1xD a 2xD.

Per il pilotaggio di micropunte con 15xD (cond. art. 86410) si consiglia di utilizzare le micropunte 4xD senza refrigerazione interna (cod. art. 86400) o 5xD con refrigerazione interna (cod. art. 86405), poiché progettate in modo ottimale a questo scopo in termini di angolo al vertice della punta e tolleranza del diametro.

Per il pilotaggio delle punte elicoidali per foratura profonda TS 100 T è possibile utilizzare ad es. la punta TS-Drills TS 100 U con refrigerazione interna 3xD (cod. articolo 86410), poiché perfettamente adatta a questo scopo in termini di angolo al vertice della punta e tolleranza del diametro.



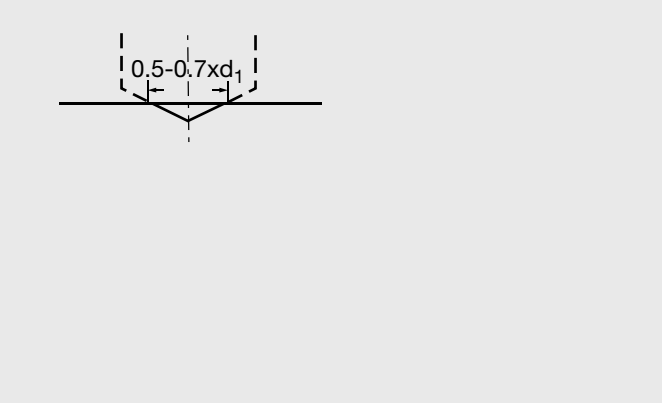
Centraggio e pilotaggio con utensili a forare in HSS

Centraggio con lunghezze di punta secondo DIN 340

Se si utilizzano punte HSS/HSS-E secondo DIN 340, si consiglia di eseguire il centraggio con un diametro di foratura di 0,5-0,7 volte il diametro della punta. Le punte HSS/HSS-E-NC sono ideali per eseguire il foro di centraggio. Per informazioni dettagliate sulle punte a centrare NC, vedere la sezione Punte a centrare NC

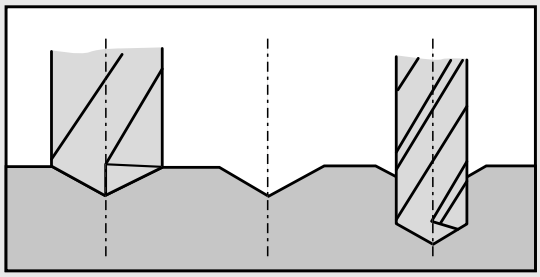
Pilotaggio con lunghezze di punta secondo DIN 1869

Se si utilizzano punte HSS/HSS-E di lunghezza maggiorata ed extra-lunghe secondo DIN 1869, si consiglia di realizzare un foro pilota con profondità da 1xD a 2xD. Le punte extra corte, tipo V, secondo DIN 1897 sono perfette a questo scopo.



Punte da centro NC

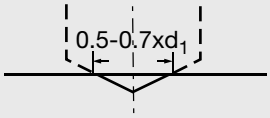
Punte da centro NC



Per la realizzazione di fori particolarmente precisi in termini di posizione, fori con tolleranze di diametro ristrette, fori profondi o in generale con pezzi di forma sfavorevole (rotondi, ruvidi), si consiglia di eseguire il centraggio con una punta NC prima della foratura vera e propria. In questo modo si garantisce che la punta successiva pratichi il foro con precisione, evitando un'eventuale deviazione. Le punte a centrare NC si possono utilizzare anche per la realizzazione di smussi e/o svasature e per il centraggio in un unico passaggio di lavorazione, se il diametro di foratura della punta a centrare NC è maggiore del diametro effettivo del foro.

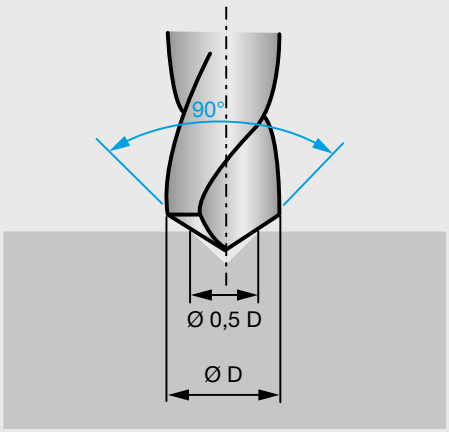
Le punte a centrare NC presentano una lunghezza della scanalatura molto corta e smusso di guida non inclinato per garantire un'esecuzione molto stabile e dunque un centraggio molto preciso. Date queste caratteristiche, le punte NC sono adatte esclusivamente per il centraggio e non per la realizzazione di fori di profondità superiore alla lunghezza dell'affilatura della punta.

Selezione della punta NC



Idealmente, il diametro di foratura dovrebbe essere 0,5-0,7 volte il diametro del foro.

Punte cilindriche per centri CN 90°

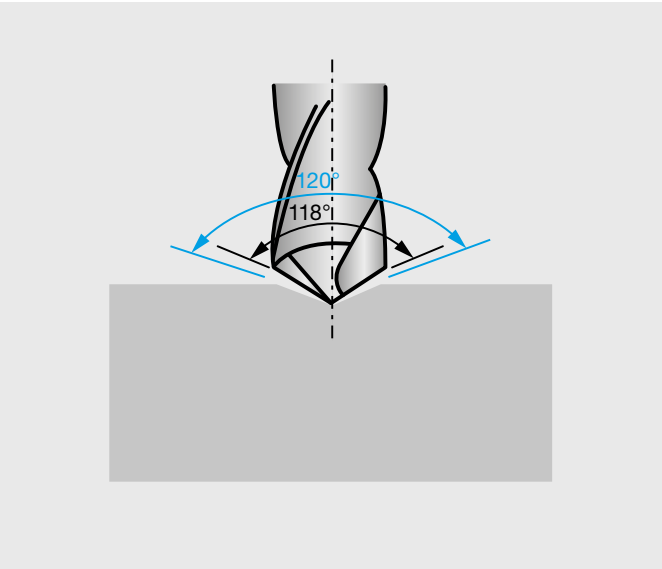


Le punte CN con angolo al vertice della punta di 90° sono particolarmente adatte per il centraggio se successivamente i fori effettivi vengono realizzati con punte HSS/HSS-E che presentano un tagliente trasversale relativamente grande. In questo modo si garantisce che la punta HSS/HSS-E successiva pratichi prima il foro con i taglienti principali e venga guidata nei punti più stabili dei taglienti. Inoltre, le punte CN con un angolo al vertice della punta di 90° sono adatte per la realizzazione del centraggio e di un abbassamento di 90° in un unico passaggio, se il diametro di foratura della punta a centrare CN è maggiore del diametro effettivo del foro.

Punte da centro NC

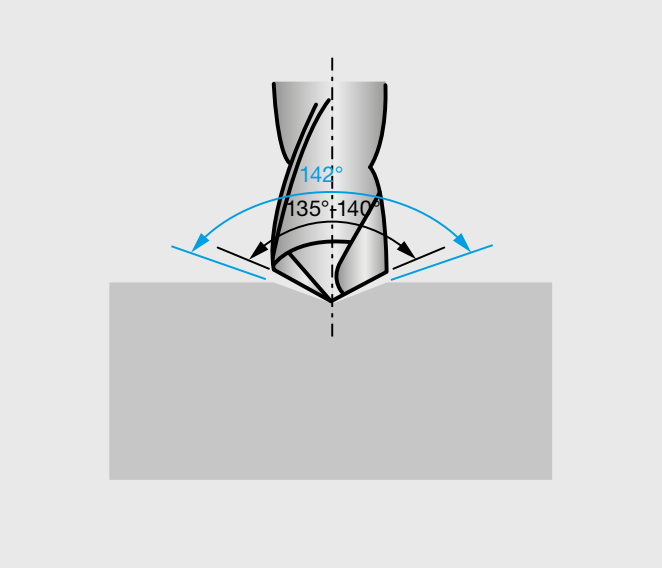
Punte cilindriche per centri CN 120°

Le punte CN con angolo al vertice della punta di 120° sono adatte nello specifico per il centraggio, se il foro effettivo viene successivamente realizzato con punte HSS/HSS-E con angolo al vertice della punta di 118°. In questo modo si garantisce che la punta HSS/HSS-E successiva pratichi prima il foro con la punta e venga guidata a saturazione.



Punte cilindriche per centri CN 142°

Le punte NC con angolo al vertice di 142° sono particolarmente adatte per effettuare prefori, quando il foro vero e proprio viene poi prodotto con punte in metallo duro con un angolo al vertice di 135°-140°. Ciò garantisce che la successiva punta in metallo duro fori con il vertice e sia guidata nel foro. Se i taglienti della punta in metallo duro colpiscono il materiale da lavorare prima del vertice, c'è il rischio di fratture degli angoli taglienti delle punte in metallo duro.



Punte da centro NC

90°	120°	142°

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Tabella di conversione pollici - millimetri da 1/64 fino a 11 63/64

Grandezza (pollici)	mm	parte di pollici (decimale)
-	0,10	0,0039
97	0,15	0,0059
96	0,16	0,0063
95	0,17	0,0067
94	0,18	0,0071
93	0,19	0,0075
92	0,20	0,0079
91	0,21	0,0083
90	0,22	0,0087
89	0,23	0,0091
88	0,24	0,0095
-	0,25	0,0098
87	0,25	0,0100
	0,26	0,0102
86	0,27	0,0105
	0,27	0,0106
85	0,28	0,0110
	0,29	0,0114
84	0,29	0,0115
-	0,30	0,0118
83	0,30	0,0120
82	0,32	0,0125
	0,32	0,0126
81	0,33	0,0130
80	0,34	0,0135
79	0,37	0,0145
1/64	0,40	0,0156
78	0,41	0,0160
77	0,46	0,0180
-	0,50	0,0197
76	0,51	0,0200
75	0,53	0,0210
74	0,57	0,0225
-	0,60	0,0236
73	0,61	0,0240
72	0,64	0,0250
71	0,66	0,0260
-	0,70	0,0276
70	0,71	0,0280
69	0,74	0,0292
-	0,75	0,0295
68	0,79	0,0310
1/32	0,79	0,0313
-	0,80	0,0315
67	0,81	0,0320
66	0,84	0,0330
65	0,89	0,0350
-	0,90	0,0354
64	0,91	0,0360
63	0,94	0,0370
62	0,97	0,0380
61	0,99	0,0390
-	1,00	0,0394
60	1,02	0,0400
59	1,04	0,0410
58	1,07	0,0420
57	1,09	0,0430
56	1,18	0,0465
3/64	1,19	0,0469
	1,20	0,0472
	1,25	0,0492
	1,30	0,0512
55	1,32	0,0520
54	1,40	0,0550
	1,45	0,0571
	1,50	0,0591
53	1,51	0,0595
	1,55	0,0610
1/16	1,59	0,0625
	1,60	0,0630
52	1,61	0,0635
	1,65	0,0650

Grandezza (pollici)	mm	parte di pollici (decimale)
51	1,70	0,0670
	1,75	0,0689
50	1,78	0,0700
	1,80	0,0709
49	1,85	0,0730
	1,90	0,0748
48	1,93	0,0760
	1,95	0,0768
5/64	1,98	0,0781
47	1,99	0,0785
-	2,00	0,0787
	2,05	0,0807
46	2,06	0,0810
45	2,08	0,0820
	2,15	0,0846
44	2,18	0,0860
43	2,26	0,0890
42	2,37	0,0935
3/32	2,38	0,0938
41	2,44	0,0960
40	2,50	0,0980
39	2,53	0,0995
38	2,58	0,1015
37	2,64	0,1040
36	2,71	0,1065
7/64	2,78	0,1094
35	2,79	0,11
34	2,82	0,111
33	2,87	0,113
	2,90	0,1142
32	2,95	0,116
-	3,00	0,1181
31	3,05	0,12
1/8	3,18	0,125
30	3,26	0,1285
	3,30	0,1299
29	3,45	0,136
	3,50	0,1378
28	3,57	0,1405
9/64	3,57	0,1406
27	3,66	0,144
26	3,73	0,147
	3,75	0,1476
25	3,80	0,1495
24	3,86	0,152
23	3,91	0,154
5/32	3,97	0,1562
22	3,99	0,157
-	4,00	0,1575
21	4,04	0,159
20	4,09	0,161
	4,20	0,1654
19	4,22	0,166
18	4,31	0,1695
11/64	4,37	0,1719
17	4,39	0,173
16	4,50	0,177
15	4,57	0,18
14	4,62	0,182
13	4,70	0,185
3/16	4,76	0,1875
12	4,80	0,189
11	4,85	0,191
10	4,91	0,1935
9	4,98	0,196
-	5,00	0,1968
8	5,05	0,199
7	5,11	0,2010
13/64	5,16	0,2031
6	5,18	0,2040
5	5,22	0,2055
	5,25	0,2067

Grandezza (pollici)	mm	parte di pollici (decimale)
4	5,31	0,2090
3	5,41	0,213
	5,50	0,2165
7/32	5,56	0,2188
2	5,61	0,221
1	5,79	0,228
A	5,94	0,234
15/64	5,95	0,2344
-	6,00	0,2362
B	6,05	0,238
C	6,15	0,242
D	6,25	0,246
1/4	6,35	0,25
E	6,35	0,25
	6,50	0,2559
F	6,53	0,257
G	6,63	0,261
17/64	6,75	0,2656
	6,75	0,2657
H	6,76	0,266
I	6,91	0,272
-	7,00	0,2756
J	7,04	0,2772
K	7,14	0,281
9/32	7,14	0,2812
L	7,37	0,29
M	7,49	0,2949
	7,50	0,2953
19/64	7,54	0,2969
N	7,67	0,3020
	7,75	0,3051
5/16	7,94	0,3125
-	8,00	0,315
O	8,03	0,316
P	8,20	0,323
21/64	8,33	0,3281
Q	8,43	0,332
	8,50	0,3346
R	8,61	0,339
11/32	8,73	0,3438
	8,75	0,3445
S	8,84	0,348
-	9,00	0,3543
T	9,09	0,358
23/64	9,13	0,3594
U	9,35	0,368
	9,50	0,374
3/8	9,53	0,375
V	9,56	0,377
W	9,80	0,386
25/64	9,92	0,3906
-	10,00	0,3937
X	10,08	0,397
Y	10,26	0,4040
13/32	10,32	0,4062
Z	10,49	0,413
	10,50	0,4134
27/64	10,72	0,4219
-	11,00	0,4331
7/16	11,11	0,4375
	11,50	0,4528
29/64	11,51	0,4531
15/32	11,91	0,4688
-	12,00	0,4724
31/64	12,30	0,4844
	12,50	0,4921
1/2	12,70	0,50
-	13,00	0,5118
33/64	13,10	0,5156
17/32	13,49	0,5312
	13,50	0,5315
35/64	13,89	0,5469

Grandezza (pollici)	mm	parte di pollici (decimale)
-	14,00	0,5512
9/16	14,29	0,5625
	14,50	0,5709
37/64	14,68	0,5781
-	15,00	0,5906
19/32	15,08	0,5938
39/64	15,48	0,6094
	15,50	0,6102
5/8	15,88	0,625
-	16,00	0,6299
41/64	16,27	0,6406
	16,50	0,6496
21/32	16,67	0,6562
-	17,00	0,6693
43/64	17,07	0,6719
11/16	17,46	0,6875
	17,50	0,689
45/64	17,86	0,7031
-	18,00	0,7087
23/32	18,26	0,7188
	18,50	0,7283
47/64	18,65	0,7344
-	19,00	0,748
3/4	19,05	0,75
49/64	19,45	0,7656
	19,50	0,7677
25/32	19,84	0,7812
-	20,00	0,7874
51/64	20,24	0,7969
	20,50	0,8071
13/16	20,64	0,8125
-	21,00	0,8268
53/64	21,03	0,8281
27/32	21,43	0,8438
	21,50	0,8465
55/64	21,84	0,8594
-	22,00	0,8661
7/8	22,23	0,875
	22,50	0,8858
57/64	22,62	0,8906
-	23,00	0,9055
29/32	23,02	0,9062
59/64	23,42	0,9219
	23,50	0,9252
15/16	23,81	0,9375
-	24,00	0,9449
61/64	24,21	0,9531
	24,50	0,9646
31/32	24,61	0,9688
-	25,00	0,9843
63/64	25,00	0,9844
1	25,40	1,00

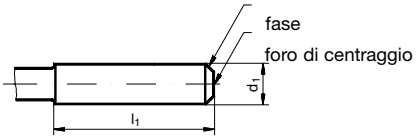
1 pollici = 25,400 0 mm vedi DIN 4890 (edizione 2/75)

HARTNER

Dimensioni di codoli cilindrici in acciaio rapido secondo DIN 1835 (estratto)

Forma A, liscio

Misure in mm

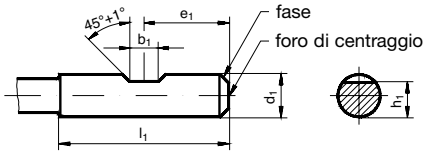


d_1 h8	l_1 +2 0	d_1 h8	l_1 +2 0	d_1 h8	l_1 +2 0
3	28	10	40	32	60
4	28	12	45	40	70
5	28	16	48	50	80
6	36	20	50	63	90
8	36	25	56		

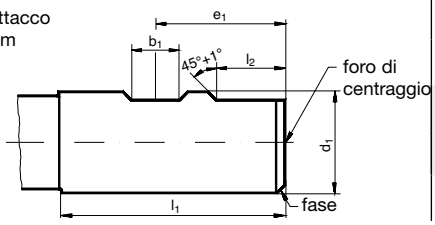
Forma B, con piano di attacco laterale

Misure in mm

con 1 piano di attacco per d_1 = 6 ... 20 mm



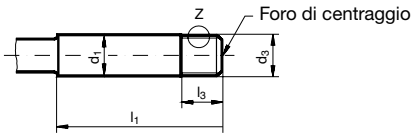
con 2 piani di attacco d_1 = 25 ... 63 mm



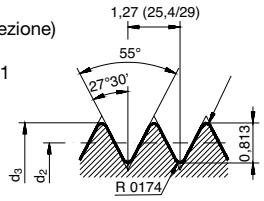
d_1 h6	b_1 +0,05 0	e_1 0 -1	h_1 h13	l_1 +2 0	l_2 +1 0	Foro di centraggio Forma R DIN 332 parte 1
6	4,2	18	4,8	36	-	1,6x2,5
8	5,5	18	6,6	36	-	1,6x3,35
10	7	20	8,4	40	-	1,6x3,35
12	8	22,5	10,4	45	-	1,6x3,35
16	10	24	14,2	48	-	2,0x4,25
20	11	25	18,2	50	-	2,5x5,3
25	12	32	23	56	17	2,5x5,3
32	14	36	30	60	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

Forma D, filettato

Misure in mm



Particolare Z
(rappresentato in sezione)
profilo del filetto a
DIN ISO 228 parte 1



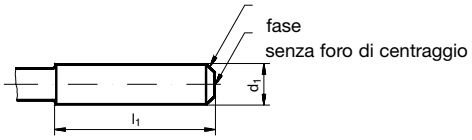
d_1 h8	d_3	d_3 scostam. limite	d_2	d_2 scostam. limite	l_1 +2 0	l_3 +2 0	Foro di centraggio Forma R DIN 332 parte 1
6	5,9	0 -0,1	5,087	0 -0,1	36	10	1,6 x 2,5
10	9,9	0 -0,1	9,087	0 -0,1	40	10	1,6 x 3,35
12	11,9	0 -0,1	11,087	0 -0,1	45	10	1,6 x 3,35
16	15,9	0 -0,1	15,087	0 -0,1	48	10	2,0 x 4,25
20	19,9	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

Dimensioni di codoli cilindrici in metallo duro secondo DIN 6535 (estratto)

Forma HA, liscio

Misure in mm

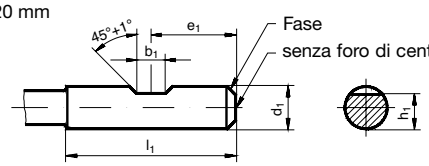


d_1 h6	l_1 +2 0	d_1 h6	l_1 +2 0	d_1 h6	l_1 +2 0
2	28	8	36	18	48
3	28	10	40	20	50
4	28	12	45	25	56
5	28	14	45	32	60
6	36	16	48		

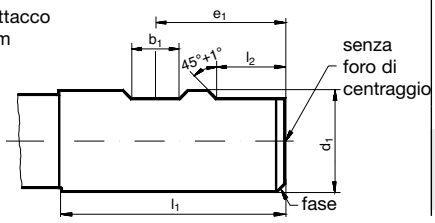
Forma HB, con piano di attacco laterale

Misure in mm

con 1 piano di attacco per d_1 = 6 - 20 mm



con 2 piani di attacco d_1 = 25 e 32 mm

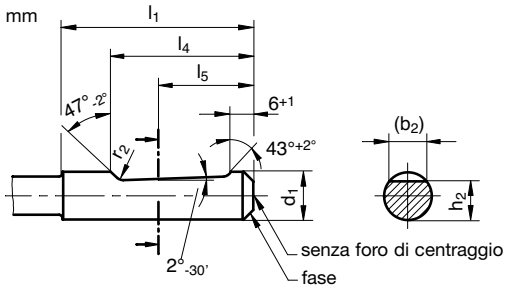


d_1 h6	b_1 +0,05 0	e_1 0 -1	h_1 h11	l_1 +2 0	l_2 +1 0
6	4,2	18	5,1	36	-
8	5,5	18	6,9	36	-
10	7	20	8,5	40	-
12	8	22,5	10,4	45	-
14	8	22,5	12,7	45	-
16	10	24	14,2	48	-
18	10	24	16,2	48	-
20	11	25	18,2	50	-
25	12	32	23	56	17
32	14	36	30	60	19

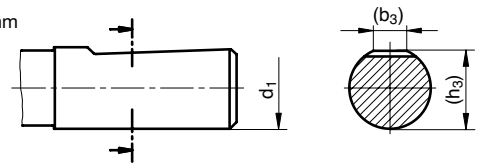
Forma HE, con piano di attacco inclinato, senza fori di refrigerazione*

*Esecuzione: codoli cilindrici a DIN 6535 sono eseguiti senza o con fori di refrigerazione. L'impiego dell'esecuzione per differenti utensili come pure dati dimensionali e designazione per la posizione dei fori di refrigerazione sono contenute nelle corrispondenti norme.

per d_1 = 6 fino 20 mm



per d_1 = 25 e 32 mm

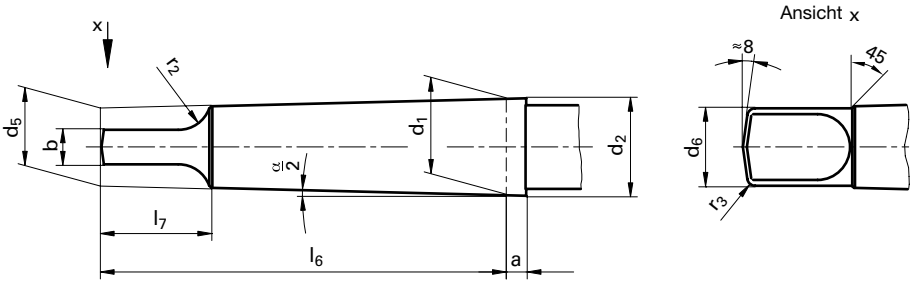


d_1 h6	(b_2) ≈	(b_3)	h_2 h13	(h_3)	l_1 +2 0	l_4 0 -1	l_5 misura nom.	r_2 min.
6	4,3	–	5,1	–	36	25	18	1,2
8	5,5	–	6,9	–	36	25	18	1,2
10	7,1	–	8,5	–	40	28	20	1,2
12	8,2	–	10,4	–	45	33	22,5	1,2
14	8,1	–	12,7	–	45	33	22,5	1,2
16	10,1	–	14,2	–	48	36	24	1,6
18	10,8	–	16,2	–	48	36	24	1,6
20	11,4	–	18,2	–	50	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

Dimensioni di codoli conici Morse DIN 228 parte 1 (estratto)

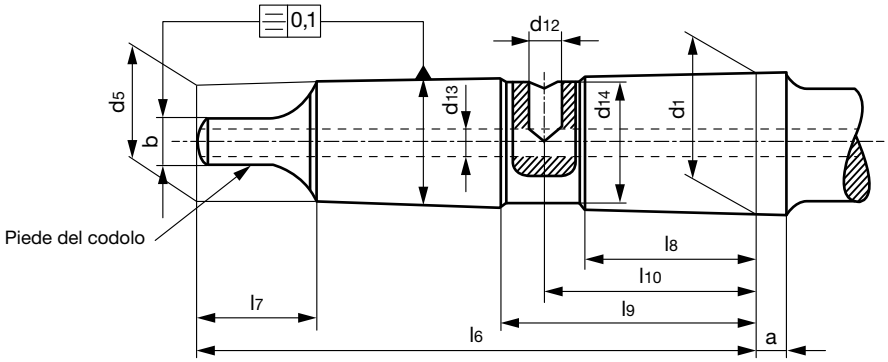
Forma B, cono Morse con tenone



Misure in mm

Codolo a DIN 228 forma B grandezza	a	scost. limite	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´´

Forma BK, attacco cono morse con refrigerazione tramite aletta



Misure in mm

Codolo a DIN 228 forma BK grandezza	a ±0,1	scost. limite	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

Diametri dei fori di filettatura per la maschiatura

Filettatura metrica ISO DIN 13

Ø nom.	passo P mm	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite 6H* min. mm	Ø preforo madrevite 6H* max. mm
M 1	0,25	**0,75**	0,729	0,785
M 1,1	0,25	**0,85**	0,829	0,885
M 1,2	0,25	**0,95**	0,929	0,985
M 1,4	0,30	**1,10**	1,075	1,142
M 1,6	0,35	**1,25**	1,221	1,321
M 1,8	0,35	**1,45**	1,421	1,521
M 2	0,40	**1,60**	1,567	1,679
M 2,2	0,45	**1,75**	1,713	1,838
M 2,5	0,45	**2,05**	2,013	2,138
M 3	0,50	**2,50**	2,459	2,599
M 3,5	0,60	**2,90**	2,850	3,010
M 4	0,70	**3,30**	3,242	3,422
M 4,5	0,75	**3,70**	3,688	3,878
M 5	0,80	**4,20**	4,134	4,334
M 6	1,00	**5,00**	4,917	5,153
M 7	1,00	**6,00**	5,917	6,153
M 8	1,25	**6,80**	6,647	6,912
M 9	1,25	**7,80**	7,647	7,912
M 10	1,50	**8,50**	8,376	8,676
M 11	1,50	**9,50**	9,376	9,676
M 12	1,75	**10,20**	10,106	10,441
M 14	2,00	**12,00**	11,835	12,210
M 16	2,00	**14,00**	13,835	14,210
M 18	2,50	**15,50**	15,294	15,744
M 20	2,50	**17,50**	17,294	17,744
M 22	2,50	**19,50**	19,294	19,744
M 24	3,00	**21,00**	20,752	21,252
M 27	3,00	**24,00**	23,752	24,252
M 30	3,50	**26,50**	26,211	26,771
M 33	3,50	**29,50**	29,211	29,771
M 36	4,00	**32,00**	31,670	32,270
M 39	4,00	**35,00**	34,670	35,270
M 42	4,50	**37,50**	37,129	37,799
M 45	4,50	**40,50**	40,129	40,799
M 48	5,00	**43,00**	42,587	43,297
M 52	5,00	**47,00**	46,587	47,297
M 56	5,50	**50,50**	50,046	50,796

* M 1,1 fino a M 1,4 nom.-Ø madrevite 5H

Filettatura metrica ISO, passo fine DIN 13

Ø nom.	x passo P mm	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite 6H min. mm	Ø preforo madrevite 6H max. mm
M 2,5	x 0,35	**2,15**	2,121	2,221
M 3,0	x 0,35	**2,65**	2,621	2,721
M 3,5	x 0,35	**3,15**	3,121	3,221
M 4,0	x 0,50	**3,50**	3,459	3,599
M 4,5	x 0,50	**4,00**	3,959	4,099
M 5,0	x 0,50	**4,50**	4,459	4,599
M 5,5	x 0,50	**5,00**	4,959	5,099
M 6,0	x 0,75	**5,20**	5,188	5,378
M 7,0	x 0,75	**6,20**	6,188	6,378
M 8,0	x 0,50	**7,50**	7,459	7,599
M 8,0	x 0,75	**7,20**	7,188	7,378
M 8,0	x 1,00	**7,00**	6,917	7,153
M 9,0	x 0,75	**8,20**	8,188	8,378
M 9,0	x 1,00	**8,00**	7,917	8,153
M 10	x 0,75	**9,20**	9,188	9,378
M 10	x 1,00	**9,00**	8,917	9,153
M 10	x 1,25	**8,80**	8,647	8,912
M 11	x 0,75	**10,20**	10,188	10,378
M 11	x 1,00	**10,00**	9,917	10,153
M 12	x 1,00	**11,00**	10,917	11,153
M 12	x 1,25	**10,80**	10,647	10,912
M 12	x 1,50	**10,50**	10,376	10,676
M 14	x 1,00	**13,00**	12,917	13,153
M 14	x 1,25	**12,80**	12,647	12,912
M 14	x 1,50	**12,50**	12,376	12,676
M 15	x 1,00	**14,00**	13,917	14,153
M 15	x 1,50	**13,50**	13,376	13,676
M 16	x 1,00	**15,00**	14,917	15,153
M 16	x 1,25	**14,80**	14,647	14,912
M 16	x 1,50	**14,50**	14,376	14,676
M 17	x 1,00	**16,00**	15,917	16,153
M 17	x 1,50	**15,50**	15,376	15,676
M 18	x 1,00	**17,00**	16,917	17,153
M 18	x 1,50	**16,50**	16,376	16,676
M 20	x 1,00	**19,00**	18,917	19,153
M 20	x 1,50	**18,50**	18,376	18,676
M 20	x 2,00	**18,00**	17,835	18,210

Ø nom.	x passo P mm	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite 6H min. mm	Ø preforo madrevite 6H max. 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

Filettatura UNC ASME B1.1

Ø nom.	filetti per pollici	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite 2B min. mm	Ø preforo madrevite 2B max. mm
Nr. 1	- 64	**1,55**	1,425	1,580
Nr. 2	- 56	**1,85**	1,694	1,872
Nr. 3	- 48	**2,10**	1,941	2,146
Nr. 4	- 40	**2,35**	2,157	2,385
Nr. 5	- 40	**2,65**	2,487	2,698
Nr. 6	- 32	**2,85**	2,642	2,896
Nr. 8	- 32	**3,50**	3,302	3,531
Nr. 10	- 24	**3,90**	3,683	3,937
Nr. 12	- 24	**4,50**	4,343	4,597
1/4	- 20	**5,10**	4,978	5,258
5/16	- 18	**6,60**	6,401	6,731
3/8	- 16	**8,00**	7,798	8,153
7/16	- 14	**9,40**	9,144	9,550
1/2	- 13	**10,80**	10,592	11,024
9/16	- 12	**12,20**	11,989	12,446
5/8	- 11	**13,50**	13,386	13,868
3/4	- 10	**16,50**	16,307	16,840
7/8	- 9	**19,50**	19,177	19,761
1	- 8	**22,25**	21,971	22,606
1 1/8	- 7	**25,00**	24,638	25,349
1 1/4	- 7	**28,00**	27,813	28,524
1 3/8	- 6	**30,75**	30,353	31,115
1 1/2	- 6	**34,00**	33,528	34,290
1 3/4	- 5	**39,50**	38,938	39,802
2	- 4,5	**45,00**	44,679	45,593

Filettatura MJ DIN ISO 5855

Ø nom.	x passo P mm	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite 5H* min. mm	Ø preforo madrevite 5H* max. mm
MJ 3	x 0,50	**2,60**	2,513	2,653
MJ 4	x 0,70	**3,40**	3,318	3,498
MJ 5	x 0,80	**4,30**	4,221	4,421
MJ 6	x 0,50	**5,55**	5,513	5,625
MJ 6	x 0,75	**5,35**	5,269	5,419
MJ 6	x 1,00	**5,10**	5,026	5,216
MJ 8	x 0,50	**7,55**	7,513	7,625
MJ 8	x 0,75	**7,35**	7,269	7,419
MJ 8	x 1,00	**7,10**	7,026	7,216
MJ 8	x 1,25	**6,90**	6,782	6,994
MJ 10	x 1,00	**9,10**	9,026	9,216
MJ 10	x 1,25	**8,90**	8,782	8,994
MJ 10	x 1,50	**8,60**	8,539	8,775
MJ 12	x 1,75	**10,40**	10,295	10,560
MJ 16	x 2,00	**14,20**	14,051	14,351

* MJ3 x 0,50 a MJ 5 x 0,80 nom.-Ø madrevite 6H

Filettatura UNJC ISO 3161

Ø nom.	filetti per pollici	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite 3B min. mm	Ø preforo madrevite 3B max. mm
Nr. 6	- 32	**2,85**	2,733	2,939
Nr. 8	- 32	**3,55**	3,393	3,599
Nr. 10	- 24	**4,00**	3,795	4,064
Nr. 12	- 24	**4,60**	4,455	4,704
1/4	- 20	**5,30**	5,113	5,387
5/16	- 18	**6,75**	6,563	6,833
3/8	- 16	**8,20**	7,978	8,255
7/16	- 14	**9,60**	9,346	9,639
1/2	- 13	**11,00**	10,798	11,095
9/16	- 12	**12,40**	12,228	12,482
5/8	- 11	**13,80**	13,627	13,904

Filettatura UNJF ISO 3161

Ø nom.	filetti per pollici	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite 3B min. mm	Ø preforo madrevite 3B max. mm
Nr. 6	- 40	**3,00**	2,888	3,053
Nr. 8	- 36	**3,60**	3,480	3,663
Nr. 10	- 32	**4,20**	4,054	4,255
Nr. 12	- 28	**4,75**	4,602	4,816
1/4	- 28	**5,60**	5,466	5,662
5/16	- 24	**7,00**	6,906	7,109
3/8	- 24	**8,60**	8,494	8,679
7/16	- 20	**10,00**	9,876	10,084
1/2	- 20	**11,60**	11,463	11,661
9/16	- 18	**13,00**	12,913	13,122
5/8	- 18	**14,60**	14,501	14,702

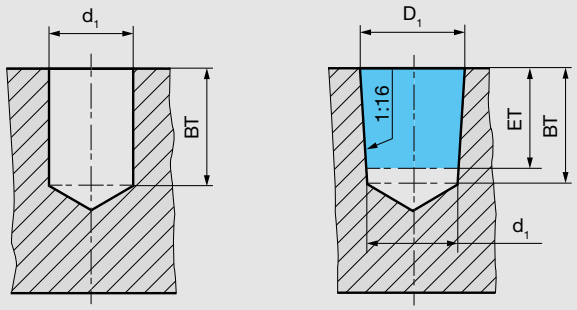
Diametri dei fori di filettatura per la maschiatura

Filettatura UNF ASME B1.1					Filettatura BSW-(Whitworth) BS84					Filettatura (Whitworth) (a DIN-ISO 228-1)					Filettatura PG a DIN 40430				
Ø nom.	filetti per pollici	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite 2B min. mm	Ø preforo madrevite 2B max. mm	Ø nom.	filetti per pollici	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite 2B min. mm	Ø preforo madrevite 2B max. mm	Ø nom. pollici	filetti per pollici	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite min. mm	Ø preforo madrevite max. mm	Ø nom.	filetti per pollici	Ø preforo (foro) Ø mm	Ø preforo madrevite min. mm	Ø preforo madrevite max. mm
Nr. 1 -	72	**1,55**	1,473	1,610	W 1/16	60	**1,20**	1,045	1,230	G 1/16	28	**6,80**	6,561	6,843	Pg 7	20	**11,40**	11,280	11,430
Nr. 2 -	64	**1,85**	1,755	1,910	W 3/32	48	**1,80**	1,704	1,912	G 1/8	28	**8,80**	8,566	8,848	Pg 9	18	**14,00**	13,860	14,010
Nr. 3 -	56	**2,15**	2,024	2,197	W 1/8	40	**2,50**	2,362	2,591	G 1/4	19	**11,80**	11,445	11,890	Pg 11	18	**17,30**	17,260	17,410
Nr. 4 -	48	**2,40**	2,271	2,459	W 5/32	32	**3,20**	2,952	3,214	G 3/8	19	**15,25**	14,950	15,395	Pg 13,5	18	**19,00**	19,060	19,210
Nr. 5 -	44	**2,70**	2,550	2,741	W 3/16	24	**3,60**	3,407	3,745	G 1/2	14	**19,00**	18,631	19,172	Pg 16	18	**21,30**	21,160	21,310
Nr. 6 -	40	**2,95**	2,819	3,023	W 7/32	24	**4,50**	4,201	4,539	G 5/8	14	**21,00**	20,587	21,128	Pg 21	16	**26,90**	26,780	27,030
Nr. 8 -	36	**3,50**	3,404	3,607	W 1/4	20	**5,10**	4,724	5,156	G 3/4	14	**24,50**	24,117	24,658	Pg 29	16	**35,50**	35,480	35,730
Nr. 10 -	32	**4,10**	3,962	4,166	W 5/16	18	**6,50**	6,130	6,590	G 7/8	14	**28,25**	27,877	28,418	Pg 36	16	**45,50**	45,480	45,730
Nr. 12 -	28	**4,60**	4,496	4,724	W 3/8	16	**7,90**	7,492	7,987	G 1	11	**30,75**	30,291	30,931	Pg 42	16	**52,50**	52,480	52,730
1/4 -	28	**5,50**	5,359	5,588	W 7/16	14	**9,20**	8,789	9,330	G 1 1/8	11	**35,50**	34,939	35,579	Pg 48	16	**57,80**	57,780	58,030
5/16 -	24	**6,90**	6,782	7,036	W 1/2	12	**10,50**	9,989	10,591	G 1 1/4	11	**39,50**	38,952	39,592					
3/8 -	24	**8,50**	8,382	8,636	W 9/16	12	**12,00**	11,577	12,179	G 1 1/2	11	**45,25**	44,845	45,485					
7/16 -	20	**9,90**	9,728	10,033	W 5/8	11	**13,50**	12,918	13,558	G 1 3/4	11	**51,00**	50,788	51,428					
1/2 -	20	**11,50**	11,328	11,608	W 3/4	10	**16,25**	15,797	16,483	G 2	11	**57,00**	56,656	57,296					
9/16 -	18	**12,90**	12,751	13,081	W 7/8	9	**19,25**	18,611	19,353										
5/8 -	18	**14,50**	14,351	14,681	W 1	8	**22,00**	21,334	22,147										
3/4 -	16	**17,50**	17,323	17,678	W 1 1/8	7	**24,50**	23,928	24,832										
7/8 -	14	**20,40**	20,269	20,650	W 1 1/4	7	**27,75**	27,103	28,007										
1 -	12	**23,25**	23,114	23,571	W 1 3/8	6	**30,50**	29,504	30,528										
1 1/8 -	12	**26,50**	26,289	26,746	W 1 1/2	6	**33,50**	32,679	33,703										
1 1/4 -	12	**29,50**	29,464	29,921	W 1 5/8	5	**35,50**	34,769	35,963										
1 3/8 -	12	**32,75**	32,639	33,096	W 1 3/4	5	**39,00**	37,944	39,138										
1 1/2 -	12	**36,00**	35,814	36,271	W 2	4,5	**44,50**	43,571	44,877										

Filettatura NPT ANSI B 2.1
filettatura conica americana, conicità 1:16

versione A
(da evitare se possibile)

versione B



Ø nom.	filetti per pollici	Ø preforo cilindr. (A) d_1	Ø preforo conico (B) D_1	prof. t. p. ET mm	prof. fil. 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

Filett. EG metr./metr. passo fine (EG M 14 x 1,25) per impiego di helicoil DIN 8140					Filettatura EG UNC (UNC-STI) per impiego di helicoil ASME B18.29.1					Filettatura EG UNF (UNF-STI) per impiego di helicoil ASME B18.29.1				
Ø nom.	x passo P mm	Ø preforo (foro) Ø DIN 336 mm	Ø preforo madrevite min. mm	Ø preforo madrevite max. mm	Ø nom.	filetti per pollici	Ø preforo (foro) Ø mm	Ø preforo madrevite min. mm	Ø preforo madrevite max. mm	Ø nom.	filetti per pollici	Ø preforo (foro) Ø mm	Ø preforo madrevite min. mm	Ø preforo madrevite max. mm
EG M 4 x	0,70	**4,20**	4,152	4,292	EG Nr. 6 -	32	**3,80**	3,678	3,879	EG Nr. 6 -	40	**3,70**	3,644	3,818
EG M 5 x	0,80	**5,25**	5,174	5,334	EG Nr. 8 -	32	**4,40**	4,338	4,524	EG Nr. 8 -	36	**4,40**	4,321	4,498
EG M 6 x	1,00	**6,30**	6,217	6,407	EG Nr. 10 -	24	**5,20**	5,055	5,283	EG Nr. 10 -	32	**5,10**	4,999	5,184
EG M 8 x	1,25	**8,40**	8,271	8,483	EG Nr. 12 -	24	**5,80**	5,715	5,944	EG Nr. 12 -	28	**5,70**	5,682	5,809
EG M10 x	1,50	**10,50**	10,324	10,560	EG 1/4 -	20	**6,70**	6,624	6,868	EG 1/4 -	28	**6,60**	6,546	6,721
EG M12 x	1,75	**12,50**	12,379	12,644	EG 5/16 -	18	**8,40**	8,242	8,489	EG 5/16 -	24	**8,25**	8,166	8,352
EG M14 x	1,25	**14,40**	14,271	14,483	EG 3/8 -	16	**10,00**	9,868	10,127	EG 3/8 -	24	**9,80**	9,754	9,931
EG M16 x	2,00	**16,50**	16,433	16,733	EG 7/16 -	14	**11,60**	11,506	11,783	EG 7/16 -	20	**11,50**	11,389	11,585
					EG 1/2 -	13	**13,30**	13,122	13,393	EG 1/2 -	20	**13,10**	12,974	13,172
					EG 9/16 -	12	**14,90**	14,747	15,032	EG 9/16 -	18	**14,70**	14,592	14,798
					EG 5/8 -	11	**16,50**	16,375	16,673	EG 5/8 -	18	**16,25**	16,180	16,386

HARTNER

Diametri dei fori consigliati per maschiatura a rullare

Filettatura metrica ISO DIN 13

Ø nom. mm	passo P mm	Ø foro mm	Ø foro min. mm	Ø foro max. mm	Ø preforo madrevite 7H* min. mm	Ø preforo madrevite 7H* max. 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 a M 2,5 nom.-Ø madrevite 6H

Filettatura metrica ISO, passo fine DIN 13

Ø nom. mm	x	passo P mm	Ø foro mm	Ø foro min. mm	Ø foro max. mm	Ø preforo madrevite 7H* min. mm	Ø preforo madrevite 7H* max. 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
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 a M 4 x 0,35 nom.-Ø madrevite 6H

Tolleranza dei diametri di fori di filettatura nei maschi a rullare (a DIN 13, parte 50)

Per ragioni di resistenza, non è necessario mantenere la tolleranza 6H per i fori di filettatura; la tolleranza 7H è sufficiente a garantire che non sia superato il ricoprimento del diametro medio di 0,32 x P tra madrevite e bullone. Inoltre, la filettatura a rullare, per la corsa della fase non interrotta e la deformazione a freddo, conferisce di regola una resistenza superiore a quella della filettatura normale.

Filettatura UNC ASME B1.1

Ø nom.		filetti per pollici	Ø foro mm	Ø foro min. mm	Ø foro max. mm	Ø preforo madrevite 2B min. mm	Ø preforo madrevite 2B max. mm
Nr. 1	-	64	**1,68**	1,67	1,70	1,425	1,580
Nr. 2	-	56	**1,98**	1,97	2,01	1,694	1,872
Nr. 3	-	48	**2,28**	2,27	2,32	1,941	2,146
Nr. 4	-	40	**2,55**	2,54	2,59	2,157	2,385
Nr. 5	-	40	**2,90**	2,89	2,94	2,487	2,698
Nr. 6	-	32	**3,15**	3,14	3,19	2,642	2,896
Nr. 8	-	32	**3,80**	3,78	3,82	3,302	3,531
Nr. 10	-	24	**4,35**	4,33	4,39	3,683	3,937
Nr. 12	-	24	**5,00**	4,97	5,03	4,343	4,597
1/4	-	20	**5,75**	5,72	5,80	4,978	5,258
5/16	-	18	**7,30**	7,26	7,37	6,401	6,731
3/8	-	16	**8,80**	8,77	8,88	7,798	8,153
7/16	-	14	**10,30**	10,27	10,37	9,144	9,550
1/2	-	13	**11,80**	11,77	11,88	10,592	11,024
9/16	-	12	**13,30**	13,28	13,39	11,989	12,446
5/8	-	11	**14,80**	14,78	14,90	13,386	13,868
3/4	-	10	**17,90**	17,85	17,97	16,307	16,840
7/8	-	9	**21,00**	20,95	21,10	19,177	19,761
1	-	8	**24,00**	23,95	24,12	21,971	22,606

Filettatura UNF ASME B1.1

Ø nom.		filetti per pollici	Ø foro mm	Ø foro min. mm	Ø foro max. mm	Ø preforo madrevite 2B min. mm	Ø preforo madrevite 2B max. mm
Nr. 1	-	72	**1,70**	1,69	1,72	1,473	1,610
Nr. 2	-	64	**2,00**	1,99	2,03	1,755	1,910
Nr. 3	-	56	**2,30**	2,29	2,34	2,024	2,197
Nr. 4	-	48	**2,60**	2,59	2,63	2,271	2,459
Nr. 5	-	44	**2,90**	2,89	2,93	2,550	2,741
Nr. 6	-	40	**3,20**	3,19	3,24	2,819	3,023
Nr. 8	-	36	**3,85**	3,83	3,88	3,404	3,607
Nr. 10	-	32	**4,45**	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

Filettatura (Whitworth) DIN EN ISO 228-1

Ø nom. pollici	filetti per pollici	Ø foro mm	Ø foro min. mm	Ø foro max. mm	Ø preforo madrevite 2B min. mm	Ø preforo madrevite 2B max. mm
G 1/16	28	**7,30**	7,28	7,35	6,561	6,843
G 1/8	28	**9,30**	9,28	9,35	8,566	8,848
G 1/4	19	**12,50**	12,48	12,55	11,445	11,890
G 3/8	19	**16,00**	15,98	16,05	14,950	15,395
G 1/2	14	**20,00**	19,98	20,12	18,631	19,172
G 5/8	14	**22,00**	21,98	22,12	20,587	21,128
G 3/4	14	**25,50**	25,48	25,62	24,117	24,658
G 7/8	14	**29,25**	29,23	29,37	27,877	28,418
G 1	11	**32,00**	31,98	32,15	30,291	30,931
G 1 1/4	11	**40,75**	40,70	40,85	38,952	39,592

Confronto internazionale dei materiali

Germania		Gran Bretagna		Giappone	Stati Uniti
No. di 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

Confronto internazionale dei materiali

Germania		Gran Bretagna		Giappone	Stati Uniti
No. di 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

Confronto internazionale dei materiali

Germania		Gran Bretagna		Giappone	Stati Uniti
No. di 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

Confronto internazionale dei materiali

Germania		Gran Bretagna		Giappone	Stati Uniti
No. di 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

Confronto internazionale dei materiali

Germania		Gran Bretagna		Giappone	Stati Uniti
No. di 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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Confronto internazionale dei materiali

Germania		Gran Bretagna		Giappone	Stati Uniti
No. di 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

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Comparazione durezza

Rm (N/mm²)	HRC	HB30	HV10	Rm (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				

Tolleranze dei diametri

Scostamenti ISO

Nelle punte elicoidali secondo DIN 1414 la normale precisione di fabbricazione corrisponde al campo di tolleranza h8 delle norme ISO.
Per le tolleranze più restrittive contemplate dai campi di tolleranza h7, h6 e h5.

Campi di diametro mm		Scostamenti mm (misurati sulle fasi, agli spigoli)				
		h8	h7	h6	h5	m7
da	1,0	0	0	0		
fino	3,0	–0,014	–0,010	–0,006	–0,004	
oltre	3,0	0	0	0	0	+0,016
fino	6,0	–0,018	–0,012	–0,008	–0,005	+0,004
oltre	6,0	0	0	0	0	+0,021
fino	10,0	–0,022	–0,015	–0,009	–0,006	+0,006
oltre	10,0	0	0	0	0	+0,025
fino	18,0	–0,027	–0,018	–0,011	–0,008	+0,007
oltre	18,0	0	0	0	0	+0,029
fino	30,0	–0,033	–0,021	–0,013	–0,009	+0,008
oltre	30,0	0	0	0	0	
fino	50,0	–0,039	–0,025	–0,016	–0,011	
oltre	50,0	0	0	0	0	
fino	80,0	–0,046	–0,030	–0,019	–0,013	
oltre	80,0	0	0	0	0	
fino	100,0	–0,054	–0,035	–0,022	–0,015	

Tolleranze delle micropunte secondo DIN 1899

Nelle micropunte fino al Ø 1,5 mm la precisione di fabbricazione corrisponde alle tolleranze previste da DIN 1899.

Tolleranza nel diametro al vertice	= 0/– 0,004 mm
Tolleranza nel diametro al codolo h8	= 0/– 0,014 mm

Tolleranze delle misure non previste dalle norme secondo DIN-ISO 2768

Valori numerici per misure di lunghezza (mm)

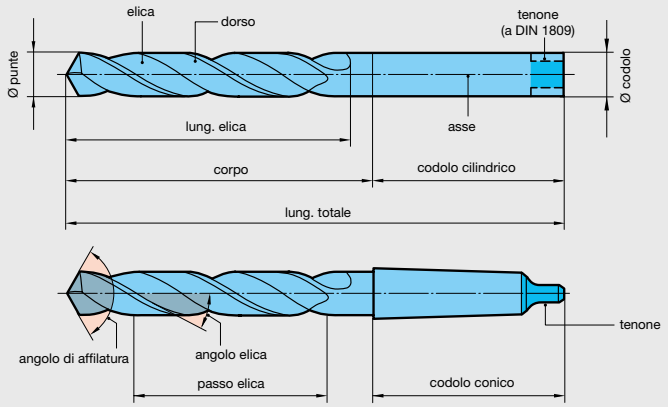
Grado di precisione	Campo misure nominali							
	0,5 fino 3	oltre 3 fino 6	oltre 6 fino 30	oltre 30 fino 120	oltre 120 fino 400	oltre 400 fino 1000	oltre 1000 fino 2000	oltre 2000 fino 4000
fine	± 0,05	± 0,05	± 0,1	± 0,15	± 0,2	± 0,3	± 0,5	-
medio	± 0,1	± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2
grosso	± 0,15	± 0,2	± 0,5	± 0,8	± 1,2	± 2	± 3	± 4
molto grosso	–	± 0,5	± 1	± 1,5	± 2,5	± 4	± 6	± 8

Valori numerici per angoli (espressi in gradi e minuti)

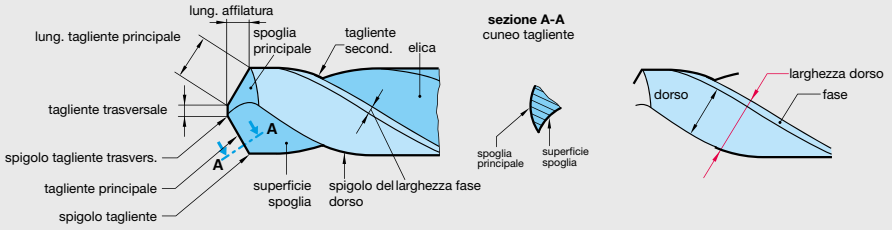
Grado di precisione	Campo misure nominali							
	fino 10	oltre 10 fino 50	oltre 50 fino 120	oltre 120 fino 400	oltre 400			
fine, medio	± 1°	± 0° 30'	± 0° 20'	± 0° 10'	± 0° 5'			
grosso	± 1°30'	± 1°	± 0° 30'	± 0° 15'	± 0° 10'			
molto grosso	± 3°	± 2°	± 1°	± 0° 30'	± 0° 20'			

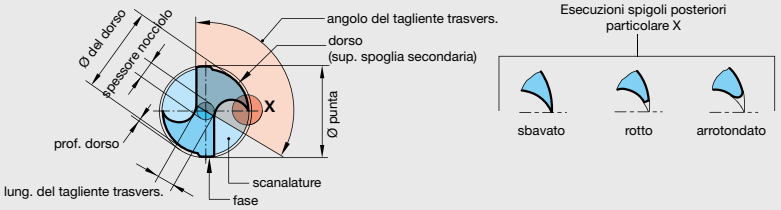
Designazioni, misure ed angoli DIN ISO 5419 (estratto; edizione 06/98)

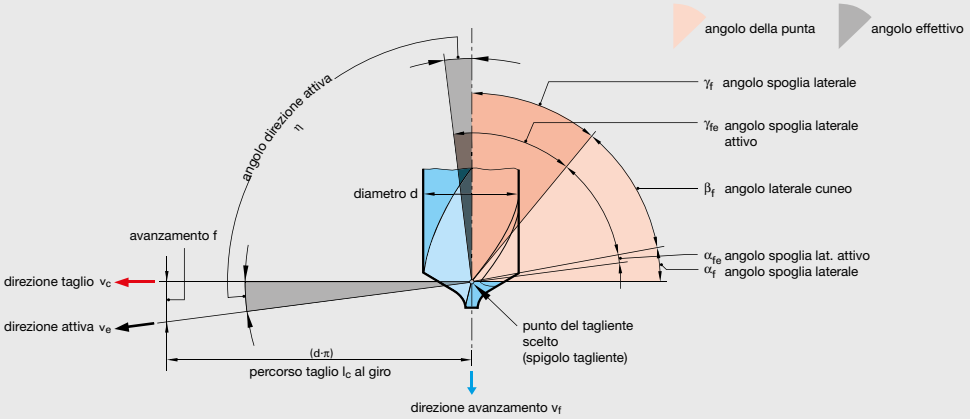
Punte elicoidali con codolo cilindrico/conico Morse



Parte tagliente

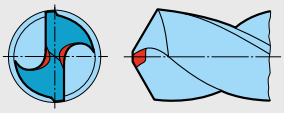




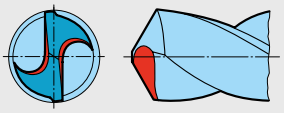


Affilature e precisione di produzione

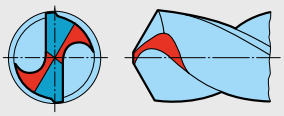
Affilature DIN 1412 (estratto; edizione 03/01)



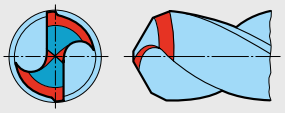
Forma A
Tagliente trasversale ridotto



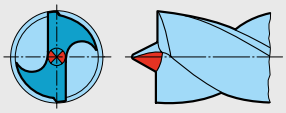
Forma B
Tagliente trasversale ridotto con correzione tagliente principale



Forma C
Affilatura a croce



Forma D
Affilatura per ghisa grigia



Forma E
Affilatura con centrino

Precisione di produzione per punte elicoidali a DIN ISO 286, parte 2

diametro (misura nominale) fino a mm compresi	scostamento µm 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

* se la nostra normale tolleranza di produzione ISO h8 non é adatta per Voi, fatecelo sapere. Aumenti per tolleranze differenti si trovano alla fine del capitolo utensili a forare.

Cenni su altre norme

DIN 228	foglio 1 codolo dell'utensile; codolo cono Morse e metrico, codoli conici
DIN 1414-1	condizioni tecniche di fornitura per punte elicoidali in acciaio super rapido
DIN 6580	dati della tecnica di truciolatura; movimenti e geometria del procedimento di truciolatura
DIN 6581	dati della tecnica di truciolatura; Sistema di riferimento ed angoli sulla parte tagliente

Le norme sono compilate con il benestare dell'Istituto Tedesco per Normalizzazione. Fa testo l'edizione più recente della norma in formato A4,ottenibile dalla Beuth-Verlag GmbH, 10787 Berlino.

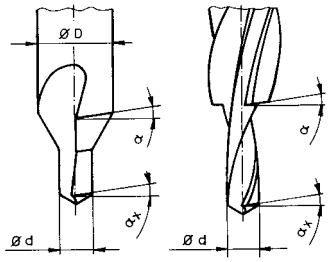
Angolo di spoglia/Indice di frequenza

Angolo di spoglia nelle punte elicoidali in HSS e HSS-E

Diametro	Tipo N, tipo H e punte da centro		Tipo W, tipo FN, tipo FW, tipo S, tipo IS		Tipo V	
Ø punte in mm oltre fino	Angolo di spoglia α_x	Angolo al vertice	Angolo di spoglia α_x	Angolo al vertice	Angolo di spoglia α_x	Angolo al vertice
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°

Angolo di spoglia nelle punte a gradino ad eliche indipendenti, punte a gradino e punte a centrare

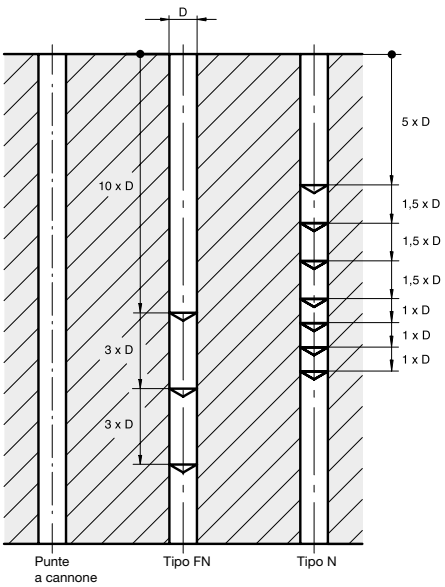
Diametro	Tipo N, tipo S angolo di svasatura 20 - 160°	161 - 180°	Tipo W, tipo H, angolo di svasatura 20 - 160°	161 - 180°	Punte a centrare
Ø punte D oltre fino	Angolo al vertice α_x	Angolo al vertice α	Angolo al vertice α_x	Angolo al vertice α	Angolo misurato al corpo Ø D
0,48 – 0,95	-	-	-	-	7°
0,95 – 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°	–



Indice di frequenza di scarico trucioli

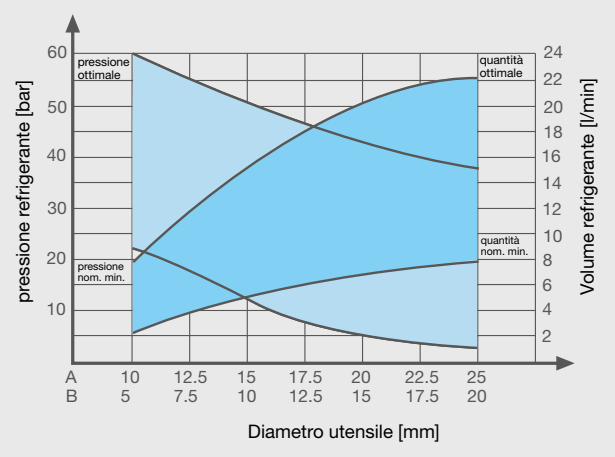
I dati sopra esposti rappresentano valori medi orientativi. Nelle perforazione in profondità si ponga la massima attenzione ad una abbondante e costante presenza di refrigerante ai taglienti della punta. Con lo scarico dei trucioli, da eseguirsi almeno una volta, o meglio ripetute volte, nel corso della lavorazione, la punta si raffredda già in maniera sufficiente. La frequenza delle operazioni di scarico dei trucioli dipende essenzialmente dal tipo di materiale, dalla profondità della foratura nonché dal tipo della punta impiegata.
L'impiego di punte del tipo FN, cioé avente profilo a scanalature piatte riduce sensibilmente la frequenza di scarico. Si tenga presente, comunque che in determinati materiali è possibile influire sul modo di formazione dei trucioli con l'adeguato variare dell'angolo del vertice; se la loro forma è abbastanza favorevole l'asportazione spontanea ne risulterà facilitata e l'afflusso del lubrorefrigerante diventa piu efficace. Per perforazioni di estrema profondità come per le perforazioni orizzontali si consiglia il ricorso alle punte auto-refrigeranti ad alimentazione interna.

Tutti i dati sono orientativi e rappresentano valori medi.



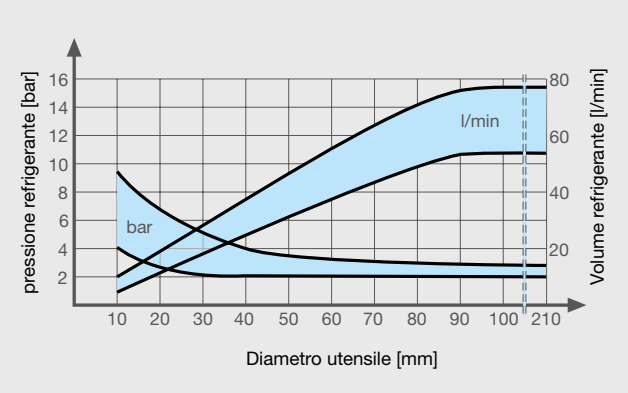
Diagrammi del refrigerante
Pressione e volume del refrigerante

Per punte elicoidali in metallo duro con fori di refrigerazione



A = Diametri per utensili con condotto refrigerante centrale
B = Diametri per utensili con condotto refrigerante elicoidale

Per punte con placchette intercambiabili, sistema Multiplex con fori di refrigerazione



Nella foratura con placchette intercambiabili in HSS-E e MD l'emulsione serve come lubrorefrigerante. Il rapporto di miscelazione è quello usuale di 1:20.

Di decisiva importanza è un efficiente gruppo refrigerante. Una pressione e quantità del refrigerante non sufficienti possono provocare un risultato di foratura insoddisfacente e persino la rottura dell'utensile.

La quantità delle particelle della sostanza solida possibilmente non deve superare i 50 µm.

Consigli per l'impiego di punte elicoidali

Articolo nr. ®
Articolo nr. ↺
Norma/DIN
Materiale tagliente
Tratt. superficiale
Tipo
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
↺ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤3xD

81110	81120	81130	81140
81115			81145
1897	1897	1897	1897
HSS			
>Ø 2,36			>Ø 2,36
N	H	W	FN
24/26	28	29	30/31

84400
1897
HSS
T
N
33

84501
1897
HSS
F
N
33

81171	82971	81173	82972
1897	N.d.F.	1897	N.d.F.
HSS-E			
>Ø 2,36			
V	V	IS	IS
37	181	39	182

v_c m/min	Num. col. avanzam.			
27	**6**			6
22	**5**			5
30	**6**			**6**
30	5			5
25	**5**			**5**
25	**5**			**5**
30	**6**			6
16	4			4
30	**6**			6
30	6			6
25	**6**			6
20	6			6
70			**7**	7
70			**7**	7
50	7		7	**7**
50	6			**6**
70	6	**6**		6
60	5		5	**5**
70		6		
40	5		5	**5**
30	4	4		**4**
25	4			4
15	4			4
18	4	4		**4**
28	5	**5**	5	5

v_c m/min	Num. col. avanzam.
30	**6**
24	**5**
33	**6**
33	5
28	**5**
28	**5**
25	4
22	4
33	**6**
20	4
14	4
18	4
33	**6**
33	6
28	**6**
22	6
80	6
65	**5**
75	5
45	**5**
33	**4**
27	4
16	**4**
15	4
22	**4**
36	**5**

v_c m/min	Num. col. avanzam.
32	**7**
26	**6**
36	**7**
36	6
31	**6**
31	**6**
28	5
24	5
36	**7**
22	5
16	5
20	5
36	7
36	**7**
31	7
24	**7**
85	8
85	8
60	**8**
60	**7**
90	6
70	**6**
80	6
50	**6**
36	**5**
30	5
18	**5**
18	5
29	**5**
47	6

v_c m/min	Num. col. avanzam.			
35	5	5	5	5
30	5	5	5	5
40	5	5	5	5
40	**5**	**5**	5	5
40	5	5	5	5
40	5	5		
35	**4**	**4**		
20	**4**	**4**		
16	**3**	**3**		
36	6	6	6	6
20	**4**	**4**		
15	**3**	**3**		
16	4	**4**		
12	3	**3**		
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
35	**6**	6		
30	**6**	**6**		
30	6	6		
25	**6**	**6**		
10	3	3		
8	1	1		
10	2	2	2	2
6	2	2	2	2
90			7	7
90			7	7
80			7	7
70			6	6
70			6	6
40			5	5
60			5	5
40			5	5
35	4	4	4	4
30	**4**	**4**	4	4
20	4	4	**4**	**4**
15	4	4	**4**	**4**
20	4	4		
30			4	4

Consigli per l'impiego di punte elicoidali

Articolo nr. ®
Articolo nr. ↺
Norma/DIN
Materiale tagliente
Tratt. superficiale
Tipo
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
↺ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

HARTNER

≤3xD

81112	81000	81178	84803	84503	89253
1897	N.d.F.	1897	1897	1897	6539
M42	M42	HSS-E	HSS-E	HSS-E	int. in MD
○	Z	S	T	F	F
N		IS	V	V	N
35	104	44	40	40	50

v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.
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

Consigli per l'impiego di punte elicoidali

Articolo nr. ®
Articolo nr. ↺
Norma/DIN
Materiale tagliente
Tratt. superficiale
Tipo
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
↺ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤3xD

84805	84808	84806	84511	89235	89246	89301	89302	89303
N.d.F.	1897	1897	1897	6539	N.d.F.	8037	8041	8038
HSS-E-PM	HSS-E	HSS-E	HSS-E-PM	int. in MD				
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	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.				
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

Consigli per l'impiego di punte elicoidali

Articolo nr. ®
Articolo nr. ↺
Norma/DIN
Materiale tagliente
Tratt. superficiale
Tipo
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
↺ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤5xD

81010	81017	82010	81020	81030	82030	81040
81015			81025	81035		81045
338	338	345	338	338	345	338
HSS						
>Ø 2,36						>Ø 2,36
N	N	N	H	W	W	FN
53/57	59	173	60/62	64/66	177	67/69

84406
338
HSS
T
N
73

84405	84460	84415
338	345	338
HSS		
T	T	T
N	N	FN
71	176	75

84502
338
HSS
F
FN
75

v_c m/min	Num. col. avanzam.						
27	**6**	**6**	**6**				6
22	**5**	**5**	**5**				5
30	**6**	**6**	**6**				**6**
30	5	5	5				5
25	**5**	**5**	**5**				5
25	**5**	**5**	**5**				5
30	6	6	6				6
16	4	4	4				4
30	**6**	**6**	**6**				6
30	6	6	6				6
25	6	6	6				6
25	6	6	6				6
80					**7**	**7**	
80					**7**	**7**	
70	7	7	7		7	7	**7**
70	6	6	6				**6**
50	6	6	6	6			6
50	5	5	5		**5**	**5**	**5**
70				**6**			
40	5	5	5				**5**
30	4	4	4	4			
25	4	4	4				
15	4	4	4				4
18	4	4	4	4			**4**
28	5	5	5	**5**	5	5	

v_c m/min	Num. col. avanzam.
32	**6**
26	**5**
36	**6**
36	**5**
31	**5**
31	**5**
28	**4**
24	4
36	**6**
22	4
16	4
20	4
36	**6**
36	**6**
31	**6**
24	**6**
90	6
70	**5**
80	**5**
50	**5**
36	**4**
33	**4**
18	**4**
18	**4**
29	**4**
36	**5**

v_c m/min	Num. col. avanzam.		
30	**6**	**6**	6
24	**5**	**5**	5
33	**6**	**6**	**6**
33	5	5	5
28	**5**	**5**	5
28	**5**	**5**	5
25	4	4	4
22	4	4	4
33	**6**	**6**	6
20	4	4	4
14	4	4	4
18	4	4	4
33	6	6	6
33	6	6	6
28	**6**	**6**	6
22	6	6	6
80	6	6	
65	5	5	**5**
75	5	5	5
45	5	5	**5**
33	**4**	**4**	
27	**4**	**4**	
16	**4**	**4**	4
15	**4**	**4**	4
22	4	4	**4**
36	5	5	

v_c m/min	Num. col. avanzam.
32	7
26	6
36	**7**
36	6
31	6
31	6
28	5
24	5
36	7
22	5
16	5
20	5
36	7
36	7
31	7
24	7
85	8
85	8
60	8
60	7
90	7
70	6
80	6
50	**6**
18	5
18	5
29	5

Consigli per l'impiego di punte elicoidali

Articolo nr. ®
Articolo nr. ↺
Norma/DIN
Materiale tagliente
Tratt. superficiale
Tipo
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento 1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
↺ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	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

v_c m/min	Num. col. avanzam.						
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				

v_c m/min	Num. col. avanzam.		
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	

v_c m/min	Num. col. avanzam.	
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	

Consigli per l'impiego di punte elicoidali

Articolo nr. ®
Articolo nr. ↺
Norma/DIN
Materiale tagliente
Tratt. superficiale
Tipo
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
↺ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤5xD

81018	81019	81078	84804	84802	84801	84660
338	338	338	338	338	N.d.F.	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	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.
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**		

Consigli per l'impiego di punte elicoidali

Articolo nr.
Norma/DIN
Materiale tagliente
Tratt. di superficie
Tipo
Raffreddamento
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤5xD

84811	84507	82761	84461	89244	89261
338	N.d.F.	N.d.F.	N.d.F.	N.d.F.	N.d.F.
HSS-E-PM	HSS-E-PM	HSS-E	HSS-E	int. in MD	int. in MD
T	F		T		F
FN 500 DZ	FN 500	FN	FN	N	N
		assiale	assiale		
99	107	120	120	100	102

v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.
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

Consigli per l'impiego di punte elicoidali

Articolo nr. ®
Articolo nr. ↺
Norma/DIN
Materiale tagliente
Tratt. superficiale
Tipo
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
↺ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	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	Num. col. avanzam.							v_c m/min	Num. avanz.	v_c m/min	Num. avanz.	v_c m/min	Num. col. avanzam.		v_c m/min	Num. avanz.
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			

Consigli per l'impiego di punte elicoidali

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	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	Num. col. avanzam.				v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.
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				

Consigli per l'impiego di punte elicoidali

Articolo nr.
Norma/DIN
Materiale tagliente
Tratt. di superficie
Tipo
Refrigerazione
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
Ⓡ destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤10xD

89286	82710	82521	82535	82525	82515
N.d.F.	N.d.F.	N.d.F.	N.d.F.	N.d.F.	N.d.F.
MD	HSS			HSS-E	HSS-E
○	○	●	●	●	●
N	FN	N	FN	FN	FN
	assiale	assiale	assiale	assiale	assiale
146	121	195	196	197	198

v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.			v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.
		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								

Consigli per l'impiego di punte elicoidali

Articolo nr.

Norma/DIN

Materiale tagliente

Tratt. di superficie

Tipo

Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

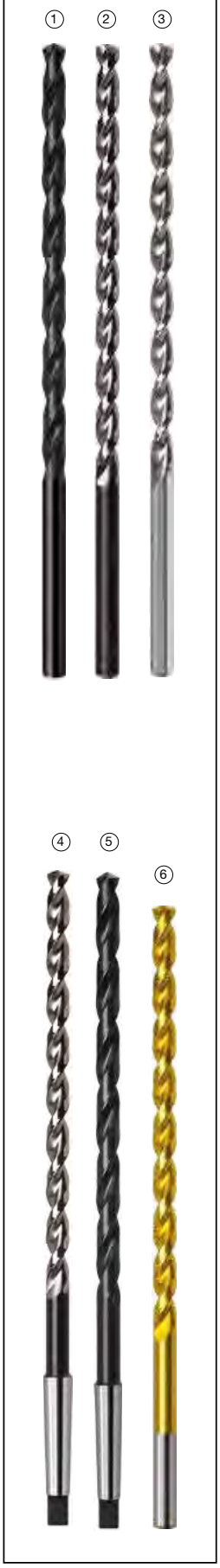
Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
- ○ Aria
- ● Olio
- ◍ Emulsione

Direzione di taglio:
- destre
- sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	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.d.F.	1870	N.d.F.	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	Num. col. avanzam.							v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.
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

Consigli per l'impiego di micropunte elicoidali

Articolo nr. ®
Articolo nr. Ⓛ
Norma/DIN
Materiale tagliente
Tipo di metallo duro
Tratt. di superficie
Tipo
Refrigerazione
Prezzi/misure pag.

Ø utensile mm	Num. colonna avanzamento								
	101	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**
	f (mm/riv.)								
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 utensile mm	Num. colonna avanzamento articolo no. 6400/6401/6408/6412												
	56	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**
	f (mm/riv.)												
0,80	0,008	0,016	0,024	0,032	0,04	0,05	0,06	0,07	0,08	0,08	0,08	0,09	0,09
1,00	0,012	0,022	0,032	0,042	0,06	0,07	0,08	0,09	0,10	0,10	0,11	0,11	0,12
1,50	0,021	0,036	0,051	0,066	0,09	0,10	0,12	0,13	0,15	0,15	0,16	0,17	0,18
2,00	0,032	0,052	0,072	0,092	0,12	0,14	0,16	0,18	0,20	0,21	0,22	0,23	0,24
2,50	0,045	0,070	0,095	0,120	0,15	0,17	0,20	0,22	0,25	0,26	0,27	0,28	0,30
3,00	0,060	0,090	0,120	0,150	0,18	0,21	0,24	0,27	0,30	0,31	0,33	0,34	0,36

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

HARTNER

					≤4xD	≤7xD	≤5xD	≤8xD	≤15xD
87011 87016	84810	89281	86402	86400	86401	86405	86408	86412
1899	1899	N. di fab.	N. di fab.	N. di fab.	N. di fab.	N. di fab.	N. di fab.	N. di fab.
HSS-E-PM	HSS-E-PM	int. in MD	int. in MD	int. in MD	int. in MD	int. in MD	int. in MD	int. in MD
		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
						assiale	assiale	assiale
329/331	332	335	333	334	336	337	338	339

v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.		v_c m/min	Num. col. avanzam.		
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									

Consigli per l'impiego di TS-Drills

Articolo nr.
Norma/DIN
Materiale tagliente
Tipo di metallo duro
Tratt. di superficie
Tipo
Forma dell'attacco
Refrigerazione
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
Ⓡ destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤3xD

89306	89264	89237	89422	89413	89402	89401	89450	89550	89266
6538K	6537K	6539	6537K	6537K	6537K	6539	6537K	6537K	6537K
MD	int. MD		int. MD	int. MD			int. MD	int. MD	int. MD
	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
							assiale	assiale	assiale
221	210	216	214	212	212	216	227	227	222

v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.			v_c m/min	Num. col. avanzam.		v_c m/min	Num. col. avanzam.
95	6	100	6	130	7	130	7	7	7				110	6
80	5	85	5	110	6	110	6	6	6				90	5
95	7	110	7	145	8	145	8	8	8				130	7
75	6	85	6	110	7	110	7	7	7				110	7
80	6	90	6	120	7	120	7	7	7				100	7
75	6	85	6	110	7	110	7	7	7				95	6
70	6	80	6	105	7	105	7	7	7				90	6
75	6	80	6	105	7	105	7	7	7				90	6
60	5	75	5	100	6	100	6	6	6				80	6
90	7	100	7	130	8	130	8	8	8				110	7
75	6	90	6	120	7	120	7	7	7				90	6
60	5	65	4	85	5	85	5	5	5				65	4
75	6	75	5	100	6	100	6	6	6				85	6
60	5	70	4	90	5	90	5	5	5				80	5
45	5	50	5	65	6	65	6	6	6				60	5
35	5	40	4	55	5	55	5	5	5				50	4
40	4			55	4								45	3
		35	2	45	3	45	3	3	3				45	2
		35	1	40	1	40	1	1	1				40	2
		20	1	20	1	20	1	1	1				20	1
40	2	40	2	40	2	40	2	2	2	80	5	5	45	4
35	2	15	1	15	1	15	1	1	1	60	2-3	2-3	40	2
35	2	35	2	35	2	35	2	2	2	80	5	5	35	4
150	7	160	7			210	8	8	8				160	8
110	7	120	7			155	8	8	8				120	8
110	7	120	6			155	7	7	7				100	8
90	6	95	6			125	7	7	7				95	7
		25	2			35	3	3	3				30	2
		20	3	25	4	25	4	4	4	30	4	4	25	3
		15	1	15	1	15	1	1	1	45	4	4	35	3
		15	1	15	1	15	1	1	1	40	3	3	30	2
200	8	200	8			260	9	9	9				240	8
200	8	200	8			260	9	9	9				240	8
170	8	170	8			220	8	8	8				200	8
140	7	140	7			180	8	8	8				170	8
		200	7			260	8	8	8				230	7
		80	6			105	7	7	7				95	6
		210	7			270	8	8	8				250	7
		140	6			180	7	7	7				170	6
		80	5			105	6	6	6				95	6
		65	5			85	6	6	6				80	5
		60	4			80	5	5	5				70	5
		45	4			60	5	5	5				60	5

Consigli per l'impiego di TS-Drills

Articolo nr.
Norma/DIN
Materiale tagliente
Tipo di metallo duro
Tratt. di superficie
Tipo
Forma dell'attacco
Refrigerazione
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
Ⓡ destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤3xD

89410	89415
6537K	6537K
int. MD	
K/P	K/P
F	F
TS 100 U	TS 100 U
HA	HE
assiale	assiale
223	223

89423	89424
6537K	6537K
int. MD	int. MD
Y	Y
TS 100 H	TS 100 H
HA	HE
assiale	assiale
225	225

≤4xD

89292
WN
int. MD
K
○
TS 150 GG
HA
assiale
229

≤5xD

89307	89420	89451	89551
6538M	6537L	6537L	6537L
MD	int. MD	int. MD	int. MD
P	K/P	K/P	K/P
T	F	a	a
TS 80 U	TS 100 R	TS 100 INOX	
HE	HA	HA	HE
assiale	assiale	assiale	assiale
230	234	238	238

v_c m/min	Num. col. avanzam.		v_c m/min	Num. col. avanzam.		v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.		v_c m/min	Num. col. avanzam.	
145	7	7	145	7	7			95	5						
120	6	6	120	6	6			80	4						
170	8	8	170	8	8			95	6						
145	8	8	145	8	8			75	5						
130	8	8	130	8	8			80	5						
125	7	7	125	7	7			75	5						
120	7	7	120	7	7			75	5						
120	7	7	120	7	7			75	5						
105	7	7	105	7	7			55	4						
145	8	8	145	8	8			90	6						
120	7	7	120	7	7			75	5						
85	5	5	85	5	5			55	4						
110	7	7	110	7	7			70	5						
105	5	5	105	5	5			55	4						
80	6	6	80	6	6			40	4						
65	5	5	65	5	5			35	4						
60	4	4	60	4	4			40	3						
60	3	3	60	3	3										
55	3	3	55	3	3										
35	2	2	35	2	2										
60	5	5						40	2				80	5	5
55	2	2						35	2				60	2-3	2-3
45	5	5						35	2				80	5	5
210	9	9				120	7	150	6	210	9				
160	9	9				100	7	110	6	160	9				
140	9	9				90	7	110	6	160	9				
130	8	8				80	7	90	5	130	8				
40	3	3				40	2								
										130	8				
										100	8				
										80	8				
										60	8				
35	4	4	35	4	4								30	4	4
45	4	4	45	4	4								45	4	4
40	3	3	40	3	3								40	3	3
310	9	9				410	9	200	7						
310	9	9				410	9	200	7						
260	9	9				380	9	170	7						
220	9	9				330	9	140	6						
280	8	8													
125	7	7													
325	8	8				280	9								
220	7	7													
125	7	7				110	6								
105	6	6				80	5								
90	6	6													
80	6	6													

Consigli per l'impiego di TS-Drills

Articolo nr.
Norma/DIN
Materiale tagliente
Tipo di metallo duro
Tratt. di superficie
Tipo
Forma dell'attacco
Refrigerazione
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
Ⓡ destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤5xD

89275	89414	89417	89272	89411	89408	89425	89426
WN	6537L	6537L	6537L	6537L	6537L	6537L	6537L
int. MD	int. MD	int. MD	int. MD	int. MD	int. MD	int. MD	int. MD
K/P	K/P	K/P	K/P	K/P	K/P		
T	F	F	T	F	F	Y	Y
TS 100 U	TS 100 U	TS 100 U	TS 100 U	TS 100 U	TS 100 U	TS 100 H	TS 100 H
DZ	HA	HE	HE	HA	HE	HA	HE
			assiale	assiale	assiale	assiale	assiale
220	218	218	231	232	232	236	236

v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.		v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.		v_c m/min	Num. col. avanzam.	
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			

Consigli per l'impiego di TS-Drills

Articolo nr.
Norma/DIN
Materiale tagliente
Tipo di metallo duro
Tratt. di superficie
Tipo
Forma dell'attacco
Refrigerazione
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
Ⓡ destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

≤5xD

89560	89460	89239	89247
6537L	6537L	6539	6537L
int. MD	int. MD	int. MD	
K	K/P	K	K
○	F	○	○
TS 100 ALU	TS 100 HPC	TS 3 G	TS 3 G
HA	HA	DZ	HA
	assiale		
240	242	263	262

v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.
		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				
		160	9				
		140	9				
		140	8				
		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
int. MD	int. MD	int. MD
P	K	K/P
T	○	F
TS 80 U	TS 150 GG	TS 100 R
HE	HA	HA
	assiale	assiale
244	245	248

v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.
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		

Consigli per l'impiego di TS-Drills

Articolo nr.
Norma/DIN
Materiale tagliente
Tipo di metallo duro
Tratt. di superficie
Tipo
Forma dell'attacco
Refrigerazione
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
0,50	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
1,00	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
2,00	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250
50,00	0,250	0,310	0,400	0,500	0,630	0,800	1,000	1,250	1,250
63,00	0,315	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600
80,00	0,400	0,500	0,630	0,800	1,000	1,250	1,600	1,600	2,000

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
Ⓡ destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

HARTNER

≤7xD

89461	89412	89416
6537L	WN	WN
int. MD	int. MD	
K/P	K/P	K/P
F	F	F
TS 100 HPC	TS 100 U	TS 100 U
HA	HA	HE
assiale	assiale	assiale
251	246	246

v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	
180	8	145	6	6
180	7	120	5	5
180	8	170	7	7
180	8	145	7	7
160	8	130	7	7
140	8	125	6	6
120	8	120	6	6
110	8	120	6	6
110	7	105	6	6
160	8	145	7	7
110	8	120	6	6
100	7	85	4	4
100	7	110	6	6
90	5	105	4	4
80	7	80	5	5
60	6	65	4	4
55	5	60	4	4
55	5	60	2	2
45	3	55	2	2
		35	1	1
70	5	60	4	4
		55	2	2
50	5	45	4	4
165	9	195	8	8
145	9	160	8	8
130	9	140	8	8
130	8	130	7	7
		40	2	2
130	8			
130	8			
70	7			
70	7			
25	4	35	3	3
35	4	40	3	3
30	3	40	2	2
		310	8	8
		310	8	8
		260	8	8
		220	8	8
		280	7	7
		125	6	6
		325	7	7
		220	6	6
		125	6	6
		105	5	5
		90	5	5
		80	5	5

≤10xD

89427
WN
int. MD
Y
TS 100 H
HA
assiale
250

v_c m/min	Num. col. avanzam.
145	6
120	5
170	7
145	7
130	7
125	6
120	6
120	6
105	6
145	7
120	6
85	4
110	6
105	4
80	5
65	4
60	3
60	2
55	2
35	1
35	3
45	3
40	4

≤12xD

89293	89295
WN	WN
int. MD	
K	K
○	○
TS 150 GG	TS 150 GG
HA	HA
assiale	assiale
253	253

v_c m/min	Num. col. avanzam.	
120	6	6
100	6	6
90	6	6
80	6	6
40	1	2
410	8	6
410	8	6
380	8	6
330	8	6
280	7	7
110	6	6
80	5	5

89418

89418
WN
int. MD
K/P
F
TS 100 U
HA
assiale
255

v_c m/min	Num. col. avanzam.
110	6
110	5
110	7
100	7
110	7
110	6
100	6
110	6
105	6
110	7
110	6
85	4
100	6
80	4
80	5
65	4
50	4
50	2
60	4
55	2
45	4
120	8
120	8
100	8
90	7
150	8
150	8
150	8
120	8
150	7
80	6
120	7
120	6
40	6
40	5

Consigli per l'impiego di TS-Drills

Articolo nr. ®
Norma/DIN
Materiale tagliente
Tipo di metallo duro
Tipo
Tratt. di superficie
Refrigerante
Prezzi/misure pag.

Procedimento:
- Fresatura di una superficie perpendicolare rispetto all'angolo di entrata della foratura (necessario soltanto per superfici oblique).
- Eseguire un foro pilota cilindrico (tolleranza F9) con profondi tà minimo 1 x D.
- Entrata nel foro pilota con ca. 300 giri/min. e f = 500 mm/min
- Regolazione di pressione del refrigerante e del numero di giri.
- Foratura continua sull'intera lunghezza senza scaricare.
- Con fori passanti e uscita obliqua ridurre l'avanzamento vf del 40% a ca. 1 mm. prima dell'uscita della punta.
- Spegnimento dell'adduzione refrigerante al raggiungimento della profondità di foro voluta, corsa di ritorno rapida.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
2,50	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
3,15	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
4,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
5,00	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
6,30	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
8,00	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
® destre
Ⓛ sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

HARTNER

≤15xD

86509
n. di fab.
int. in MD
K/P
TS 100 T
A
40 bar MQL
257

v_c m/min	Num. col. av.	v_c m/min	Num. col. av.
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
n. di fab.
int. in MD
K/P
TS 100 T
A
40 bar MQL
258

v_c m/min	Num. col. av.	v_c m/min	Num. col. av.
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
n. di fab.
int. in MD
K/P
TS 100 T
A
40 bar MQL
259

v_c m/min	Num. col. av.	v_c m/min	Num. col. av.
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
n. di fab.
int. in MD
K/P
TS 100 T
A
40 bar MQL
260

v_c m/min	Num. col. av.	v_c m/min	Num. col. av.
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
n. di fab.
int. in MD
K/P
TS 100 T
A
40 bar
261

v_c m/min	Num. col. avanzam.
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

Consigli per l'impiego di punte a cannone

Come lavorare con punte a cannone

- Produzione del foro pilota (L = 1,5 x D, tolleranza H8)
- Entrata con nr. giri limitato, ca. 200 giri/min, avanzamento ca. 500 mm/min.
- Regolazione di pressione del refrigerante e del numero di giri
- Foratura in continuo sull'intera lunghezza, senza scaricare. Impiegando punte a cannone con un grosso rapporto lunghezza-diametro, consigliamo di lavorare fino ad una profondità di foro di ca. 25 mm con parametri di taglio ridotti (ca. 75% della velocità di taglio ottimale).
- Spegnimento dell'adduzione refrigerante al raggiungimento della profondità di foro voluta
- Corsa di ritorno rapido con mandrino fermo.

Ø punte mm	Numero colonna avanzamento									
	20	19	18	17	16	15	14	13	12	11
	f (mm/giro)									
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

* I valori di avanzamento si basano sempre su utensili con la ricopertura consigliata.
In alcuni casi la funzionalità degli utensili non può essere garantita senza ricopertura.

Refrigerante specifico per materiali da lavorare:
○ emulsione
● olio
◍ aria

E100

Punte a cannone ad 1 tagliente

MD

0,9 ... 16,0

Prezzi/misure pag. 271

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resist. N/mm²	Durezza	Refri-geracion	ricopert. consigl.	≤35xD v_c m/min	≤35xD Nr. col. avanzamento	>35xD v_c m/min	>35xD Nr. col. avanzamento
Acciai da costruzione	**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
Acciai automatici	**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
Acciai da bonifica non legati	**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
Acciai da bonifica legati	**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
Acciai da cementazione non legati	**1.0301**, **1.1121** C10E	≤850		◍	a A	80	15	80	15
Acciai da cementazione legati	**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
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍	a A	75	14	75	14
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●		65	14	65	14
Acciai utensili	**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
Acciai super rapidi	**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
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4		≤350 HB	●	a A	65	13	65	13
Acciai temprati	**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
Acciai inossidabili, allo zolfo	**1.4057** X20CrNi172, **1.4122** X39CrMo17-1, **1.4521**	≤900		●		40	14	40	14
austenitici	–	≤1100		●	a A	35	14	35	14
martensitici		≤1500		●		35	14	35	14
Ghise	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
Ghise sferoidali, ghise	**0.6025** EN-GJL-250, **0.6035** EN-GJL-350		≤240 HB	◍	a A	80	15	80	15
temperate	**0.7050** EN-GJS-500-7, **0.8035** EN-GJMW-350-4		≤350 HB	◍		70	15	70	15
Ghisa in conchiglia	**0.7070** EN-GJS-700-2, **0.8170** EN-GJMB-700-2		≤350 HB	◍	a A	55	14	55	14
Nuove ghise GGV	–		≤220 HB	◍ ○	a A				
	3.7024 Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2		≤300 HB	◍ ○					
Nuove ghise ADI	**3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184**	≤1000		◍ ○	a A				
	3.0255 Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤1400		◍ ○					
Leghe speciali	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245**, **3.4365**	≤2000		●	a	20	12	20	12
Titanio e leghe di titanio	**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
Alluminio e leghe di alu	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05**	≤400		◍	○	150	17	150	17
Leghe di alu per lav. plastiche	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤650		◍	○	120	19	120	19
Leghe di alu-ghisa ≤ 10 % Si	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410**	≤600		◍	○	120	20	120	20
> 10 % Si	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍		130	18	130	18
Leghe di magnesio	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176**	≤400		○	○	110	17	110	17
Rame legato in bassa %	**2.0790** CuNi18Zn19Pb	≤500		◍	○	75	15	75	15
Ottone, a truciolo corto	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤600		◍	○	120	18	120	18
a truciolo lungo	**2.0980** CuAl11Ni, **2.1247** CuBe2	≤600		◍		90	18	90	18
Bronzi a truciolo corto	Resina epossidica, Resopal, Pertinax, Moltopren	≤600		◍ ●	○	95	17	95	17
	Plexiglas, Hostalen, Novodur, Makralon	≤850		●		75	17	75	17
Bronzi a truciolo lungo	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)	≤850		●	○	70	17	70	17
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6	≤1000		●		60	17	60	17
Mat. plastiche termoindurenti	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤150		○	○	75	15	75	15
Materie termoplastiche	**EN-GJS-1200-2** (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤100		◍ ○		70	15	70	15
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○	○	60	14	60	14
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○		50	14	50	14

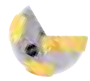
Suggerimenti e trucchi
- Con profondità di foro superiore a 40 x D, consigliamo l'impiego di due o più punte a cannone, p. es. Ø 10 x 400 mm e Ø 9,95 x 800 mm.
- Punte a cannone per profondità di foro superiore a 40 x D dovrebbero essere guidate nel foro pilota con rotazione sinistrorsa.
- Nel cambio di utensili da 40 x D, gli stessi possono essere smorzati con l'accensione di refrigerazione interna ad alta pressione per ca. 1 secondo.
- Per la lavorazione di materiali a truciolo lungo, consigliamo di ordinare punte a cannone con scanalature lucidate.
- In generale consigliamo di impiegare emulsione con almeno il 10% di grasso.
- Punte a cannone ad un tagliente per alluminio a truciolo lungo dovrebbero essere ordinate con angolo di affilatura a 180° e spazio per vano olio.
- Nell'entrare in alluminio con meno dell'1% di Si, cioè con velocità di taglio consigliate vc > 160 m/min, consigliamo di raggiungere il numero di giri finale in più passaggi. Inoltre si dovrebbe avere un foro pilota di ca. 3 x D.

STOP Tutte le punte a cannone devono essere guidate da un foro pilota. Le punte a cannone non devono essere mai mosse libere al massimo dei giri nello spazio macchina.

E80
Punte a cannone ad 1 tagliente
Testa di MD
2,0 ... 40,0
280/284

Z80
Punte a cannone a 2 taglienti
Testa di MD
6,0 ... 30,0
295

E800
Punte a cannone ad 1 tagliente
con inserti intercambiabili
12,0 ... 52,0
292



E80	≤35xD		>35xD		Z80	≤35xD		>35xD		E800	≤35xD		>35xD	
ricopert. consigl.	v_c m/min	**Nr. col. avanzamento**	v_c m/min	**Nr. col. avanzamento**	ricopert. consigl.	v_c m/min	**Nr. col. avanzamento**	v_c m/min	**Nr. col. avanzamento**	ricopert. consigl.	v_c m/min	**Nr. col. avanzamento**	v_c m/min	**Nr. col. avanzamento**
○	*100*	14	*95*	13						T	*90*	15	*85*	15
	85	14	*80*	13							*80*	15	*75*	15
T	*90*	14	*85*	13						T	*85*	16	*80*	16
	80	14	*75*	13							*75*	16	*70*	16
T	*90*	13	*85*	12						T	*85*	15	*80*	15
	80	13	*75*	12							*80*	15	*75*	15
	75	13	*70*	12							*75*	15	*70*	15
T	*75*	13	*70*	12						F	*75*	15	*70*	15
	65	13	*60*	12							*65*	15	*60*	15
T	*80*	14	*75*	13						F	*80*	15	*75*	15
T	*75*	13	*70*	12						Y	*75*	15	*70*	15
	65	13	*60*	12							*70*	15	*65*	15
C	*75*	13	*70*	12						F	*70*	15	*65*	15
	65	13	*60*	12							*60*	15	*55*	15
C	*75*	12	*70*	11						F	*65*	14	*60*	14
	65	12	*60*	11							*60*	14	*55*	14
C	*55*	11	*50*	11						Y	*55*	14	*50*	14
C	*65*	12	*60*	12						Y	*65*	15	*60*	15
C	*30*	12	*25*	11						Y	*30*	13	*25*	13
	25	11	*20*	11							*25*	12	*20*	12
C	*55*	13	*50*	12						a	*50*	14	*45*	14
	45	13	*40*	12							*45*	14	*40*	14
	35	13	*35*	12							*40*	14	*35*	14
T	*85*	15	*80*	14	○	*85*	18	*80*	17	Y	*85*	16	*80*	16
	80	15	*75*	14		*80*	18	*75*	17		*80*	16	*75*	16
T	*80*	14	*75*	13	○	*75*	17	*70*	16	Y	*75*	16	*70*	16
	70	14	*65*	13		*70*	17	*65*	16		*70*	16	*65*	16
T	*55*	13	*50*	12	○	*65*	16	*60*	15	Y	*55*	15	*50*	15
T					○					Y				
T					○					Y				
C	*20*	11	*20*	11						a	*25*	13	*20*	13
○	*35*	11	*30*	11						a	*35*	13	*30*	13
	30	11	*25*	11							*30*	12	*25*	12
C	*150*	16	*140*	15	○	*120*	18	*115*	17	T	*140*	16	*135*	16
○	*120*	15	*115*	14	○	*110*	18	*105*	17	T	*125*	16	*120*	16
○	*150*	16	*140*	15	○	*135*	18	*130*	17	T	*170*	17	*165*	17
	130	16	*120*	15		*120*	17	*115*	16		*140*	17	*135*	17
○	*110*	16	*100*	15						T	*115*	16	*110*	16
C	*75*	14	*70*	13						T	*75*	15	*70*	15
○	*120*	17	*115*	16	○	*130*	18	*125*	17	T	*120*	17	*115*	17
	90	17	*85*	16		*120*	18	*115*	17		*90*	17	*85*	17
○	*95*	16	*90*	15	○	*110*	17	*105*	16	T	*95*	17	*90*	17
	75	16	*70*	15		*110*	17	*105*	16		*75*	17	*70*	17
○	*70*	16	*65*	15	○	*95*	17	*90*	16	T	*70*	17	*65*	17
	60	16	*55*	15		*95*	17	*90*	16		*60*	17	*55*	17
○	*75*	14	*70*	13						T	*75*	16	*70*	16
	70	14	*65*	13							*70*	16	*65*	16
○	*60*	13	*55*	12						T	*60*	15	*55*	15
	50	13	*45*	12							*50*	15	*45*	15

Applicazioni raccomandate per svasatori cilindrici

Articolo n. ®
Norma/DIN
Materiale die taglio
Superficie
Angolo di svasatura
Forma del gambo
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento					
	81	82	83	84	85	86
	f (mm/giro)					
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

Avvertenza importante sui svasatori cilindrici a taglienti elicoidali:

Diametro del foro più piccolo per consentire la svasatura e adatto per viti a testa svasata

d1	Ø del foro più piccolo p. consentire la svasatura	per viti svasate ISO 2009, 2010, 7046, 7047	per viti svasate 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

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza MPa (N/mm²)	Durezza	Refri-gerante
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 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		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

88200	88021
335	335
HSS	HSS
○	○
90°	90°
cil.	cil.
382	384

88201	88022
335	335
HSS-E	HSS-E
A	A
90°	90°
cil.	cil.
383	385

v_c m/min	Num. colonna avanzamento	
32	85	85
30	85	85
32	85	85
30	85	85
32	85	85
30	85	85
20	84	84
15	84	84
12	**84**	**84**
25	85	85
15	84	84
10	**84**	**84**
15	85	85
12	**84**	**84**
17	84	84
15	84	84
15	84	84
10	84	84
16	84	84
12	84	84
14	84	84
25	85	85
16	84	84
22	84	84
20	84	84
8	**84**	**84**
25	**84**	**84**
16	**84**	**84**
8	84	84
15	85	85
10	85	85
90	85	85
70	86	86
40	85	85
30	85	85
100	86	86
60	84	84
80	85	85
50	85	85
30	86	86
26	86	86
24	86	86
20	86	86
30	84	84
40	85	85
70	84	84

v_c m/min	Num. colonna avanzamento	
41	**83**	**83**
39	**82**	**82**
41	**83**	**83**
39	**82**	**82**
41	**83**	**83**
39	**83**	**83**
25	**82**	**82**
19	**83**	**83**
15	**82**	**82**
32	**83**	**83**
19	**83**	**83**
13	**82**	**82**
19	**82**	**82**
15	**81**	**81**
22	**82**	**82**
19	**81**	**81**
19	**81**	**81**
13	**81**	**81**
20	**82**	**82**
15	**81**	**81**
18	**81**	**81**
32	**83**	**83**
20	**83**	**83**
28	**83**	**83**
25	**83**	**83**
10	**81**	**81**
28	**83**	**83**
18	**83**	**83**
10	**81**	**81**
19	**82**	**82**
13	**81**	**81**
114	**84**	**84**
89	**84**	**84**
51	**83**	**83**
39	**83**	**83**
127	**84**	**84**
76	**84**	**84**
101	**84**	**84**
64	**84**	**84**
39	**84**	**84**
33	**84**	**84**
31	**84**	**84**
25	**84**	**84**
39	**84**	**84**
51	**84**	**84**

Consigli per l'impiego di Multiplex

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento 1	2	3	4	5	6
	f (mm/giro)					
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

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
destre
sinistre

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	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	Num. col. avanzam.
40	4
35	4
50	5
40	5
40	4
35	4
30	4
25	3
22	2
35	3
25	3
22	2
22	3
15	2
26	3
22	2
12	2
10	2
20	2
15	2
15	2
35	4
35	4
35	4
28	4
60	5
80	5
85	5
70	5
45	4
45	4
60	5
45	4
32	5
40	3
36	3
28	3
22	3

v_c m/min	Num. col. avanzam.
48	4
42	4
60	5
50	5
45	4
40	4
35	4
28	3
25	2
40	3
28	3
25	2
25	3
18	2
28	3
25	2
18	2
13	2
23	2
17	2
20	2
40	4
40	4
40	4
33	4
65	5
85	5
85	5
70	5
50	4
50	4
65	5
50	4
35	5
45	3
40	3
32	3
27	3

v_c m/min	Num. col. avanzam.
40	4
35	4
50	5
40	5
40	4
35	4
30	4
25	3
22	2
35	3
25	3
22	2
22	3
15	2
26	3
22	2
12	2
10	2
20	2
15	2
15	2
35	4
35	4
35	4
28	4
60	5
80	5
85	5
70	5
45	4
45	4
60	5
45	4
32	5
40	3
36	3
28	3
22	3

v_c m/min	Num. col. avanzam.
48	4
42	4
60	5
50	5
45	4
40	4
35	4
28	3
25	2
40	3
28	3
25	2
25	3
18	2
28	3
25	2
18	2
13	2
23	2
17	2
20	2
40	4
40	4
40	4
33	4
65	5
85	5
85	5
70	5
50	4
50	4
65	5
50	4
35	5
45	3
40	3
32	3
27	3

v_c m/min	Num. col. avanzam.
25	3
25	3
30	3
25	3
22	3
20	3
20	3
15	2
15	2
20	2
15	2
15	2
15	2
12	1
15	2
15	2
10	1
8	1
10	1
10	1
10	1
20	3
20	3
20	3
15	3
32	4
42	4
42	4
35	4
25	3
25	3
32	4
25	3
20	4
22	2
20	2
15	2
15	2

Consigli per l'impiego di Multiplex

Articolo nr.
Ø
Materiale tagliente
Topologia MD
Categoria di MD
Tratt. di superficie
Prezzi/misure pag.

I numeri in grassetto della colonna avanzamento indicano gli utensili da preferire.

Ø utensile mm	Num. colonna avanzamento 1	2	3	4	5	6
	f (mm/giro)					
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

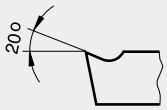
Refrigerante:
○ Aria
● Olio
◍ Emulsione

Direzione di taglio:
destre
sinistre

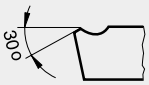
Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

86708	86709	86701	86702	86711
10…35	10…35	10…35	10…35	10…65
int. in MD	int. in MD	int. in MD	int. in MD	int. in MD
H22	H22	H22	H22	H22
K20/K40	K20/K40	K20/K40	K20/K40	K20/K40
T	T	F	F	○
419	420	417	418	421

Articolo nr. 86709/86701
senza fase
per materiali fino a
ca. 600 N/mm²
di resistenza a trazione



Articolo nr. 86708/86702
con fase
per materiali da
ca. 600 N/mm²
di resistenza a trazione



v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.	v_c m/min	Num. col. avanzam.
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

Consigli per l'impiego di Multiplex HPC

Articolo nr.
Norma/DIN
Materiale tagliente
Tipo di metallo duro
Prof. di foro
Tratt. di superficie
Tipo
Prezzi/misure pag.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Tutti i valori sono indicativi. La velocità di taglio e l'avanzamento effettivamente realizzabili dipendono dalle reali condizioni di lavoro. Consigliamo di effettuare prove di foratura.

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

HARTNER

≤1,5×D

86722	86725	86723	86724
N. d. f.	N. d. f.	N. d. f.	N. d. f.
Int. MD	Int. MD	Int. MD	Int. MD
K/P	K/P	K/P	K/P
1,5xD	1,5xD	1,5xD	1,5xD
F	a	Y	○
Acciaio	Acc. inoss.	Ghisa	Alluminio
446	455	449	452

v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.
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. d. f.	N. d. f.	N. d. f.	N. d. f.
Int. MD	Int. MD	Int. MD	Int. MD
K/P	K/P	K/P	K/P
3xD	3xD	3xD	3xD
F	a	Y	○
Acciaio	Acc. inoss.	Ghisa	Alluminio
446	455	449	452

v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.
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

Consigli per l'impiego di Multiplex HPC

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Tutti i valori sono indicativi. La velocità di taglio e l'avanzamento effettivamente realizzabili dipendono dalle reali condizioni di lavoro. Consigliamo di effettuare prove di foratura.

Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**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		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍ ○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍ ○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍ ○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍ ○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍ ○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍ ●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍ ○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

HARTNER

≤5×D

86722	86725	86723	86724
N. d. f.	N. d. f.	N. d. f.	N. d. f.
Int. MD	Int. MD	Int. MD	Int. MD
K/P	K/P	K/P	K/P
1,5xD	1,5xD	1,5xD	1,5xD
F	a	Y	○
Acciaio	Acc. inoss.	Ghisa	Alluminio
446	455	449	452

v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.
125	6						
105	5						
125	7						
105	6						
125	6						
120	6						
105	5						
105	6						
85	5						
125	7						
105	6						
70	4						
105	5						
70	4						
55	5						
50	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				
						180	7
						180	7
						140	7
						110	7
						180	7
						70	6
						180	7
						120	6
						70	6
						50	6
						45	6
						35	5

≤7×D

86722	86725	86723	86724
N. d. f.	N. d. f.	N. d. f.	N. d. f.
Int. MD	Int. MD	Int. MD	Int. MD
K/P	K/P	K/P	K/P
3xD	3xD	3xD	3xD
F	a	Y	○
Acciaio	Acc. inoss.	Ghisa	Alluminio
446	455	449	452

v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.
120	5						
105	4						
120	6						
105	5						
120	5						
110	5						
100	4						
100	5						
85	4						
120	6						
100	5						
70	4						
105	4						
70	3						
55	4						
50	3						
55	2						
50	2						
		25	1				
		55	2				
		40	2				
		35	2				
				80	6		
				70	6		
				100	7		
				80	6		
		70	6				
				60	5		
				60	5		
				60	5		
				60	5		
		25	1				
		40	2				
		35	1				
						180	6
						180	6
						140	6
						110	6
						180	6
						70	5
						180	6
						120	5
						70	5
						50	5
						45	5
						35	4

Consigli per l'impiego di Multiplex HPC

Articolo nr.
Norma/DIN
Materiale tagliente
Tipo di metallo duro
Prof. di foro
Tratt. di superficie
Tipo
Prezzi/misure pag.

Ø utensile mm	Num. colonna avanzamento								
	1	2	3	4	5	6	7	8	9
	f (mm/giro)								
10,00	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
12,50	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
16,00	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
20,00	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
25,00	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
31,50	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
40,00	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250

Refrigerante:
○ Aria
● Olio
◍ Emulsione

Tutti i valori sono indicativi. La velocità di taglio e l'avanzamento effettivamente realizzabili dipendono dalle reali condizioni di lavoro. Consigliamo di effettuare prove di foratura.

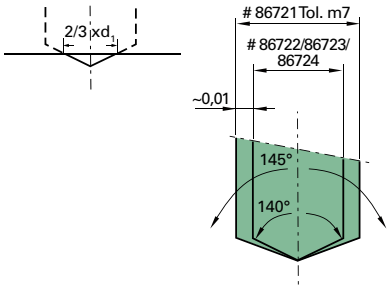
Materiali	Esempi di materiale Numeri in grassetto = nr. materiale a DIN EN 10 027	Resistenza N/mm²	Durezza	Refri-geracion
Acciai da costruzione	**1.0035** S185(St33), **1.0486** P275N(StE285), **1.0345** P235GH(H1), **1.0425** P265GH(H2)	≤500		◍
	1.0050 E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤1000		◍
Acciai automatici	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36)	≤850		◍
	1.0727 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤1000		◍
Acciai da bonifica non legati	**1.0402** C22, **1.1178** C30E (Ck30)	≤700		◍
	1.0503 C45, **1.1191** C45E (Ck45)	≤850		◍
	1.0601 C60, **1.1221** C60E (Ck60)	≤1000		◍
Acciai da bonifica legati	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000		◍
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍
Acciai da cementazione non legati	**1.0301** (C10), **1.1121** C10E (Ck10)	≤850		◍
Acciai da cementazione legati	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000		●
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400		●
Acciai nitrurati	**1.8504** 34CrAl6	≤1000		◍
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●
Acciai utensili	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤1400		●
Acciai super rapidi	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400		●
Acciai per molle	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤350 HB	●
Acciai temprati	–		≤48 HRC	●
			≤66 HRC	●
Acciai inossidabili, allo zolfo	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.86681** X6CrMoS17, **1.4305** X8CrNiS18-9	≤900		●
austenitici	**1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A)	≤1100		●
martensitici	**1.4057** X20CrNi172 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤1500		●
Ghise	**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	◍○
Ghise sferoidali, ghise temperate	**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	◍
Ghisa in conchiglia	–		≤350 HB	◍
Nuove ghise GGV	**EN-GJV250** (GGV25), **EN-GJV350** (GGV35)		≤220 HB	◍○
	EN-GJV400 (GGV40), **EN-GJV500** (GGV50), SiMo 6		≤300 HB	◍○
Nuove ghise ADI	**EN-GJS-800-8** (ADI800), **EN-GJS-1000-5** (ADI1000)	≤1000		◍○
	EN-GJS-1200-2 (ADI1200), **EN-GJS-1400-1** (ADI1400)	≤1400		◍○
Leghe speciali	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Titanio e leghe di titanio	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850		●
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤1400		●
Alluminio e leghe di alu	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		◍
Leghe di alu per lav. plastiche	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤650		◍
Leghe di alu-ghisa ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600		◍
> 10 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		◍
Leghe di magnesio	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤400		○
Rame legato in bassa %	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500		◍
Ottone, a truciolo corto	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2	≤600		◍
a truciolo lungo	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600		◍
Bronzi a truciolo corto	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn	≤600		◍●
	2.0790 CuNi18Zn19Pb	≤850		●
Bronzi a truciolo lungo	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850		●
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000		●
Mat. plastiche termoindurenti	Resina epossidica, Resopal, Pertinax, Moltopren	≤150		○
Materie termoplastiche	Plexiglas, Hostalen, Novodur, Makralon	≤100		◍○
Mat. plast. a fibre aramidiche	Kevlar	≤1000		○
a fibre di vetro/C rinforzate	GFK/CFK	≤1000		○

HARTNER

≤10×D

≤1×D foro pilota/svasatura

86722	86725	86723	86724	86721
N. d. f.	N. d. f.	N. d. f.	N. d. f.	N. d. f.
Int. MD	Int. MD	Int. MD	Int. MD	Int. MD
K/P	K/P	K/P	K/P	K/P
1,5xD	1,5xD	1,5xD	1,5xD	1xD
F	a	Y	○	a
Acciaio	Acc. inoss.	Ghisa	Alluminio	Pil./svas.
446	455	449	452	443



- Per la realizzazione di fori passanti bisogna controllare che le fasi di guida restino in presa. Inoltre l'avanzamento va ridotto prima di effettuare il foro passante.
- In generale, per profondità di foro da 5xD, consigliamo l'uso dello stelo art. 86681 e relativo inserto art. 86721, per effettuare il foro pilota consentendo il centraggio ottimale.
- Senza foro pilota, consigliamo di ridurre l'avanzamento durante centratura.
- Non utilizzare la punta per fori interrotti (scanalature, fori trasversali) senza prove preliminari. In caso di fori interrotti (max. 0,2 x D) consigliamo, se possibile, di ridurre l'avanzamento.
- Contrariamente alle classiche punte ad inserto, la Multiplex è adatta anche per la foratura di pacchi di lamierini.
- Su torni (utensile fisso) fare attenzione che l'utensile sia esattamente nel centro
- Presupposto per una truciolatura ottimale è una buona refrigerazione con emulsione ad olio.
- L'utensile è adatto per lavorazione a secco o con nebulizzazione solo a ben determinate condizioni. Con nebulizzazione suggeriamo l'impiego di codoli conici per nebulizzazione, nonché di mandrini per nebulizzazione. Chiedete ai nostri tecnici che Vi consiglieranno.

v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.	v_c m/min	Nr. col. avanz.
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

Annotazioni

Annotazioni

Annotazioni

Misure e dati tecnici possono variare a seguito di sviluppo tecnico e modifica delle normative.
Sono valide le nostre condizioni generali di vendita.
Errori di stampa di qualsiasi tipo, anche in dati tecnici, non costituiscono motivo di reclamo.
Sono vietate riproduzioni, anche parziali.

Hartner dispone sia internamente che all'estero di una valida e competente rete di vendita. I nostri partner rappresentanti seguono il cliente con un servizio di assistenza tecnico-commerciale.

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