

... Precision is our Job!

TUSA[®]

Precision Tools SA



SWISS MADE



... Precision is our Job!

 L'attività industriale di TUSA Precision Tools SA consiste nello sviluppo e nella produzione di una vasta gamma di utensili da taglio in metallo duro di altissima qualità (carburo di tungsteno) come punte, micropunte, frese, microfrese, alesatori.

Il marchio TUSA Precision Tools, sul mercato da 50 anni, è una realtà affermata e conosciuta su scala mondiale ed è sinonimo di professionalità e alto livello qualitativo sia per quanto riguarda la realizzazione del prodotto che per il servizio fornito ai Clienti.

Tipiche applicazioni dei prodotti TUSA sono gli utensili per le lavorazioni meccaniche di alta precisione per i settori aerospaziale, medicale, ottico, gioielleria e orologeria, industria dei componenti elettronici, automotive ecc.

TUSA Precision Tools, grazie all'acquisto di attrezzature e macchinari all'avanguardia, è in grado di offrire alla propria clientela una gamma completa di utensili in metallo duro integrale in grado di rispondere al meglio alle attuali esigenze imposte dalle più avanzate tecniche produttive.

Lo staff tecnico di TUSA Precision Tools è in grado di garantire soluzioni ottimali di taglio per tutte le operazioni di lavorazione meccanica ed assicura assistenza tecnica e consulenza attiva ai partner commerciali.

La struttura organizzativa di TUSA Precision Tools è configurata al fine di assicurare ai Clienti massima flessibilità e tempistiche ottimizzate: soluzioni speciali possono essere realizzate in tempi brevi anche per lotti minimi.

 Die industrielle Tätigkeit der TUSA Precision Tools SA besteht in die Entwicklung und Produktion einer breiten Palette von Hochwertigen Schneidwerkzeugen aus Hartmetall wie Spiralbohrer, Micro-Spiralbohrer, Fräser und Reibahlen.

Die Marke TUSA ist weltweit bestens bekannt und steht für die Herstellung und Lieferung von qualitativ hochstehenden Produkten aus Vollhartmetall (Tungsten) wie auch für einen professionellen Kundenservice.

TUSA kann mit Stolz auf eine 50-jährige Erfahrung und das dadurch gewonnene Know-how im Hartmetallbereich zurückblicken.

TUSA Produkte sind Spezialwerkzeuge für Anwendungen aller Art im mechanischen Bereich, speziell auch für Hochgeschwindigkeits-Bearbeitungen in der Industrie wie z.B. im Flugzeug- und Autobau, in der Medizintechnologie, in der Optik-, Uhren-, Schmuck-Industrie sowie auch elektronischen und mechanischen Bereichen.

TUSA kann dank neuesten Technologien und Maschinen seinen Kunden eine komplette Palette von Hartmetall-Werkzeugen anbieten, die allen Anforderungen in der heutigen fortgeschrittenen Technik entsprechen.

Die technischen Spezialisten von TUSA garantieren für optimale Lösungen in allen Bereichen der mechanischen Bearbeitung und stehen unseren Kunden und Partnern mit aktiver Beratung jederzeit zur Verfügung.

Die Organisationsstruktur von TUSA gewährleistet auch die Realisierung und Fertigung von Spezialwerkzeugen gemäss Ihrem Bedarf durch optimale Flexibilität in kürzester Zeit, dies auch für kleinere Serien.

 The industrial activity of TUSA Precision Tools SA consists in the development and production of high-quality solid carbide (tungsten carbide) metal-cutting tools, such as drills, endmills, reamers. TUSA Precision Tools brand is well-known and recognized worldwide for 50 years as being synonymous with quality and professionalism, both in terms of production and of customer care.

TUSA is proud of its 40 years' experience in the field of integral tungsten carbide tools. TUSA products are typically used for high-precision mechanical applications in the following fields: aerospace industry, medical supplies, optics, jewellery, watch making industry, electronic components industry, automotive and so on.

Thanks to the purchase of new modern equipment and machineries, TUSA can offer its customers a complete range of integral solid carbide tools that can meet the present requirements of the most advanced production techniques.

The TUSA Precision Tools engineering staff can guarantee the most effective metal cutting solutions for all mechanical operations and provide technical assistance and working advice to their business partners.

The company organization of TUSA Precision Tools is such that its customers can be assured of maximum flexibility and optimized timing: special design solutions can be achieved within short time periods, even for minimum lots.

CERAMIC



MICROUTENSILI
MICRO TOOLS

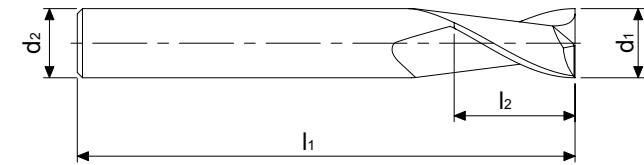


SWISS MADE

MSC40

Microfresa elicoidale, taglio al centro
Micro-fraise hélicoidale, coupe au centre
Mikrofräser, spiralgenutet, mit Zentrumschnitt
Micro-end mill, center cutting
 精密超硬マイクロエンドミル、センターカット
 微立铣刀，中心切割

MSC 40



CERAMIC

Z
1 - 2 - 3

TUSA
NORM

MICRO

25-30°

N

Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 応用範囲 / 应用

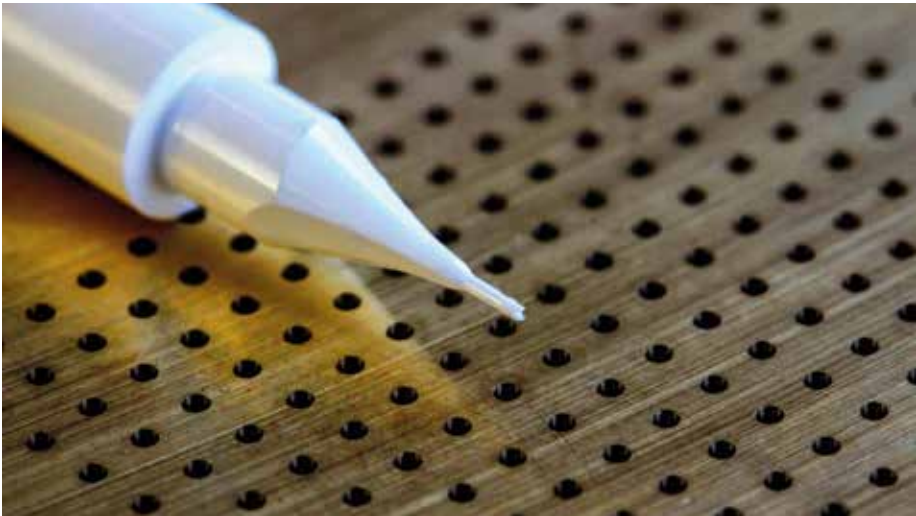
HRC < 48

Ottone
Brass

Rame
Copper

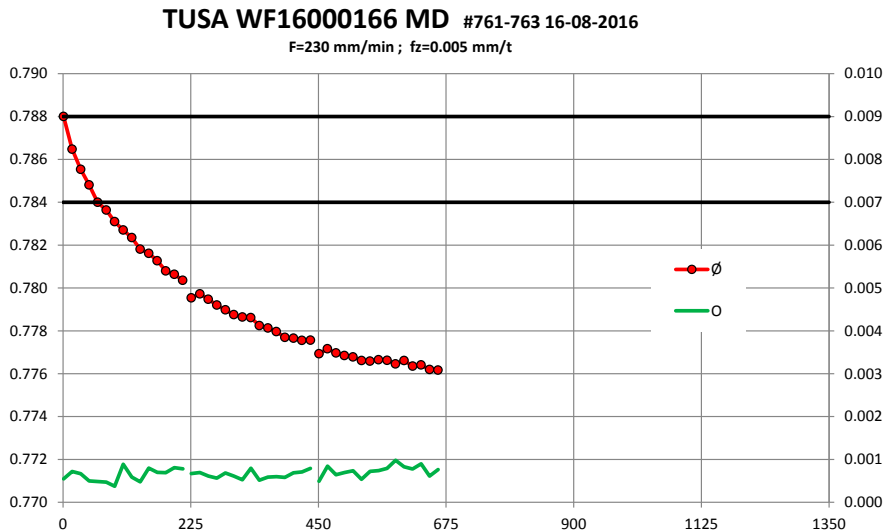
ALU

d1 h9	d2 h6	l1	l2	z	d1 h9	d2 h6	l1	l2	z
0,25	3,00	38	0,6	1	2,00	4,00	38	4	3
0,50	3,00	38	1	2	2,50	4,00	38	5	3
0,75	3,00	38	1,6	2	3,00	6,00	50	5	3
1,00	3,00	38	2	2	4,00	6,00	50	6	3
1,25	4,00	38	2,5	2	5,00	6,00	50	7	3
1,50	4,00	38	3	2	6,00	6,00	50	8	3
1,75	4,00	38	3,5	2					

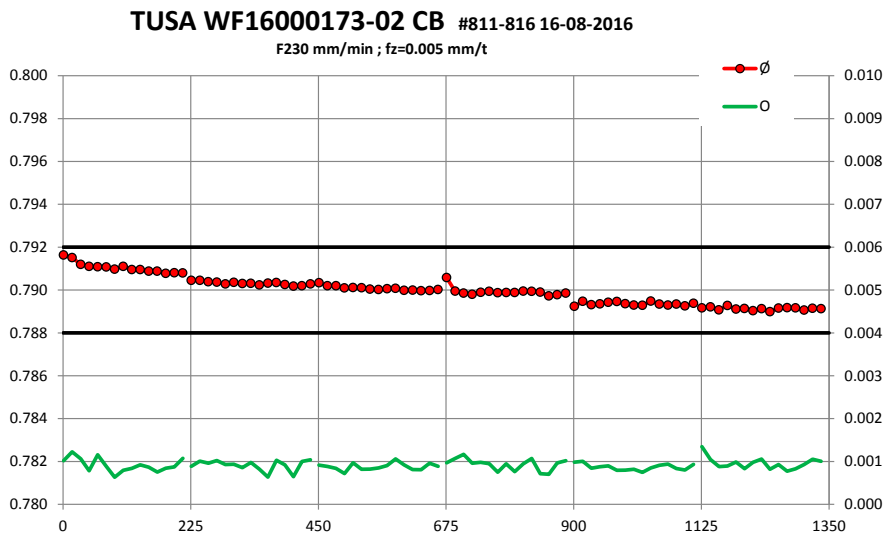


Example Interpolation milling of microborings:
 Tusa Precision Tools SA has reached new dimensions with the ceramic high-precision milling cutter for micro-drilling. With the ceramic cutter it is possible to interpolate micro-precision bores with a up to 20-fold service life instead of rubbing.

The pictures below show the comparison between carbide endmills and ceramic endmills:

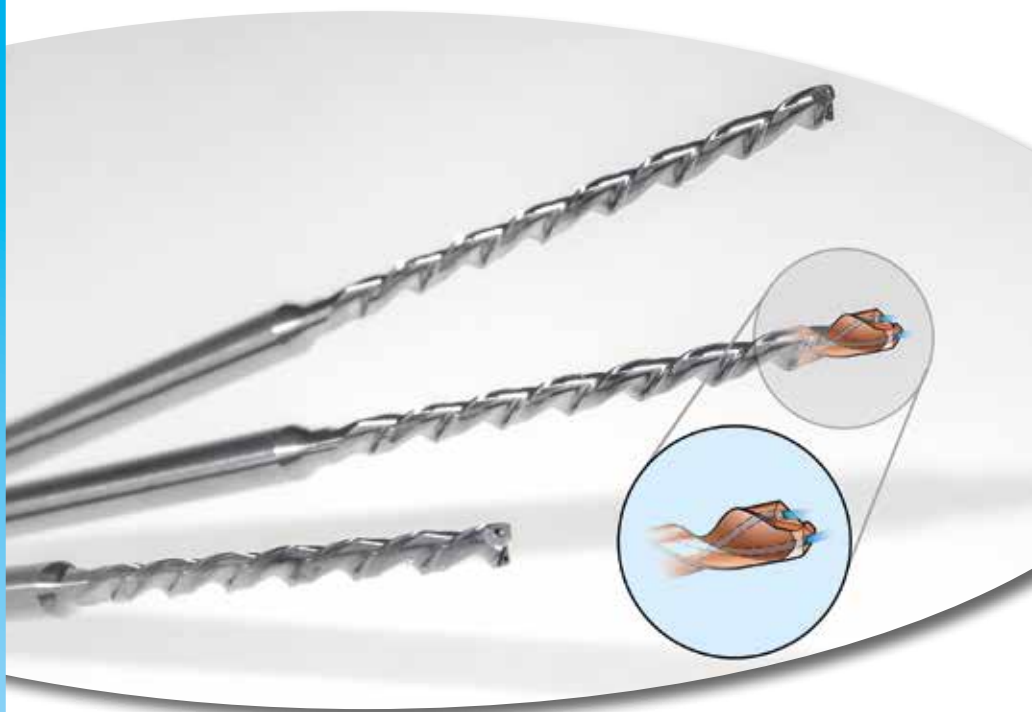


Here it is easy to see how, due to the wear of the hard metal drill after about 100 drillings, the bore diameter will migrate from the 4 μ tolerance field.



After 1350 holes, the ceramic milling cutter still shows a constant drilling pattern in the 4 μ tolerance field. After more than 1350 drillings the ceramic cutter does not have any appreciable cutting edge wear. In this experiment the 20-fold lifetime was significantly exceeded.





Punta in metallo duro con canalini per acciaio inox
Foret carbure à trous d'huile pour acier inox
Hartmetall-Bohrer mit Kühlkanälen für Edelstahl
Carbide drill with coolant holes for stainless steel



SWISS MADE

TTD 204
TTD 209
TTD 215

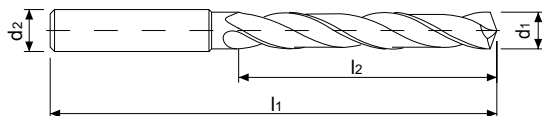
高性能ドリル、クーラント穴付、ストロングシャンク
高性能麻花钻，带冷却孔，加强刀柄

SMG
SP
$$Z_2$$
TUSA
NORM

RH

4xD

TiAlN



Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 応用範囲 / 应用

HRC < 60

Inox
Stainless

GG(G)/ghisa
Ft/cast ironTitanio
Titan

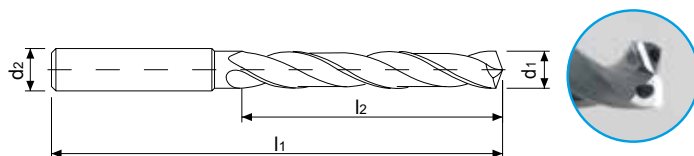
ALU

d ₁	h ₅	d ₂	h ₆	l ₁	l ₂	Coolant chamber
1,00	3,0	38,0	4,0			YES
1,10	3,0	38,0	4,4			YES
1,20	3,0	38,0	4,8			YES
1,30	3,0	38,0	5,2			YES
1,40	3,0	38,0	5,6			YES
1,50	3,0	45,0	6,0			YES
1,60	3,0	45,0	6,4			YES
1,70	3,0	45,0	6,8			YES
1,80	3,0	45,0	7,2			YES
1,90	3,0	45,0	7,6			YES
2,00	3,0	45,0	8,0			YES
2,10	3,0	45,0	8,4			YES
2,20	3,0	45,0	8,8			YES
2,30	3,0	45,0	9,2			YES
2,40	3,0	45,0	9,6			NO
2,50	3,0	45,0	10,0			NO
2,60	3,0	45,0	10,4			NO
2,70	3,0	45,0	10,8			NO
2,80	3,0	45,0	11,2			NO
2,90	3,0	45,0	11,6			NO
3,00	3,0	45,0	12,0			NO

Carbide drill with coolant holes for stainless steel

高性能麻花钻，带冷却孔，加强刀柄

A technical drawing of a shaft with a chamfer. A line indicates the chamfer angle, which is labeled as 30°.



ALU

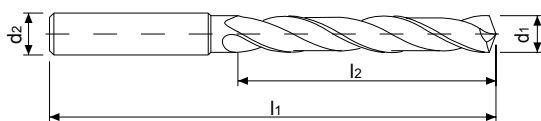
高性能ドリル、クーラント穴付、ストロングシャンク
高性能麻花钻，带冷却孔，加强刀柄

SMG
SP
$$Z_2$$
TUSA
NORM

RH

15xD

TiAlN



HRC < 60

Inox Stainless

GG(G)/ghisa
Ft/cast ironTitanio
Titan

ALU

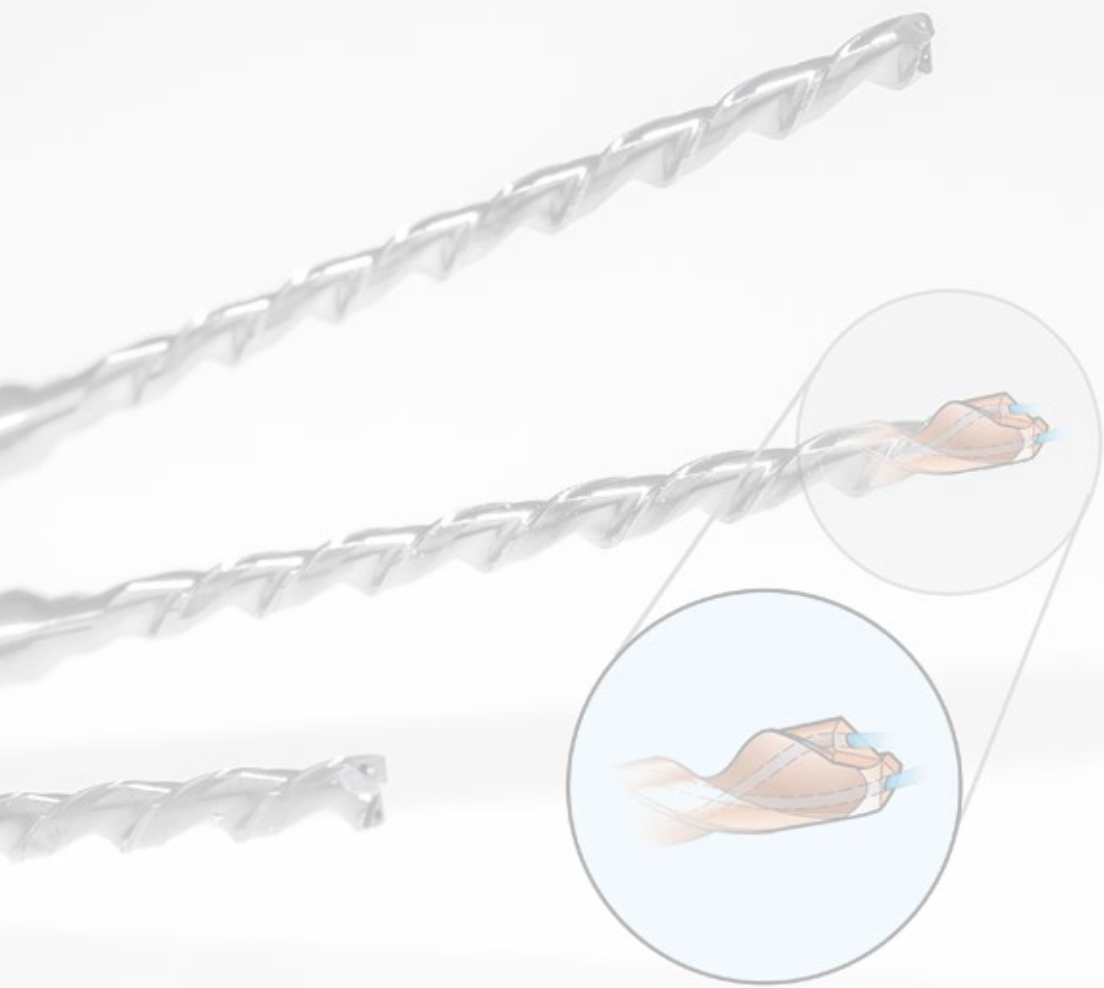
d₁ h₅ d₂ h₆ l₁ l₂ Coolant chamber

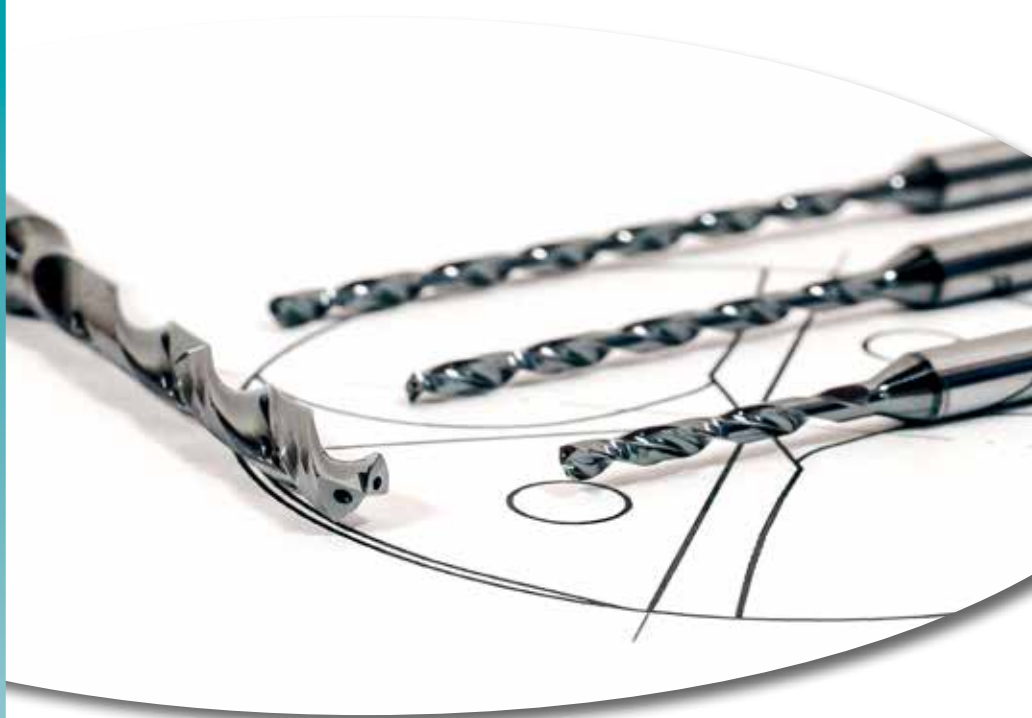
1,00	3,0	77,0	15,0	YES
1,10	3,0	77,0	16,5	YES
1,20	3,0	77,0	18,0	YES
1,30	3,0	77,0	19,5	YES
1,40	3,0	77,0	21,0	YES
1,50	3,0	77,0	22,5	YES
1,60	3,0	77,0	24,0	YES
1,70	3,0	77,0	25,5	YES
1,80	3,0	84,0	27,0	YES
1,90	3,0	84,0	28,5	YES
2,00	3,0	84,0	30,0	YES
2,10	3,0	91,0	31,5	YES
2,20	3,0	91,0	33,0	YES
2,30	3,0	91,0	34,5	YES
2,40	3,0	91,0	36,0	NO
2,50	3,0	91,0	37,5	NO
2,60	3,0	91,0	39,0	NO
2,70	3,0	104,0	40,5	NO
2,80	3,0	104,0	42,0	NO
2,90	3,0	104,0	43,5	NO
3,00	3,0	104,0	45,0	NO

Parametri indicativi per la foratura con TUSA TOP DRILL con canalini
Standard values for drilling with TUSA TOP DRILL with coolant holes
Richtwerte für das Bohren mit TUSA TOP DRILL mit Kühlkanälen
Paramètres indicatifs pour perçage avec TOP DRILL avec trous d'huile

Materiale Material Matière Werkstoff	Resistenza alla trazione Tensile strength Résistance à la traction Zugfestigkeit	Diametro Diameter Diametre Durchmesser	Avanzamento Feed Avance Vorschub	Velocità di taglio Cutting speed Vitesse de coupe Schnittgeschwindig.	Lubrificante Coolant Lubrifiant Kühlung
	N/mm2	d (mm)	(mm/ rev)	V (m/min)	
Acciai non legati (C<0,2%) Non-alloyed steels (C<0,2%) Aciers non alliés (C<0,2%) Unlegierte Stähle (C<0,2%)	fino a 800 up to 800 jusqu'à 800 bis 800	1.00-1.50mm 1.60-2.00mm 2.10-2.50mm 2.60-3.00mm	0.05-0.07 0.08-0.10 0.10-0.14 0.15-0.18	45 : 75	Olio da taglio Cutting oil Huile de coupe Schneidöl
Acciai non legati (C<0,2%) Non-alloyed steels (C<0,2%) Aciers non alliés (C<0,2%) Unlegierte Stähle (C<0,2%)	800 - 1500 N/mm2	1.00-1.50mm 1.60-2.00mm 2.10-2.50mm 2.60-3.00mm	0.02-0.04 0.03-0.05 0.04-0.07 0.05-0.09	35 : 70	Olio da taglio Cutting oil Huile de coupe Schneidöl
Acciaio inossidabile Stainless Steel Aciers inoxydables Rostfreier Stahl	400 - 700 N/mm2	1.00-1.50mm 1.60-2.00mm 2.10-2.50mm 2.60-3.00mm	0.01-0.03 0.015-0.05 0.03-0.07 0.05-0.10	25 : 40	Olio da taglio Cutting oil Huile de coupe Schneidöl
Ghisa grigia/ Ghisa malleabile Iron/ Malleable iron Fonte/ Fonte malleable Grauguss/ Temperguss	< 250 HB	1.00-1.50mm 1.50-2.00mm 2.00-3.00mm 3.00-4.00mm	0.03-0.05 0.04-0.06 0.05-0.07 0.05-0.07	30 : 60	Olio da taglio Cutting oil Huile de coupe Schneidöl
Ghisa grigia/ Ghisa malleabile Iron/ Malleable iron Fonte/ Fonte malleable Grauguss/ Temperguss	> 250 HB	1.00-1.50mm 1.50-2.00mm 2.00-3.00mm 3.00-4.00mm	0.02-0.03 0.03-0.04 0.03-0.05 0.04-0.06	10:40	Olio da taglio Cutting oil Huile de coupe Schneidöl
Ghisa ferritica sferoidale Ferritic Spheroidal Cast Iron Fonte ferritique sphéroïdal Ferritischer Sphäroguss		1.00-1.50mm 1.50-2.00mm 2.00-3.00mm 3.00-4.00mm	0.03-0.04 0.04-0.05 0.04-0.05 0.06-0.07	15:40	Olio da taglio Cutting oil Huile de coupe Schneidöl
Titanio e lega di titanio Titanium Titane, alliage de titane Titan, Titanlegierung		1.00-1.50mm 1.60-2.00mm 2.10-2.50mm 2.60-3.00mm	0.02-0.04 0.03-0.05 0.04-0.07 0.05-0.09	10:30	Olio da taglio Cutting oil Huile de coupe Schneidöl







Punta elicoidale ad alte prestazioni con canalini e gambo rinforzato
Foret hélicoïdal à hautes performances à trous d'huile et queue renforcée
Hochleistungs-Spiralbohrer mit Kühlkanälen und Verstärkter Schaft
High-performance twist drill with coolant holes and reinforced shank

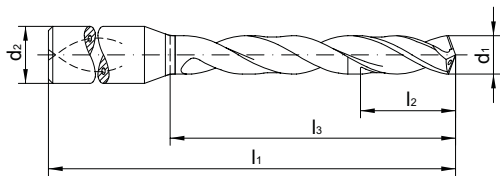


SWISS MADE

TTD 206E
TTD 212E
TTD 218E

Punta elicoidale ad alte prestazioni con canalini e gambo rinforzato
Foret hélicoïdal à hautes performances à trous d'huile et queue renforcée
Hochleistungs-Spiralbohrer mit Kühlkanälen und Verstärkter Schaft
High-performance twist drill with coolant holes and reinforced shank

TTD206E



Z
2

TUSA
NORM

6xD

ALCRONOS

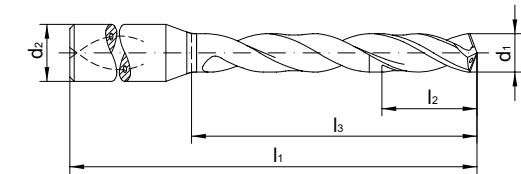
Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 应用范围 / 应用

HRC < 55	Inox Stainless	GG(G) / ghisa Ft / cast iron	Titanio Titan	ALU	Cr-Co
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d ₁	k _s	d ₂ h ₆	l ₁	l ₂	l ₃	d ₁	k _s	d ₂ h ₆	l ₁	l ₂	l ₃
1,00	3,0	50	4,40	9,30	2,50	4,0	62	11,00	23,25		
1,05	3,0	50	4,65	9,80	2,55	4,0	65	11,25	23,75		
1,10	3,0	50	4,85	10,25	2,60	4,0	65	11,45	24,20		
1,15	3,0	50	5,10	10,70	2,65	4,0	65	11,70	24,65		
1,20	3,0	50	5,30	11,20	2,70	4,0	65	11,90	25,15		
1,25	3,0	50	5,50	11,65	2,75	4,0	65	12,10	25,60		
1,30	3,0	52	5,75	12,10	2,80	4,0	67	12,35	26,05		
1,35	3,0	52	5,95	12,60	2,85	4,0	67	12,55	26,55		
1,40	3,0	52	6,20	13,05	2,90	4,0	67	12,80	27,00		
1,45	3,0	52	6,40	13,50	2,95	4,0	67	13,00	27,45		
1,50	3,0	52	6,60	13,95	3,00	6,0	70	13,20	27,90		
1,55	3,0	55	6,85	14,45	3,05	6,0	70	13,45	28,40		
1,60	3,0	55	7,05	14,90	3,10	6,0	70	13,65	28,85		
1,65	3,0	55	7,30	15,35	3,15	6,0	70	13,90	29,30		
1,70	3,0	55	7,50	15,85	3,20	6,0	70	14,10	29,80		
1,75	3,0	55	7,70	16,30	3,25	6,0	70	14,30	30,25		
1,80	3,0	57	7,95	16,75	3,30	6,0	72	14,55	30,70		
1,85	3,0	57	8,15	17,25	3,35	6,0	72	14,75	31,20		
1,90	3,0	57	8,40	17,70	3,40	6,0	72	15,00	31,65		
1,95	3,0	57	8,60	18,15	3,45	6,0	72	15,20	32,10		
2,00	4,0	57	8,80	18,60	3,50	6,0	72	15,40	32,55		
2,05	4,0	60	9,05	19,10	3,55	6,0	75	15,65	33,05		
2,10	4,0	60	9,25	19,55	3,60	6,0	75	15,85	33,50		
2,15	4,0	60	9,50	20,00	3,65	6,0	75	16,10	33,95		
2,20	4,0	60	9,70	20,50	3,70	6,0	75	16,30	34,45		
2,25	4,0	60	9,90	20,95	3,75	6,0	75	16,50	34,90		
2,30	4,0	62	10,15	21,40	3,80	6,0	77	16,75	35,35		
2,35	4,0	62	10,35	21,90	3,85	6,0	77	16,95	35,85		
2,40	4,0	62	10,60	22,35	3,90	6,0	77	17,20	36,30		
2,45	4,0	62	10,80	22,80	3,95	6,0	77	17,40	36,75		
					4,00	6,0	80	17,60	37,20		

Punta elicoidale ad alte prestazioni con canalini e gambo rinforzato
 Foret hélicoïdal à hautes performances à trous d'huile et queue renforcée
 Hochleistungs-Spiralbohrer mit Kühlkanälen und Verstärkter Schaft
 High-performance twist drill with coolant holes and reinforced shank

TTD212E



Z
2

TUSA
NORM

12xD

130°

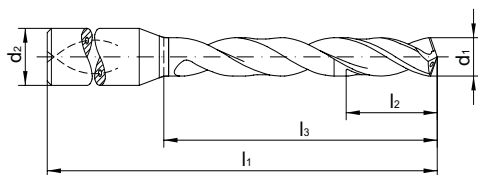
ALCRONOS

Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 应用范围 / 应用

HRC < 55	Inox Stainless	GG(G) / ghisa Ft / cast iron	Titanio Titan	ALU	Cr-Co
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d1 k5	d2 h6	l1	l2	l3	d1 k5	d2 h6	l1	l2	l3
1,00	3,0	58	4,40	15,30	2,50	4,0	80	11,00	38,25
1,05	3,0	58	4,65	16,10	2,55	4,0	84	11,25	39,05
1,10	3,0	58	4,85	16,85	2,60	4,0	84	11,45	39,80
1,15	3,0	58	5,10	17,60	2,65	4,0	84	11,70	40,55
1,20	3,0	58	5,30	18,40	2,70	4,0	84	11,90	41,35
1,25	3,0	58	5,50	19,15	2,75	4,0	84	12,10	42,10
1,30	3,0	64	5,75	19,90	2,80	4,0	88	12,35	42,85
1,35	3,0	64	5,95	20,70	2,85	4,0	88	12,55	43,65
1,40	3,0	64	6,20	21,45	2,90	4,0	88	12,80	44,40
1,45	3,0	64	6,40	22,20	2,95	4,0	88	13,00	45,15
1,50	3,0	64	6,60	22,95	3,00	6,0	92	13,20	45,90
1,55	3,0	68	6,85	23,75	3,05	6,0	92	13,45	46,70
1,60	3,0	68	7,05	24,50	3,10	6,0	92	13,65	47,45
1,65	3,0	68	7,30	25,25	3,15	6,0	92	13,90	48,20
1,70	3,0	68	7,50	26,05	3,20	6,0	92	14,10	49,00
1,75	3,0	68	7,70	26,80	3,25	6,0	92	14,30	49,75
1,80	3,0	72	7,95	27,55	3,30	6,0	96	14,55	50,50
1,85	3,0	72	8,15	28,35	3,35	6,0	96	14,75	51,30
1,90	3,0	72	8,40	29,10	3,40	6,0	96	15,00	52,05
1,95	3,0	72	8,60	29,85	3,45	6,0	96	15,20	52,80
2,00	4,0	72	8,80	30,60	3,50	6,0	96	15,40	53,55
2,05	4,0	76	9,05	31,40	3,55	6,0	100	15,65	54,35
2,10	4,0	76	9,25	32,15	3,60	6,0	100	15,85	55,10
2,15	4,0	76	9,50	32,90	3,65	6,0	100	16,10	55,85
2,20	4,0	76	9,70	33,70	3,70	6,0	100	16,30	56,65
2,25	4,0	76	9,90	34,45	3,75	6,0	100	16,50	57,40
2,30	4,0	80	10,15	35,20	3,80	6,0	104	16,75	58,15
2,35	4,0	80	10,35	36,00	3,85	6,0	104	16,95	58,95
2,40	4,0	80	10,60	36,75	3,90	6,0	104	17,20	59,70
2,45	4,0	80	10,80	37,50	3,95	6,0	104	17,40	60,45
					4,00	6,0	108	17,60	61,20

TTD218E


$$Z_2$$
TUSA
NORM

ALCRONOS

18xD



HRC < 55

Inox
Stainless

GG(G) / ghisal
Ft / cast ironTitanic
Titan

ALU

Cr-Co

d1 k5	d2 h6	l1	l2	l3	d1 k5	d2 h6	l1	l2	l3
1,00	3,0	64	4,40	21,30	2,50	4,0	100	11,00	52,50
1,05	3,0	64	4,65	22,40	2,55	4,0	106	11,25	53,55
1,10	3,0	64	4,85	23,45	2,60	4,0	106	11,45	54,60
1,15	3,0	64	5,10	24,00	2,65	4,0	106	11,70	55,65
1,20	3,0	64	5,30	25,60	2,70	4,0	106	11,90	56,70
1,25	3,0	64	5,50	26,65	2,75	4,0	106	12,10	57,75
1,30	3,0	72	5,75	27,70	2,80	4,0	110	12,35	58,80
1,35	3,0	72	5,95	28,80	2,85	4,0	110	12,55	59,85
1,40	3,0	72	6,20	29,85	2,90	4,0	110	12,80	60,90
1,45	3,0	72	6,40	30,90	2,95	4,0	110	13,00	61,95
1,50	3,0	72	6,60	31,95	3,00	6,0	114	13,20	63,00
1,55	3,0	80	6,85	33,05	3,05	6,0	114	13,45	64,05
1,60	3,0	80	7,05	34,10	3,10	6,0	114	13,65	65,10
1,65	3,0	80	7,30	35,15	3,15	6,0	114	13,90	66,15
1,70	3,0	80	7,50	36,25	3,20	6,0	114	14,10	67,20
1,75	3,0	80	7,70	37,30	3,25	6,0	114	14,30	68,25
1,80	3,0	88	7,95	38,35	3,30	6,0	118	14,55	69,30
1,85	3,0	88	8,15	39,45	3,35	6,0	118	14,75	70,35
1,90	3,0	88	8,40	40,50	3,40	6,0	118	15,00	71,40
1,95	3,0	88	8,60	41,55	3,45	6,0	118	15,20	72,45
2,00	4,0	88	8,80	42,60	3,50	6,0	118	15,40	73,50
2,05	4,0	94	9,05	43,70	3,55	6,0	122	15,65	74,55
2,10	4,0	94	9,25	44,75	3,60	6,0	122	15,85	75,60
2,15	4,0	94	9,50	45,80	3,65	6,0	122	16,10	76,65
2,20	4,0	94	9,70	46,90	3,70	6,0	122	16,30	77,70
2,25	4,0	94	9,90	47,95	3,75	6,0	122	16,50	78,75
2,30	4,0	100	10,15	49,00	3,80	6,0	126	16,75	79,80
2,35	4,0	100	10,35	49,35	3,85	6,0	126	16,95	80,85
2,40	4,0	100	10,60	50,40	3,90	6,0	126	17,20	81,90
2,45	4,0	100	10,80	51,45	3,95	6,0	126	17,40	82,95
					4,00	6,0	130	17,60	84,00

Parametri indicativi per la foratura / Standard values for drilling
Richtswerte für das Bohren / Paramètres indicatifs pour perçage

		Velocità di taglio Cutting speed m/min.	Avanzamento mm/giro Cutting feed mm/rev.					
			Ø1 - Ø1.45	Ø1.5 - Ø1.95	Ø2 - Ø2.45	Ø2.5 - Ø2.95	Ø3 - Ø3.45	Ø3.5 - Ø4
		50 - 80	0.06 - 0.08	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14	0.14 - 0.16	0.16 - 0.20
		45 - 65	0.05 - 0.07	0.07 - 0.09	0.09 - 0.11	0.11 - 0.13	0.13 - 0.15	0.15 - 0.18
		40 - 60	0.04 - 0.06	0.06 - 0.08	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14	0.14 - 0.17
		35 - 50	0.03 - 0.04	0.05 - 0.06	0.065 - 0.075	0.08 - 0.09	0.095 - 0.105	0.11 - 0.12
		30 - 45	0.03 - 0.04	0.05 - 0.06	0.065 - 0.075	0.08 - 0.09	0.095 - 0.105	0.11 - 0.12
		30 - 45	0.03 - 0.04	0.05 - 0.06	0.065 - 0.075	0.08 - 0.09	0.095 - 0.105	0.11 - 0.12
		30 - 45	0.02 - 0.03	0.04 - 0.05	0.055 - 0.065	0.07 - 0.08	0.085 - 0.095	0.10 - 0.11
		80 - 100	0.06 - 0.08	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14	0.14 - 0.16	0.16 - 0.20
		80 - 100	0.06 - 0.08	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14	0.14 - 0.16	0.16 - 0.20
		100 - 160	0.05 - 0.065	0.065 - 0.08	0.08 - 0.095	0.095 - 0.11	0.11 - 0.125	0.125 - 0.14
		80 - 140	0.06 - 0.075	0.075 - 0.09	0.09 - 0.105	0.105 - 0.12	0.12 - 0.135	0.135 - 0.15
		60 - 100	0.05 - 0.06	0.06 - 0.07	0.07 - 0.085	0.085 - 0.10	0.10 - 0.115	0.115 - 0.13
		80 - 140	0.07 - 0.08	0.08 - 0.095	0.095 - 0.11	0.11 - 0.125	0.125 - 0.14	0.14 - 0.17
		60 - 120	0.04 - 0.06	0.06 - 0.075	0.075 - 0.09	0.09 - 0.105	0.105 - 0.12	0.12 - 0.135
		20 - 40	0.01 - 0.02	0.02 - 0.03	0.03 - 0.04	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07
		10 - 25	0.02 - 0.03	0.03 - 0.04	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08
		15 - 30	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08	0.08 - 0.09	0.09 - 0.10
		35 - 50	0.03 - 0.045	0.045 - 0.06	0.06 - 0.07	0.07 - 0.08	0.08 - 0.09	0.09 - 0.10
		20 - 30	0.005 - 0.008	0.008 - 0.012	0.012 - 0.016	0.016 - 0.02	0.02 - 0.025	0.025 - 0.03
		///	///	///	///	///	///	///

LEGEND

	Recommended		Unalloyed carbon steel up to 800 N/mm ²		Aluminium alloy cast
	Partially recommended		Low alloyed steel from 800 N/mm ² to 1100 N/mm ²		Copper
	Not recommended		High alloyed steel from 1100 N/mm ² to 1400 N/mm ²		Brass - Bronze
			Stainless steel ferritic		Brass lead free
			Stainless steel martensitic		Super alloys (Inconel-Hastelloy-Nimonic)
			Stainless steel martensitic - PH		Titanium pure (Grado 2-Grado 4)
			Stainless steel austenitic		Titanium alloys (Grado 5)
			Lamellar cast iron		CrCo alloys
			Spheroidal cast iron		Hardened steel < 55 HRC
			Aluminium alloy wrought		Hardened steel > 55 HRC





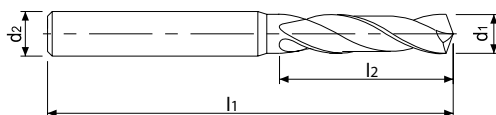
Punta in metallo duro senza canalini per acciaio inox
Foret carbure sans trous d'huile pour acier inox
Hartmet-Bohrer ohne IK für Edelstahl
Carbide drill without coolant holes for stainless steel

TTD 203
TTD 207
MTB 27



SWISS MADE

高性能右旋螺旋钻，有加强柄



A technical drawing of a shaft with a chamfer. The chamfer is labeled with a 30-degree angle.

ALU

Verfügbar auf Anfrage*
Mindestmenge 5 Stk

Punta in metallo duro senza canalini per acciaio inox
Foret carbure sans trous d'huile pour acier inox
Hartmell-Bohrer ohne IK für Edelstahl
Carbide drill without coolant holes for stainless steel
高性能ドリル7× D、ストロングシャンク
高性能右螺旋旋钻，有加强柄

TTD 207

SMG
SP

Z
2

TUSA
NORM

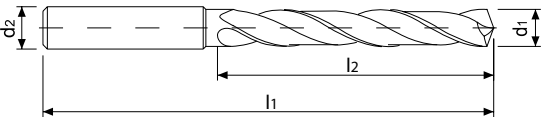
RH

7xD

TIALN







Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 応用範囲 / 应用

HRC < 60	Inox Stainless	GG(G)/ghisa Ft/cast iron	Titanio Titan	ALU
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d1	h5	d2	h6	l1	l2	d1	h5	d2	h6	l1	l2
0,80	3,0	53	5,8			1,90	3,0	53	13,8		
0,85	3,0	53	6,2	*		1,95	3,0	53	14,1	*	
0,90	3,0	53	6,5			2,00	3,0	53	14,5		
0,95	3,0	53	6,9	*		2,05	3,0	53	14,9	*	
1,00	3,0	53	7,3			2,10	3,0	53	15,2		
1,05	3,0	53	7,6	*		2,15	3,0	53	15,6	*	
1,10	3,0	53	8,0			2,20	3,0	53	16,0		
1,15	3,0	53	8,3	*		2,25	3,0	53	16,3	*	
1,20	3,0	53	8,7			2,30	3,0	53	16,7		
1,25	3,0	53	9,1	*		2,35	3,0	53	17,0	*	
1,30	3,0	53	9,4			2,40	3,0	53	17,4		
1,35	3,0	53	9,8	*		2,45	3,0	53	17,8	*	
1,40	3,0	53	10,2			2,50	3,0	53	18,1		
1,45	3,0	53	10,5	*		2,55	3,0	53	18,5	*	
1,50	3,0	53	10,9			2,60	3,0	53	18,9		
1,55	3,0	53	11,2	*		2,65	3,0	53	19,2	*	
1,60	3,0	53	11,6			2,70	3,0	53	19,6		
1,65	3,0	53	12,0	*		2,75	3,0	53	19,9	*	
1,70	3,0	53	12,3			2,80	3,0	53	20,3		
1,75	3,0	53	12,7	*		2,85	3,0	53	20,7	*	
1,80	3,0	53	13,1			2,90	3,0	53	21,0		
1,85	3,0	53	13,4	*		2,95	3,0	53	21,4	*	
						3,00	3,0	53	21,8		

Disponibili su richiesta*
Min. 5 pz

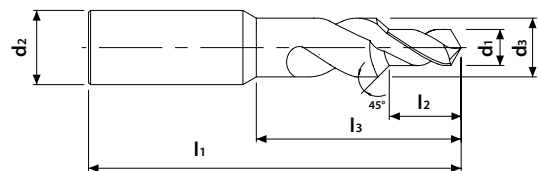
Disponible sur demande*
Au moins 5 pièces

Available on request*
Minimum qty 5 pcs

Verfügbar auf Anfrage*
Mindestmenge 5 Stk

Punta pilota in metallo duro per acciaio inox
Foret pilote carbure pour acier inox
Harmetall-Pilotbohrer für Edestahl
Carbide pilot drill for stainless steel

高性能パイロットドリル, 右刃, 強化シャンク
高性能定心钻, 右旋切削, 增强柄



MTB27

SMG
SP

Z
2

TUSA
NORM

RH

TIALN

Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 应用範圍 / 应用

HRC < 60				Inox Stainless			GG(G)/ghisa Ft/cast iron			Titanio Titan		ALU		
d1	k5	d2 h6	d3	l1	l2	l3	d1	k5	d2 h6	d3	l1	l2	l3	
0,80	3,0	2,0	53	1,6	4,8		1,90	3,0	3,0	53	3,8	8,6		
0,85	3,0	2,0	53	1,7	4,9	*	1,95	3,0	3,0	53	3,9	8,7	*	
0,90	3,0	2,0	53	1,8	5,0		2,00	3,0	3,0	53	4,0	***		
0,95	3,0	2,0	53	1,9	5,1	*	2,05	4,0	3,2	53	4,1	10,8	*	
1,00	3,0	2,2	53	2,0	5,5		2,10	4,0	3,2	53	4,2	10,9		
1,05	3,0	2,2	53	2,1	5,6	*	2,15	4,0	3,2	53	4,3	11,0	*	
1,10	3,0	2,2	53	2,2	5,7		2,20	4,0	3,2	53	4,4	11,1		
1,15	3,0	2,2	53	2,3	5,8	*	2,25	4,0	3,4	53	4,5	11,6	*	
1,20	3,0	2,2	53	2,4	5,9		2,30	4,0	3,4	53	4,6	11,7		
1,25	3,0	2,5	53	2,5	6,5	*	2,35	4,0	3,4	53	4,7	11,8	*	
1,30	3,0	2,5	53	2,6	6,6		2,40	4,0	3,4	53	4,8	11,9		
1,35	3,0	2,5	53	2,7	6,7	*	2,45	4,0	3,6	53	4,9	12,5	*	
1,40	3,0	2,5	53	2,8	6,8		2,50	4,0	3,6	53	5,0	12,6		
1,45	3,0	2,7	53	2,9	7,2	*	2,55	4,0	3,6	53	5,1	12,7	*	
1,50	3,0	2,7	53	3,0	7,3		2,60	4,0	3,6	53	5,2	12,8		
1,55	3,0	2,7	53	3,1	7,4	*	2,65	4,0	3,8	53	5,3	13,3	*	
1,60	3,0	2,7	53	3,2	7,5		2,70	4,0	3,8	53	5,4	13,4		
1,65	3,0	2,8	53	3,3	7,7	*	2,75	4,0	3,8	53	5,5	13,5	*	
1,70	3,0	2,8	53	3,4	7,8		2,80	4,0	3,8	53	5,6	13,6		
1,75	3,0	2,8	53	3,5	7,9	*	2,85	4,0	4,0	53	5,7	13,9	*	
1,80	3,0	2,8	53	3,6	8,0		2,90	4,0	4,0	53	5,8	14,0		
1,85	3,0	3,0	53	3,7	8,5	*	2,95	4,0	4,0	53	5,9	14,1	*	
							3,00	4,0	4,0	53	6,0	***		

Parametri indicativi per la foratura con TUSA TOP DRILL
Standard values for drilling with TUSA TOP DRILL
Richtwerte für das Bohren mit TUSA TOP DRILL Spiralbohre
Paramètres indicatifs pour le perçage avec TUSA TOP DRILL

Materiale Material Matière Werkstoff	Resistenza alla trazione Tensile strength Résistance à la traction Zugfestigkeit	Diametro Diameter Diametre Durchmesser	Avanzamento Feed Avance Vorschub	Velocità di taglio Cutting speed Vitesse de coupe Schnittgeschwindigkeit
	N/mm2	d (mm)	(mm/ rev)	V (m/min)
Acciai non legati (C<0,2%) <i>Non-alloyed steels (C<0,2%)</i> Aciers non alliés (C<0,2%) <i>Unlegierte Stähle (C<0,2%)</i>	fino a 800 <i>up to 800</i> jusqu'à 800 <i>bis 800</i>	1,0	< 0.11	80 : 120
		1,2	<0.14	
		1,5	<0.18	
		2,0	<0.23	
		2,5	<0.25	
		3,0	<0.32	
Acciai debolmente legati <i>Light-Alloyed steels</i> Aciers faiblement alliés <i>Leicht-Legierte Stähle</i>	fino a 1000 <i>up to 1000</i> jusqu'à 1000 <i>bis 1000</i>	1,0	< 0.10	60 : 100
		1,2	<0.14	
		1,5	<0.23	
		2,0	<0.25	
		2,5	<0.27	
		3,0	<0.32	
Acciai legati <i>Alloyed steels</i> Aciers alliés <i>Legierte Stähle</i>	fino a 1400 <i>up to 1400</i> jusqu'à 1400 <i>bis 1400</i>	1,0	< 0.07	40 : 80
		1,2	<0.11	
		1,5	<0.14	
		2,0	<0.18	
		2,5	<0.21	
		3,0	<0.23	
Acciai per utensili <i>Die steels</i> Aciers pour outils <i>Werkzeugstahl</i>	fino a 1200 <i>up to 1200</i> jusqu'à 1200 <i>bis 1200</i>	1,0	< 0.11	30 : 60
		1,2	<0.14	
		1,5	<0.18	
		2,0	<0.23	
		2,5	<0.25	
		3,0	<0.27	
Ghisa grigia/ Ghisa malleabile <i>Iron/ Malleable iron</i> Fonte/ Fonte malleable <i>Grauguss/ Temperguss</i>	fino a 300 HB <i>up to 300HB</i> jusqu'à 300HB <i>bis 300HB</i>	1,0	< 0.18	80 : 150
		1,2	<0.23	
		1,5	<0.27	
		2,0	<0.32	
		2,5	<0.36	
		3,0	<0.41	

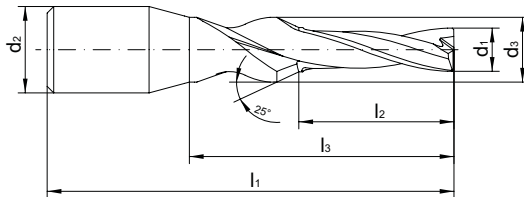






Punta pilota 180° con gambo rinforzato
Foret pilote 180° avec queue renforcée
180° Pilotbohrer mit verstärktem Shaft
180° Pilot Drill with reinforced shank

TTD180E



Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 応用範囲 / 应用

HRC < 55			Inox Stainless		GG(G) / ghsia Ft / cast iron		Titanio Titan		ALU		Cr-Co		
d1	m5	d2 h6	d3	l1	l2	l3	d1	k5	d2 h6	d3	l1	l2	l3
0,80	4,0	1,70	40	2,8	6,00		2,70	6,0	4,20	50	9,4	14,70	
0,85	4,0	1,70	40	3,0	6,00		2,75	6,0	4,25	50	9,6	14,90	
0,90	4,0	1,80	40	3,2	6,30		2,80	6,0	4,30	50	9,8	15,10	
0,95	4,0	1,90	40	3,3	6,70		2,85	6,0	4,35	50	10,0	15,20	
1,00	4,0	2,00	40	3,5	7,00		2,90	6,0	4,40	50	1,0	15,40	
1,05	4,0	2,10	40	3,7	7,40		2,95	6,0	4,45	50	10,3	15,60	
1,10	4,0	2,20	40	3,9	7,70		3,00	6,0	4,50	60	10,5	15,80	
1,15	4,0	2,30	40	4,0	8,10		3,10	6,0	4,60	60	10,9	16,10	
1,20	4,0	2,40	40	4,2	8,40		3,20	6,0	4,70	60	11,2	16,50	
1,25	4,0	2,50	40	4,4	8,80		3,30	6,0	4,80	60	11,6	16,80	
1,30	4,0	2,60	40	4,6	9,10		3,40	6,0	4,90	60	11,9	17,20	
1,35	4,0	2,70	40	4,7	9,50		3,50	6,0	5,00	60	12,3	17,50	
1,40	4,0	2,80	40	4,9	9,80		3,60	6,0	-	60	12,6	-	
1,45	4,0	2,90	40	5,1	10,20		3,70	6,0	-	60	13,0	-	
1,50	4,0	3,00	40	5,3	10,50		3,80	6,0	-	60	13,3	-	
1,55	4,0	3,05	40	5,4	10,70		3,90	6,0	-	60	13,7	-	
1,60	4,0	3,10	40	5,6	10,90		4,00	6,0	-	60	14,0	-	
1,65	4,0	3,15	40	5,8	11,00		4,10	6,0	-	60	14,4	-	
1,70	4,0	3,20	40	6,0	11,20		4,20	6,0	-	60	14,7	-	
1,75	4,0	3,25	40	6,1	11,40		4,30	6,0	-	60	15,1	-	
1,80	4,0	3,30	40	6,3	11,60		4,40	6,0	-	60	15,4	-	
1,85	4,0	3,35	40	6,5	11,70		4,50	6,0	-	60	15,8	-	
1,90	4,0	3,40	40	6,7	11,90		4,60	6,0	-	60	16,1	-	
1,95	4,0	3,45	40	6,8	12,10		4,70	6,0	-	60	16,5	-	
2,00	6,0	3,50	50	7,0	12,30		4,80	6,0	-	60	16,8	-	
2,05	6,0	3,55	50	7,2	12,40		4,90	6,0	-	60	17,2	-	
2,10	6,0	3,60	50	7,4	12,60		5,00	6,0	-	60	17,5	-	
2,15	6,0	3,65	50	7,5	12,80		5,10	8,0	-	70	17,9	-	
2,20	6,0	3,70	50	7,7	13,00		5,20	8,0	-	70	18,2	-	
2,25	6,0	3,75	50	7,9	13,10		5,30	8,0	-	70	18,6	-	
2,30	6,0	3,80	50	8,1	13,30		5,40	8,0	-	70	18,9	-	
2,35	6,0	3,85	50	8,2	13,50		5,50	8,0	-	70	19,3	-	
2,40	6,0	3,90	50	8,4	13,70		5,60	8,0	-	70	19,6	-	
2,45	6,0	3,95	50	8,6	13,80		5,70	8,0	-	70	20,0	-	
2,50	6,0	4,00	50	8,8	14,00		5,80	8,0	-	70	20,3	-	
2,55	6,0	4,05	50	8,9	14,20		5,90	8,0	-	70	20,7	-	
2,60	6,0	4,10	50	9,1	14,40		6,00	8,0	-	70	21,0	-	
2,65	6,0	4,15	50	9,3	14,50								

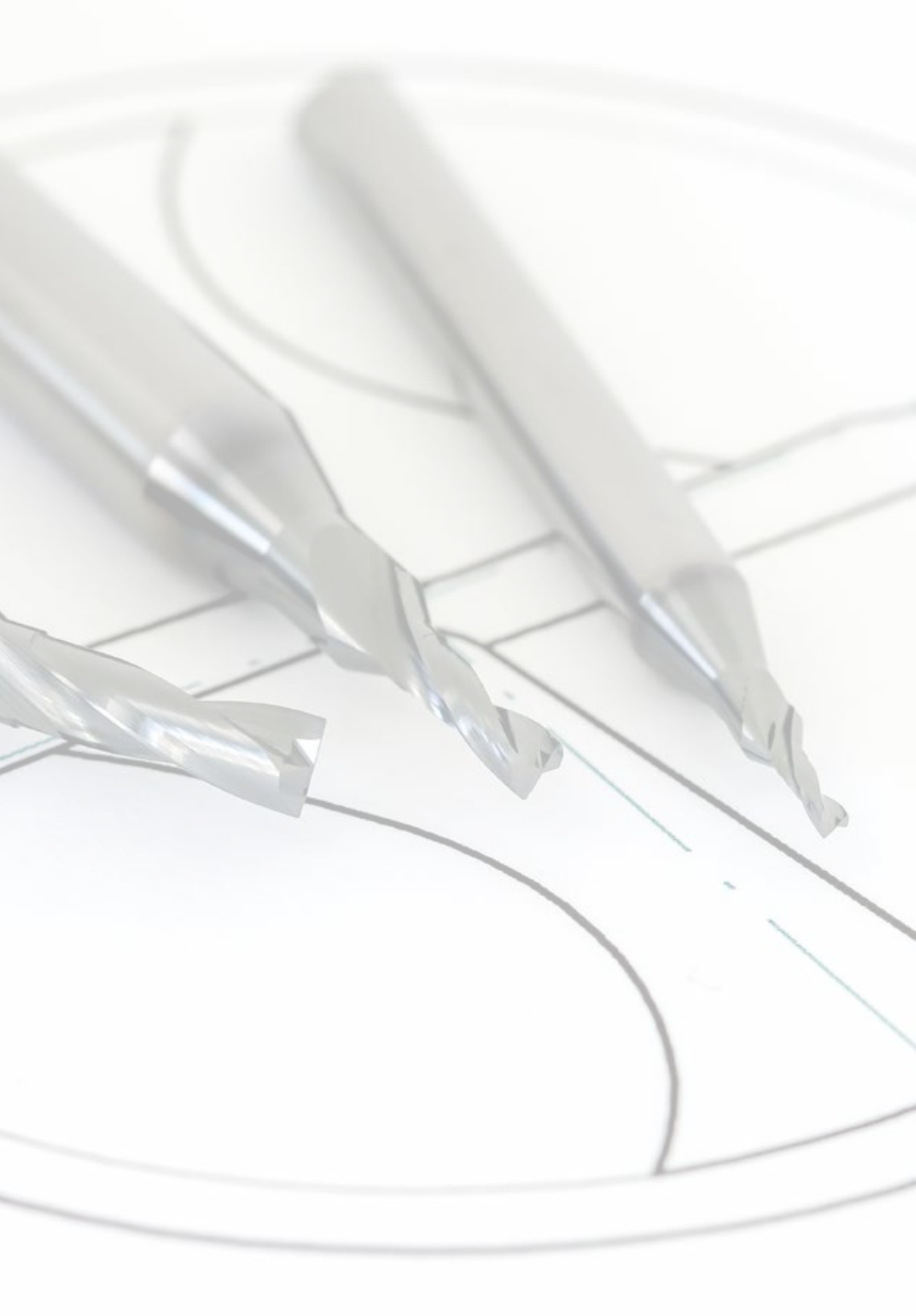
Parametri indicativi per la foratura / Standard values for drilling
Richtwerte für das Bohren / Paramètres indicatifs pour perçage

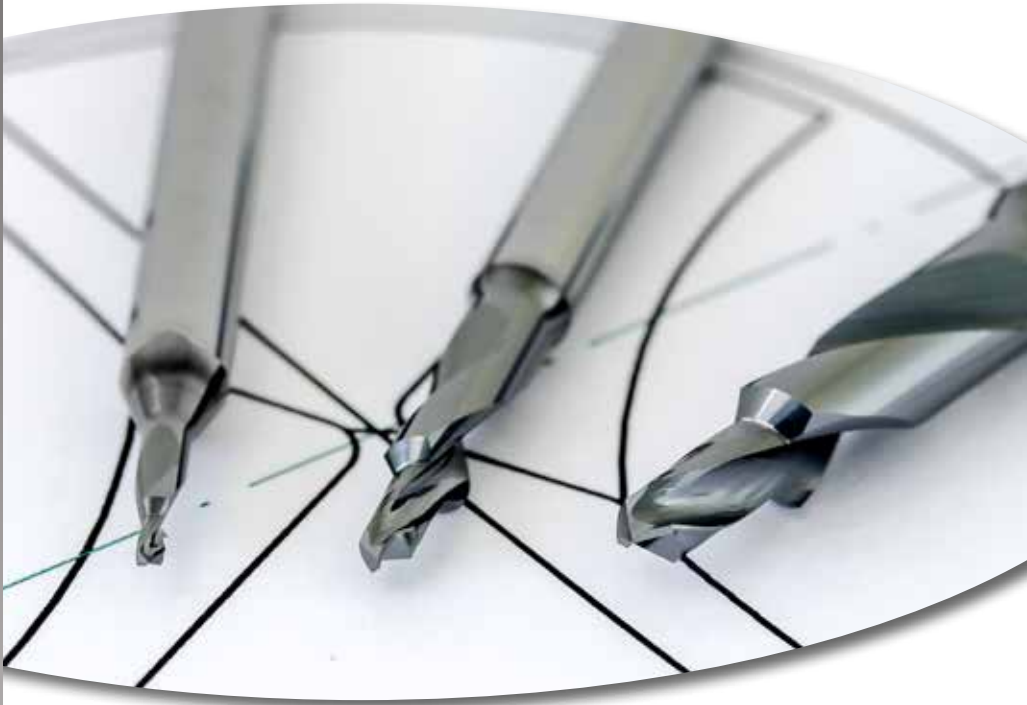
			Velocità di taglio Cutting speed m/min.	Avanzamento mm/giro Cutting feed mm/rev.											
				Ø0.80 Ø1.00	Ø1.00 Ø1.45	Ø1.45 Ø2.00	Ø2.00 Ø2.45	Ø2.45 Ø3.00	Ø3.00 Ø3.45	Ø3.45 Ø4.00	Ø4.00 Ø4.45	Ø4.45 Ø5.00	Ø5.00 Ø5.45	Ø5.45 Ø6.00	
P01		65 - 80	0.008 0.01	0.01 0.015	0.015 0.02	0.02 0.025	0.025 0.03	0.03 0.035	0.035 0.04	0.04 0.045	0.045 0.05	0.05 0.055	0.055 0.06		
P02			50 - 60	0.006 0.008	0.008 0.013	0.013 0.018	0.018 0.023	0.023 0.028	0.028 0.033	0.033 0.038	0.038 0.043	0.043 0.048	0.048 0.053	0.053 0.058	
P03		40 - 50	0.006 0.008	0.008 0.013	0.013 0.018	0.018 0.023	0.023 0.028	0.028 0.033	0.033 0.038	0.038 0.043	0.043 0.048	0.048 0.053	0.053 0.058		
M01			35 - 40	0.003 0.004	0.005 0.006	0.007 0.008	0.009 0.01	0.011 0.013	0.014 0.016	0.017 0.019	0.020 0.022	0.022 0.024	0.026 0.028	0.028 0.03	
M02		40 - 50	0.006 0.008	0.01 0.012	0.014 0.016	0.018 0.02	0.022 0.026	0.028 0.032	0.034 0.038	0.04 0.044	0.044 0.048	0.05 0.055	0.055 0.06		
M03			40 - 50	0.006 0.008	0.01 0.012	0.014 0.016	0.018 0.02	0.022 0.026	0.028 0.032	0.034 0.038	0.04 0.044	0.044 0.048	0.05 0.055	0.055 0.06	
M04		25 - 30	0.003 0.004	0.005 0.006	0.007 0.008	0.009 0.01	0.011 0.013	0.014 0.016	0.017 0.019	0.020 0.022	0.022 0.024	0.026 0.028	0.028 0.03		
K01			70 - 80	0.008 0.01	0.01 0.015	0.015 0.02	0.02 0.025	0.025 0.03	0.03 0.035	0.035 0.04	0.04 0.045	0.045 0.05	0.05 0.055	0.055 0.06	
K02		60 - 70	0.008 0.01	0.01 0.015	0.015 0.02	0.02 0.025	0.025 0.03	0.03 0.035	0.035 0.04	0.04 0.045	0.045 0.05	0.05 0.055	0.055 0.06		
N01			115 - 125	0.01 0.015	0.015 0.02	0.02 0.025	0.025 0.035	0.035 0.045	0.045 0.055	0.055 0.065	0.065 0.075	0.075 0.085	0.085 0.095	0.095 0.11	
N02		115 - 125	0.01 0.015	0.015 0.02	0.02 0.025	0.025 0.035	0.035 0.045	0.045 0.055	0.055 0.065	0.065 0.075	0.075 0.085	0.085 0.095	0.095 0.11		
N03			65 - 80	0.006 0.008	0.008 0.013	0.013 0.018	0.018 0.023	0.023 0.028	0.028 0.033	0.033 0.038	0.038 0.043	0.043 0.048	0.048 0.053	0.053 0.058	
N04		90 - 100	0.01 0.015	0.015 0.02	0.02 0.025	0.025 0.035	0.035 0.045	0.045 0.055	0.055 0.065	0.065 0.075	0.075 0.085	0.085 0.095	0.095 0.11		
N05			80 - 90	0.006 0.008	0.008 0.013	0.013 0.018	0.018 0.023	0.023 0.028	0.028 0.033	0.033 0.038	0.038 0.043	0.043 0.048	0.048 0.053	0.053 0.058	
S01		15 - 20	0.002 0.003	0.004 0.005	0.006 0.007	0.008 0.009	0.01 0.011	0.012 0.013	0.014 0.015	0.016 0.017	0.018 0.019	0.020 0.022	0.022 0.025		
S02			20 - 30	0.006 0.008	0.01 0.012	0.014 0.016	0.018 0.02	0.022 0.026	0.028 0.032	0.034 0.038	0.04 0.044	0.044 0.048	0.05 0.055	0.055 0.06	
S03		20 - 30	0.006 0.008	0.01 0.012	0.014 0.016	0.018 0.02	0.022 0.026	0.028 0.032	0.034 0.038	0.04 0.044	0.044 0.048	0.05 0.055	0.055 0.06		
S04			15 - 20	0.003 0.004	0.005 0.006	0.007 0.008	0.009 0.01	0.011 0.013	0.014 0.016	0.017 0.019	0.020 0.022	0.022 0.024	0.026 0.028	0.028 0.03	
H01		15 - 20	0.002 0.003	0.004 0.005	0.006 0.007	0.008 0.009	0.01 0.011	0.012 0.013	0.014 0.015	0.016 0.017	0.018 0.019	0.020 0.022	0.022 0.025		
H02			///	///	///	///	///	///	///	///	///	///	///	///	

LEGEND

	P01	Unalloyed carbon steel up to 800 N/mm ²		M02	Aluminium alloy cast
	P02	Low alloyed steel from 800 N/mm ² to 1100 N/mm ²		M03	Copper
	P03	High alloyed steel from 1100 N/mm ² to 1400 N/mm ²		M04	Brass - Bronze
	M01	Stainless steel ferritic		M05	Brass lead free
	M02	Stainless steel martensitic		S01	Super alloys (Inconel - Hastelloy - Nimonic)
	M03	Stainless steel martensitic - PH		S02	Titanium pure (Grado 2 - Grado 4)
	M04	Stainless steel austenitic		S03	Titanium alloys (Grado 5)
	K01	Lamellar cast iron		S04	CrCo alloys
	K02	Spheroidal cast iron		H01	Hardened steel < 55 HRC
	M01	Aluminium alloy wrought		H02	Hardened steel > 55 HRC

 Recommended
 Partially recommended
 Not recommended



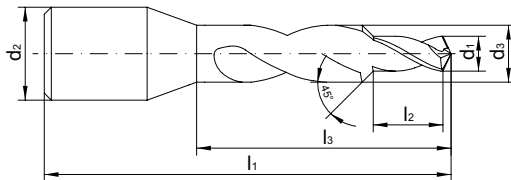


Punta pilota ad alte prestazioni con gambo rinforzato
Foret pilote hautes performances à queue renforcée
Hochleistungs-Pilotbohrer mit verstärktem Shaft
High-performance Pilot Drill with reinforced shank



SWISS MADE

MTB27E

MTB27E

Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 応用範囲 / 应用

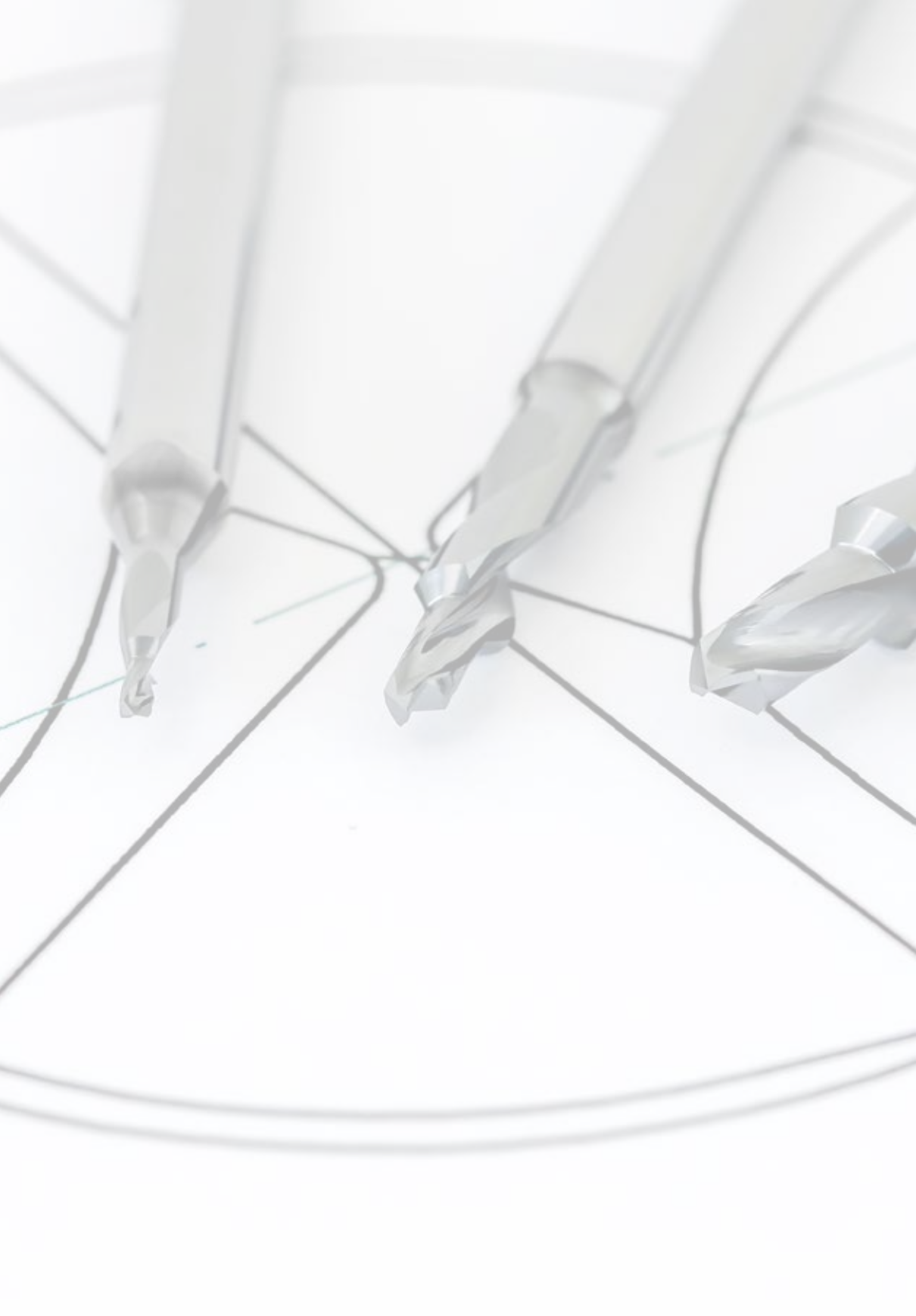
HRC < 55		Inox Stainless		GG(G) / ghsia Ft / cast iron		Titanio Titan		ALU		Cr-Co				
d1	m5	d2 h6	d3 (± 0.02)	l1	l2	l3	d1	m5	d2 h6	d3 (± 0.02)	l1	l2	l3	
1,00	4,0	1,80	45	2,0	7,30	2,50	4,0	3,60	56	5,0	18,25			
1,05	4,0	1,80	45	2,1	7,70	2,55	4,0	3,60	56	5,1	18,65			
1,10	4,0	1,80	45	2,2	8,05	2,60	4,0	-	56	5,2	-			
1,15	4,0	1,80	45	2,3	8,40	2,65	4,0	-	56	5,3	-			
1,20	4,0	2,10	45	2,4	8,80	2,70	4,0	-	56	5,4	-			
1,25	4,0	2,10	45	2,5	9,15	2,75	4,0	-	56	5,5	-			
1,30	4,0	2,10	45	2,6	9,50	2,80	4,0	-	56	5,6	-			
1,35	4,0	2,10	45	2,7	9,90	2,85	4,0	-	56	5,7	-			
1,40	4,0	2,10	45	2,8	10,25	2,90	4,0	-	56	5,8	-			
1,45	4,0	2,45	45	2,9	10,60	2,95	4,0	-	56	5,9	-			
1,50	4,0	2,45	48	3,0	10,95	3,00	6,0	4,80	60	6,0	21,90			
1,55	4,0	2,45	48	3,1	11,35	3,05	6,0	4,80	60	6,1	22,30			
1,60	4,0	2,45	48	3,2	11,70	3,10	6,0	4,80	60	6,2	22,65			
1,65	4,0	2,45	48	3,3	12,05	3,15	6,0	4,80	60	6,3	23,00			
1,70	4,0	2,80	48	3,4	12,45	3,20	6,0	4,80	60	6,4	23,40			
1,75	4,0	2,80	48	3,5	12,80	3,25	6,0	4,80	60	6,5	23,75			
1,80	4,0	2,80	48	3,6	13,15	3,30	6,0	4,80	60	6,6	24,10			
1,85	4,0	2,80	48	3,7	13,55	3,35	6,0	4,80	60	6,7	24,50			
1,90	4,0	2,80	48	3,8	13,90	3,40	6,0	4,80	60	6,8	24,85			
1,95	4,0	2,80	48	3,9	14,25	3,45	6,0	4,80	60	6,9	25,20			
2,00	4,0	3,30	52	4,0	14,60	3,50	6,0	5,50	65	7,0	25,55			
2,05	4,0	3,30	52	4,1	15,00	3,55	6,0	5,50	65	7,1	25,95			
2,10	4,0	3,30	52	4,2	15,35	3,60	6,0	5,50	65	7,2	26,30			
2,15	4,0	3,30	52	4,3	15,70	3,65	6,0	5,50	65	7,3	26,65			
2,20	4,0	3,30	52	4,4	16,10	3,70	6,0	5,50	65	7,4	27,05			
2,25	4,0	3,30	52	4,5	16,45	3,75	6,0	5,50	70	7,5	27,40			
2,30	4,0	3,60	52	4,6	16,80	3,80	6,0	5,50	70	7,6	27,75			
2,35	4,0	3,60	52	4,7	17,20	3,85	6,0	5,50	70	7,7	28,15			
2,40	4,0	3,60	52	4,8	17,55	3,90	6,0	5,50	70	7,8	28,50			
2,45	4,0	3,60	52	4,9	17,90	3,95	6,0	5,50	70	7,9	28,85			
							4,00	6,0	5,50	70	8,0	29,20		

Parametri indicativi per la foratura / Standard values for drilling
Richtswerte für das Bohren / Paramètres indicatifs pour perçage

		Velocità di taglio Cutting speed m/min.	Avanzamento mm/giro Cutting feed mm/rev.					
			Ø1 - Ø1.45	Ø1.5 - Ø1.95	Ø2 - Ø2.45	Ø2.5 - Ø2.95	Ø3 - Ø3.45	Ø3.5 - Ø4
P01	●	30 - 60	0.06 - 0.08	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14	0.14 - 0.16	0.16 - 0.20
P02	●	30 - 55	0.05 - 0.07	0.07 - 0.09	0.09 - 0.11	0.11 - 0.13	0.13 - 0.15	0.15 - 0.18
P03	●	25 - 45	0.04 - 0.06	0.06 - 0.08	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14	0.14 - 0.17
M01	●	25 - 40	0.03 - 0.04	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08	0.08 - 0.09
M02	●	25 - 40	0.03 - 0.04	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08	0.08 - 0.09
M03	●	25 - 40	0.03 - 0.04	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08	0.08 - 0.09
M04	●	20 - 35	0.02 - 0.03	0.03 - 0.04	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08
K01	●	40 - 80	0.06 - 0.07	0.07 - 0.08	0.08 - 0.09	0.09 - 0.10	0.10 - 0.12	0.12 - 0.14
K02	●	40 - 80	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08	0.08 - 0.09	0.09 - 0.11	0.11 - 0.13
N01	●	80 - 140	0.06 - 0.07	0.07 - 0.09	0.09 - 0.11	0.11 - 0.13	0.13 - 0.15	0.15 - 0.17
N02	●	50 - 120	0.065 - 0.075	0.075 - 0.09	0.09 - 0.105	0.105 - 0.12	0.12 - 0.135	0.135 - 0.15
N03	●	40 - 80	0.05 - 0.06	0.06 - 0.07	0.07 - 0.085	0.085 - 0.10	0.10 - 0.115	0.115 - 0.13
N04	●	50 - 120	0.07 - 0.08	0.08 - 0.095	0.095 - 0.11	0.11 - 0.125	0.125 - 0.14	0.14 - 0.17
N05	●	35 - 70	0.04 - 0.06	0.06 - 0.075	0.075 - 0.09	0.09 - 0.105	0.105 - 0.12	0.12 - 0.135
S01	●	15 - 25	0.01 - 0.02	0.02 - 0.03	0.03 - 0.04	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07
S02	●	10 - 25	0.02 - 0.03	0.03 - 0.04	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08
S03	●	15 - 30	0.04 - 0.05	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08	0.08 - 0.09	0.09 - 0.10
S04	●	30 - 40	0.03 - 0.045	0.045 - 0.06	0.06 - 0.07	0.07 - 0.08	0.08 - 0.09	0.09 - 0.10
H01	●	15 - 25	0.005 - 0.008	0.008 - 0.012	0.012 - 0.016	0.016 - 0.02	0.02 - 0.025	0.025 - 0.03
H02	●	///	///	///	///	///	///	///

LEGEND

● Recommended	P01 Unalloyed carbon steel up to 800 N/mm ²	M01 Stainless steel ferritic	N01 Aluminium alloy cast
● Partially recommended	P02 Low alloyed steel from 800 N/mm ² to 1100 N/mm ²	M02 Stainless steel martensitic	N02 Copper
● Not recommended	P03 High alloyed steel from 1100 N/mm ² to 1400 N/mm ²	M03 Stainless steel martensitic - PH	N03 Brass - Bronze
		M04 Stainless steel austenitic	N04 Brass lead free
		K01 Lamellar cast iron	S01 Super alloys (Inconel - Hastelloy - Nimonic)
		K02 Spheroidal cast iron	S02 Titanium pure (Grado 2 - Grado 4)
		N02 Aluminium alloy wrought	S03 Titanium alloys (Grado 5)
			S04 CrCo alloys
			H01 Hardened steel < 55 HRC
			H02 Hardened steel > 55 HRC





Punta in metallo duro senza canalini per acciaio inox
Foret carbure sans trous d'huile pour acier inox
Hartmell-Bohrer ohne IK für Edelstahl
Carbide drill without coolant holes
for stainless steel

MTB 25
MTB 25/1.100
MTB 25/3
MTB 30



SWISS MADE

Punte in metallo duro elicoidali, corte, taglio destro
Forets carbure hélicoïdaux, courtes, coupe à droit
Hartmetall kurze Spiralbohrer rechtsschneidend
Carbide Short twist drills right hand cutting
超硬ソリッドドリル
右旋螺旋钻

MTB 25

SMG
10

Z
2

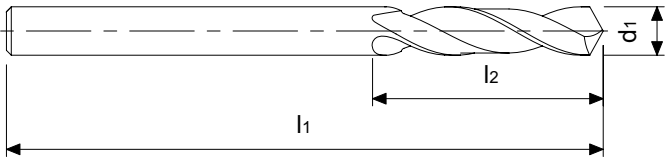
DIN
6539

RH









Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 応用範囲 / 应用

HRC < 42	Inox Stainless	GG(G) / ghisa Ft / cast iron	Titanio Titan	ALU
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d1	h6	l1	l2	d1	h6	l1	l2	d1	h6	l1	l2
0,50		20	3	4,20		55	22	8,00		79	37
0,60		21	4	4,30		58	24	8,10		79	37
0,70		23	5	4,40		58	24	8,20		79	37
0,80		24	5	4,50		58	24	8,30		79	37
0,90		25	6	4,60		58	24	8,40		79	37
1,00		26	6	4,70		58	24	8,50		79	37
1,10		28	7	4,80		62	26	8,60		84	40
1,20		30	8	4,90		62	26	8,70		84	40
1,30		30	8	5,00		62	26	8,80		84	40
1,40		32	9	5,10		62	26	8,90		84	40
1,50		32	9	5,20		62	26	9,00		84	40
1,60		34	10	5,30		62	26	9,10		84	40
1,70		34	10	5,40		66	28	9,20		84	40
1,80		36	11	5,50		66	28	9,30		84	40
1,90		36	11	5,60		66	28	9,40		84	40
2,00		38	12	5,70		66	28	9,50		84	40
2,10		38	12	5,80		66	28	9,60		89	43
2,20		40	13	5,90		66	28	9,70		89	43
2,30		40	13	6,00		66	28	9,80		89	43
2,40		43	14	6,10		70	31	9,90		89	43
2,50		43	14	6,20		70	31	10,00		89	43
2,60		43	14	6,30		70	31	10,10		89	43
2,70		46	16	6,40		70	31	10,20		89	43
2,80		46	16	6,50		70	31	10,50		89	43
2,90		46	16	6,60		70	31	11,00		95	47
3,00		46	16	6,70		70	31	11,50		95	47
3,10		49	18	6,80		74	34	11,80		95	47
3,20		49	18	6,90		74	34	12,00		102	51
3,30		49	18	7,00		74	34	12,50		102	51 *
3,40		52	20	7,10		74	34	12,70		102	51 *
3,50		52	20	7,20		74	34	13,00		102	51 *
3,60		52	20	7,30		74	34	13,50		102	51 *
3,70		52	20	7,40		74	34	14,00		107	54 *
3,80		55	22	7,50		74	34	14,50		107	56 *
3,90		55	22	7,60		79	37	15,00		111	56 *
4,00		55	22	7,70		79	37	16,00		115	58 *
4,10		55	22	7,80		79	37	18,00		123	62 *
				7,90		79	37	20,00		131	66 *

Disponibili su richiesta*
Min. 5 pz

Disponible sur demande*
Au moins 5 pièces

Available on request*
Minimum qty 5 pcs

Verfügbar auf Anfrage*
Mindestmenge 5 Stk

Punte in metallo duro elicoidali, corte, taglio destro
Forets carbure hélicoïdaux, courtes, coupe à droite
Hartmetall kurze Spiralbohrer rechtsschneidend
Carbide Short twist drills right hand cutting
超硬ソリッドドリル
右旋螺旋钻

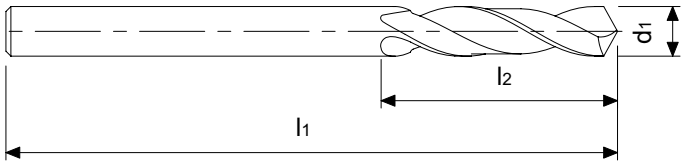
MTB 25/1.100

SMG
10

Z
2

TUSA
NORM

RH



Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 应用範圍 / 应用

HRC < 42			Inox Stainless			GG(G) / ghisa Ft / cast iron			Titanio Titan			ALU		
d1 h6	l1	l2	d1 h6	l1	l2	d1 h6	l1	l2						
0,30 – 0,39	30	4	3,50	50	25	5,35	65	40						
0,40 – 0,49	30	5	3,55	50	25	5,40	65	40						
0,50 – 0,59	30	6	3,60	55	27	5,45	65	40						
0,60 – 0,69	30	6	3,65	55	27	5,50	65	40						
0,70 – 0,79	40	12	3,70	55	27	5,55	65	40						
0,80 – 0,89	40	12	3,75	55	27	5,60	65	40						
0,90 – 0,99	40	12	3,80	55	27	5,65	65	40						
1,00 – 1,09	40	15	3,85	55	27	5,70	65	40						
1,10 – 1,19	40	15	3,90	55	27	5,75	65	40						
1,20 – 1,29	40	15	3,95	55	27	5,80	65	40						
1,30 – 1,39	40	16	4,00	55	27	5,85	65	40						
1,40 – 1,49	40	16	4,05	55	27	5,90	65	40						
1,50 – 1,59	40	16	4,10	60	30	5,95	65	40						
1,60 – 1,69	40	18	4,15	60	30	6,00	65	40						
1,70 – 1,79	40	18	4,20	60	30	6,10	65	40						
1,80 – 1,89	40	18	4,25	60	30	6,20	65	40						
1,90 – 1,99	40	18	4,30	60	30	6,30	65	40						
2,00 – 2,09	40	18	4,35	60	30	6,40	65	40						
2,10 – 2,19	40	20	4,40	60	30	6,50	65	40						
2,20 – 2,29	40	20	4,45	60	30	6,60	65	40						
2,30 – 2,39	40	20	4,50	60	30	6,70	65	40						
2,40 – 2,49	40	20	4,55	60	30	6,80	65	40						
2,50 – 2,59	40	20	4,60	60	30	6,90	65	40						
2,60 – 2,69	45	20	4,65	60	30	7,00	65	40						
2,70 – 2,79	45	20	4,70	60	30	7,20	80	40						
2,80 – 2,89	45	20	4,75	60	30	7,50	80	40						
2,90 – 2,99	45	20	4,80	60	30	8,00	80	40						
3,00	45	20	4,85	60	30	8,50	80	40						
3,05	45	20	4,90	60	30	9,00	80	40						
3,10	50	25	4,95	60	30	9,50	80	40						
3,15	50	25	5,00	60	30	10,00	100	50						
3,20	50	25	5,05	60	30	10,50	100	50						
3,25	50	25	5,10	65	40	11,00	100	50						
3,30	50	25	5,15	65	40	11,50	100	50						
3,35	50	25	5,20	65	40	12,00	100	50						
3,40	50	25	5,25	65	40	12,50	100	50						
3,45	50	25	5,30	65	40	13,00	100	50						

超硬ソリッドドリル3枚刃
三刃右旋螺旋钻

Verfügbar auf Anfrage*
Mindestmenge 5 Stk

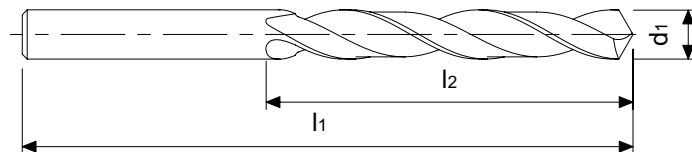
超硬ソリッドドリル
右旋螺旋钻

SMG
10

2
Z

DIN
338

RH



HRC < 42

Inox
Stainless

GG(G) / ghisal
Ft / cast iron

Titanic
Titan

ALU

[illegible]

Disponibili su richiesta*
Min. 5 pz

Disponible sur demande*
Au moins 5 pièces

Available on request*
Minimum qty 5 pcs

Verfügbar auf Anfrage*
Mindestmenge 5 Stk





Punte elicoidali in metallo duro
Taglio destro - taglio sinistro - da centro

*Forets carbure hélicoïdaux
Coupe à droite - coupe à gauche - à centrer*

Hartmetall-Spiralbohrer
Rechtsschneidend-linksschneidend-zentrumschneidend

*Carbide twist Drills
Right hand cutting - left hand cutting - center cutting*

MTB 33
MTB 35
MTB 35/L
MTB 40
MTB 41



SWISS MADE

右旋螺旋钻

30°

[illegible]

Punte elicoidali in metallo duro taglio destro
Forets carbure hélicoïdaux coupe à droite
Hartmetall-Spiralbohrer Rechtsschneidend
Carbide Twist drill right hand cutting

超硬ソリッドドリル
右旋螺旋钻

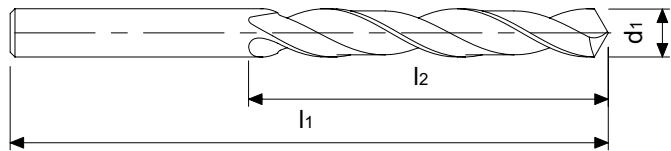
MTB 35

SMG
10

Z
2

TUSA
NORM

RH

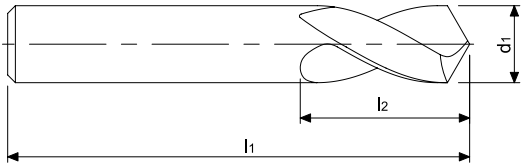


Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 応用範囲 / 应用

HRC < 42	Inox Stainless	GG(G) / ghisa Ft / cast iron	Titanio Titan	ALU
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d1 h6	l1	l2	d1 h6	l1	l2	d1 h6	l1	l2
0,30	28	4	1,70	40	16	3,20	50	20
0,35	30	5	1,75	40	16	3,30	50	20
0,40	30	5	1,80	40	16	3,40	50	20
0,45	30	5	1,85	40	16	3,50	50	20
0,50	30	5	1,90	40	16	3,60	50	20
0,55	30	5	1,95	40	16	3,70	50	20
0,60	30	5	2,00	40	16	3,80	50	20
0,65	30	6	2,05	40	18	3,90	50	20
0,70	30	6	2,10	40	18	4,00	50	20
0,75	30	8	2,15	40	18	4,10	50	25
0,80	30	8	2,20	40	18	4,20	50	25
0,85	30	9	2,25	40	18	4,30	50	25
0,90	30	9	2,30	40	18	4,40	50	25
0,95	30	10	2,35	40	18	4,50	50	25
1,00	30	10	2,40	40	18	4,60	50	25
1,05	30	10	2,45	40	18	4,70	50	25
1,10	30	10	2,50	40	18	4,80	50	25
1,15	30	12	2,55	45	18	4,90	50	25
1,20	30	12	2,60	45	18	5,00	50	25
1,25	30	12	2,65	45	18	5,10	50	25
1,30	30	12	2,70	45	18	5,20	50	25
1,35	30	12	2,75	45	18	5,30	50	25
1,40	30	12	2,80	45	18	5,40	50	25
1,45	30	12	2,85	45	18	5,50	50	25
1,50	30	12	2,90	45	18	5,60	50	25
1,55	40	16	2,95	45	18	5,70	50	25
1,60	40	16	3,00	45	18	5,80	50	25
1,65	40	16	3,10	50	20	5,90	50	25
			3,17	50	20	6,00	50	25

Punta in metallo duro da centro 120°
Foret carbure à centrer 120°
Hartmetall-Bohrer zentrumschneidend 120°
Carbide Center drill 120°
 センタードリル120°
 中心钻 120°

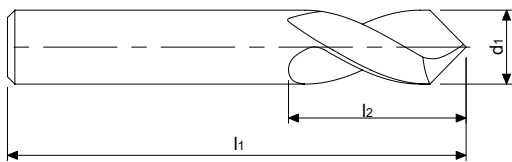


d1	h8	l1	l2
3,00	45	12	
4,00	50	15	
5,00	50	18	
6,00	50	21	
8,00	60	25	
10,00	70	27	
12,00	70	27	
14,00	75	30	
16,00	75	30	

MTB 40

SMG 10	Z 2
TUSA NORM	RH

Punta in metallo duro da centro 90°
Foret carbure à centrer 90°
Hartmetall-Bohrer zentrumschneidend 90°
Carbide Center drill 90°
 センタードリル90°
 中心钻 90°



d1	h8	l1	l2
3,00	45	12	
4,00	50	15	
5,00	50	18	
6,00	50	21	
8,00	60	25	
10,00	70	27	
12,00	70	27	
14,00	75	30	
16,00	75	30	

MTB 41

SMG 10	Z 2
TUSA NORM	RH





Punte elicoidali taglio destro lunghe ed extra-lunghe
Forets hélicoïdaux coupe à droite serie longue et extra-longue
Spiralbohrer rechtsschneidend, lange und extra-lange Ausführung
Twist drill right hand cutting long and extra long serie

MTB 45

MTB 50

MTB 60



SWISS MADE

Punte elicoidali taglio destro lunghe
Forets hélicoïdaux coupe à droite serie longue
Spiralbohrer rechtsschneidend lange Ausführung
Twist drill right hand cutting long serie
超硬ソリッドドリル、セミロングシリーズ
右旋螺旋钻，半长系列

MTB 45

SMG
10

Z
2

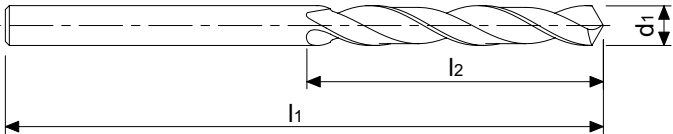
TUSA
NORM

RH









Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 应用範圍 / 应用

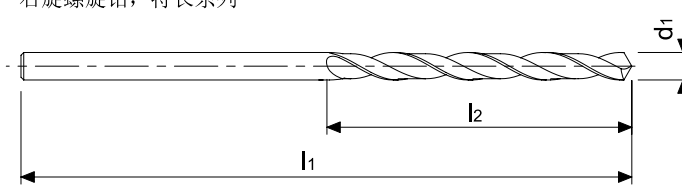
HRC < 42	Inox Stainless	GG(G) / ghisa Ft / cast iron	Titanio Titan	ALU
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d ₁ h ₆	l ₁	l ₂	d ₁ h ₆	l ₁	l ₂	d ₁ h ₆	l ₁	l ₂
0,30	40	8	3,20	71	32	6,10	102	50
0,40	40	8	3,30	73	35	6,20	102	50
0,50	40	8	3,40	73	35	6,30	102	50
0,60	40	8	3,50	73	35	6,40	105	50
0,70	50	15	3,60	76	37	6,50	105	50
0,80	50	15	3,70	76	37	6,60	105	50
0,90	50	15	3,80	76	37	6,70	105	50
1,00	50	16	3,90	79	37	6,80	105	50
1,10	50	16	4,00	83	40	6,90	105	50
1,20	50	18	4,10	83	40	7,00	105	50
1,30	50	18	4,20	83	40	7,10	108	52
1,40	50	18	4,30	83	40	7,20	108	52
1,50	50	24	4,40	86	42	7,30	108	52
1,60	55	24	4,50	86	42	7,40	111	52
1,70	55	24	4,60	86	42	7,50	111	52
1,80	55	24	4,70	89	42	7,60	111	52
1,90	55	24	4,80	89	42	7,70	114	55
2,00	55	24	4,90	92	45	7,80	114	55
2,10	55	24	5,00	92	45	7,90	114	55
2,20	58	26	5,10	92	45	8,00	117	60
2,30	58	26	5,20	95	45	8,50	121	60
2,40	61	26	5,30	95	45	9,00	124	65
2,50	61	26	5,40	95	45	9,50	127	65
2,60	64	28	5,50	95	45	10,00	130	70
2,70	64	28	5,60	98	45	10,50	137	70
2,80	67	30	5,70	98	45	11,00	140	70
2,90	71	30	5,80	98	45	11,50	143	70
3,00	71	30	5,90	98	45	12,00	149	70
3,10	71	32	6,00	102	50	12,50	149	70
						13,00	149	70

[illegible]

超硬ソリッドドリル、エキストラロングシリーズ
右旋螺旋鑽，特长系列

25° - 30°



ALU

d ₁ h ₆	l ₁	l ₂	d ₁ h ₆	l ₁	l ₂	d ₁ h ₆	l ₁	l ₂
1,00	100	50	2,90	150	75	4,90	150	75
1,10	100	50	3,00	150	75	5,00	200	100
1,20	100	50	3,10	150	75	5,10	200	100
1,30	100	50	3,20	150	75	5,20	200	100
1,40	100	50	3,30	150	75	5,30	200	100
1,50	100	50	3,40	150	75	5,40	200	100
1,60	100	50	3,50	150	75	5,50	200	100
1,70	100	50	3,60	150	75	5,60	200	100
1,80	100	50	3,70	150	75	5,70	200	100
1,90	100	50	3,80	150	75	5,80	200	100
2,00	100	50	3,90	150	75	5,90	200	100
2,10	100	50	4,00	150	75	6,00	200	100
2,20	100	50	4,10	150	75	6,50	200	105
2,30	100	50	4,20	150	75	7,00	200	105
2,40	150	75	4,30	150	75	7,50	200	105
2,50	150	75	4,40	150	75	8,00	200	105
2,60	150	75	4,50	150	75	8,50	250	130
2,70	150	75	4,60	150	75	9,00	250	130
2,80	150	75	4,70	150	75	9,50	250	145
			4,80	150	75	10,00	250	145

SERVIZIO DI RIAFFILATURA

Con il continuo aumento dei prezzi della materia prima, e i lunghi termini di approvvigionamento del materiale grezzo, un processo di rigenerazione degli utensili diventa sempre più interessante per i clienti.

L'incidenza del costo del materiale sul prezzo degli utensili è notevole e può arrivare in alcuni casi anche oltre il 60%.

Perché non approfittare di questa opportunità?

L'azienda Tusa Precision Tools, grazie alla sua decennale esperienza e alla professionalità del suo Team, è in grado di rigenerare nella massima qualità i propri utensili anche più volte, garantendo le prestazioni iniziali dei propri prodotti e abbattendo i costi di utilizzo.

Possiamo garantire dei servizi personalizzati e in caso di urgenze dei canali di servizio veloce, risparmiando tempo e danaro.

Contattate il nostro ufficio tecnico e discutete la migliore soluzione per la vostra azienda.

RE-SHARPENING SERVICE

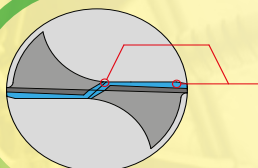
Considering the fact that raw material price has surged consistently during last years and delivery time for raw material's supply is becoming longer and longer – it could be very interesting to take tools' re-sharpening process into consideration.

The incidence of raw material costs is really remarkable and can reach, to some extent, also 60%.

Why not make the most of this opportunity?

Owing to its experience and professional approach, TUSA PRECISION TOOLS SA can regenerate every tool more times, granting the initial performance and decreasing usage costs. Customized, fast service, saving time and money is TUSA's aim,

Get in touch with our technical team and find the best solution for your company!



zona di
usura
wear area



Tool with worn cutting edges

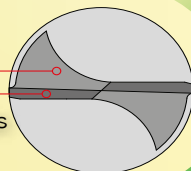
Utensile con taglienti usurati

Utensile con taglienti rigenerati

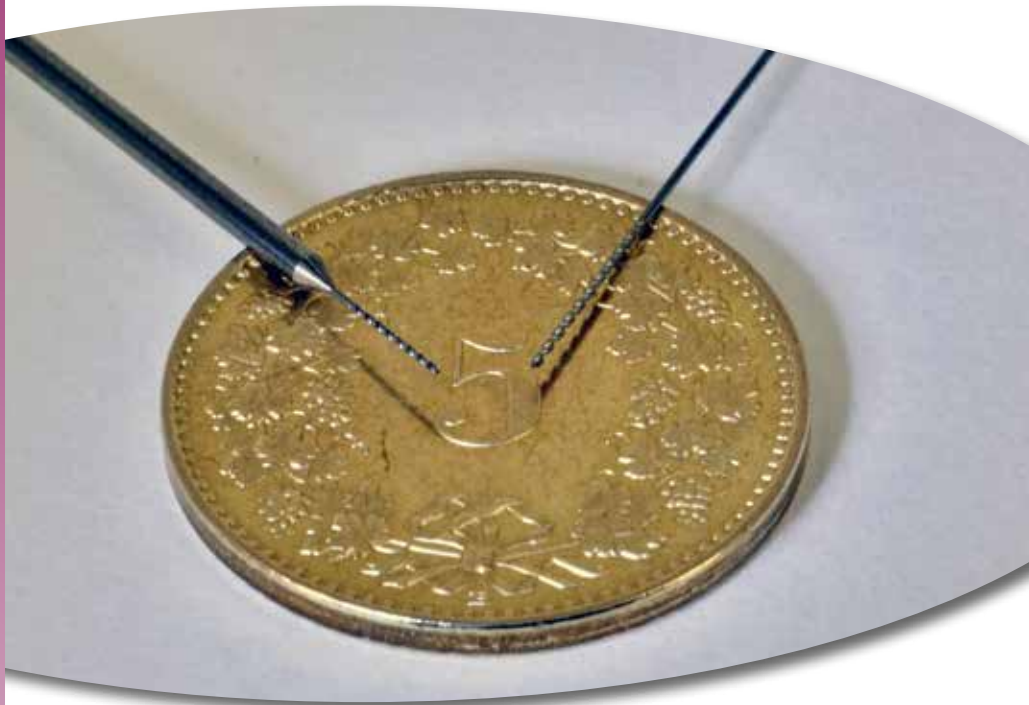
Tool with regenerated cutting edges



taglienti
rigenerati
regenerated cutting edges







Micropunte in metallo duro elicoidali taglio destro
Micro-forets carbure hélicoïdaux coupe à droite
Hartmetall Micro-Spiralbohrer rechtsschneidend
Carbide Micro twist drills right hand cutting

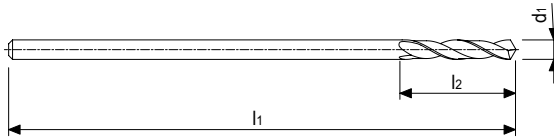


SWISS MADE

TC 35
TA 35

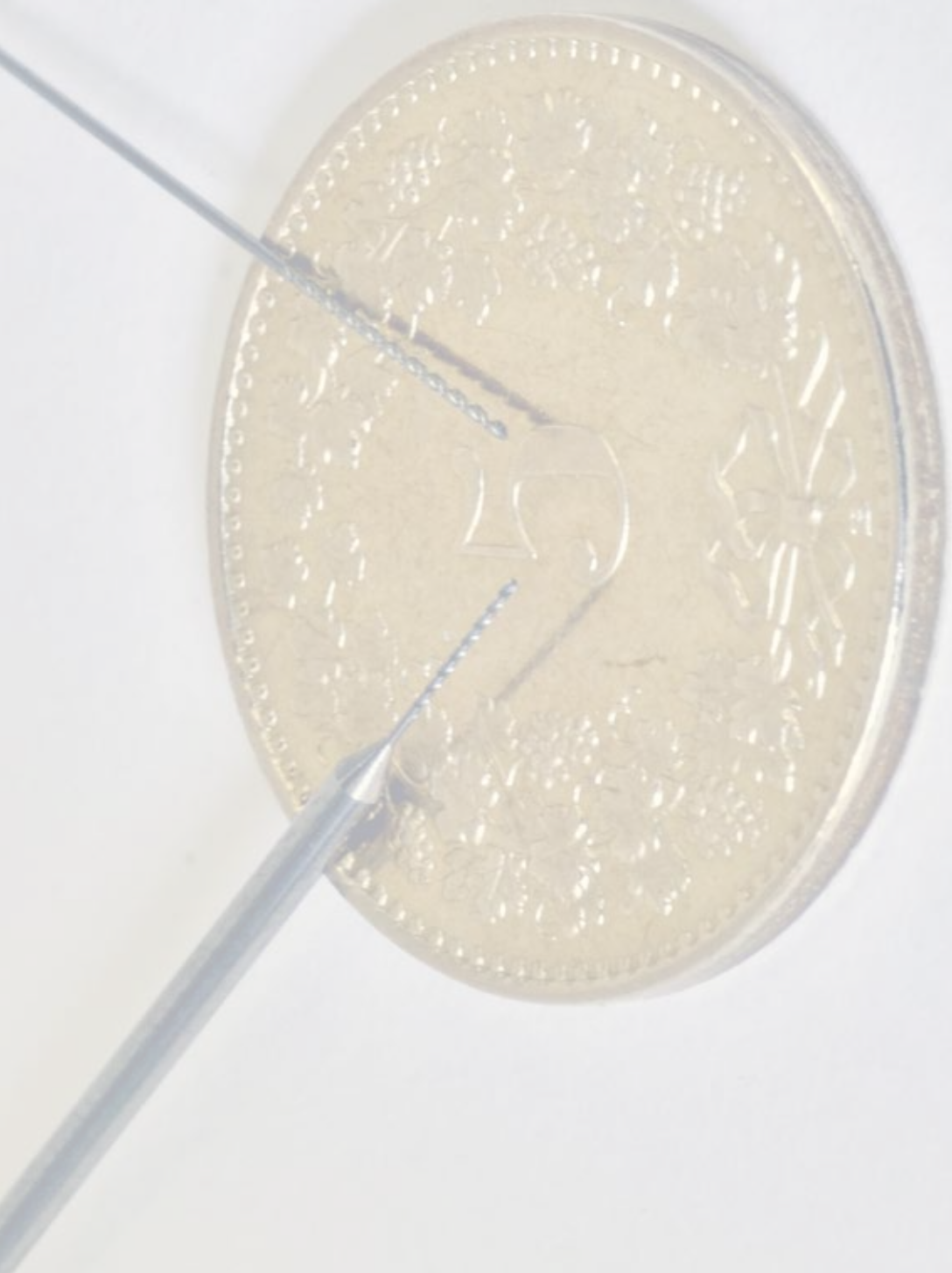
マイクロソリッドドリル
微右旋螺旋钻

A technical drawing of a cylindrical part with a chamfer. The chamfer is indicated by a line with a 35-degree angle, labeled '35°'.



ALU

[illegible]





Micropunta elicoidale con svasatura posteriore
Micro-centrino 90°-118°

Micro foret hélicoïdal avec chanfrein postérieur
Micro foret à centrer 90°-118°

Mikro Bohr-Senk-Kombinationswerkzeug
Mikro NC Anbohrer 90°-118°

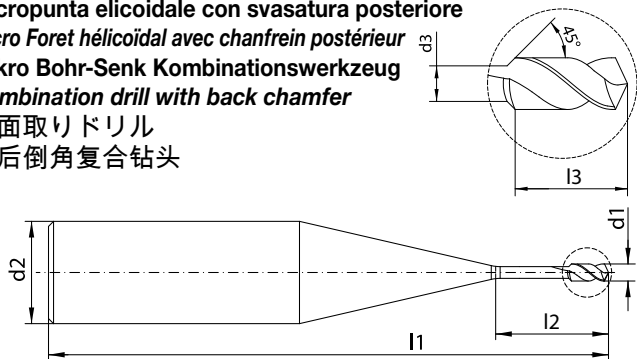
Combination drill with back chamfer
Micro center drill 90°-118°



SWISS MADE

TA303B
MTB 43
MTB 44

Micropunta elicoidale con svasatura posteriore
Micro Foret hélicoïdal avec chanfrein postérieur
Mikro Bohr-Senk Kombinationswerkzeug
Combination drill with back chamfer
裏面取りドリル
带后倒角复合钻头

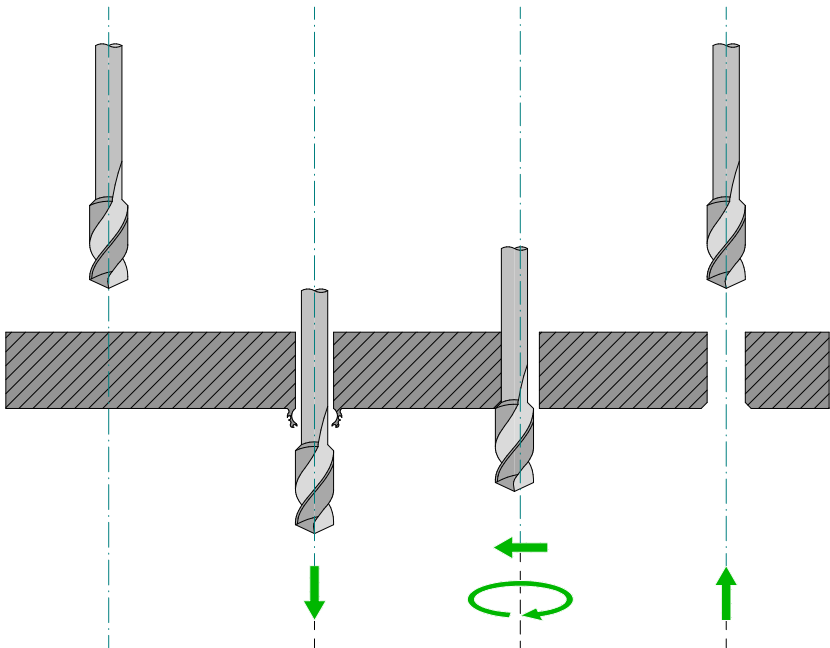


TA303B

SMG 10	Z 2
TUSA NORM	RH
MICRO	TIALN
	3xD

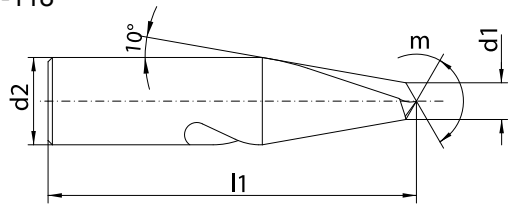
Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 应用範圍 / 应用

HRC < 42			Inox Stainless			GG(G) / ghisa Ft / cast iron			Titanio Titan			ALU		
d1 h5	d2 h5	d3	l1	l2	l3	d1 h5	d2 h5	d3	l1	l2	l3	d1 h5	d2 h5	d3
0,50	3,00	0,34	50,00	3,00	1,50	1,80	4,00	1,21	60,00	10,80	5,40	0,50	3,00	0,34
0,60	3,00	0,40	50,00	3,60	1,80	1,90	4,00	1,27	60,00	11,40	5,70	0,60	3,00	0,40
0,70	3,00	0,47	50,00	4,20	2,10	2,00	4,00	1,34	60,00	12,00	6,00	0,70	3,00	0,47
0,80	3,00	0,54	50,00	4,80	2,40	2,10	6,00	1,41	70,00	12,60	6,30	0,80	3,00	0,54
0,90	3,00	0,60	50,00	5,40	2,70	2,20	6,00	1,47	70,00	13,20	6,60	0,90	3,00	0,60
1,00	3,00	0,67	50,00	6,00	3,00	2,30	6,00	1,54	70,00	13,80	6,90	1,00	3,00	0,67
1,10	3,00	0,74	50,00	6,60	3,30	2,40	6,00	1,61	70,00	14,40	7,20	1,10	3,00	0,74
1,20	3,00	0,80	50,00	7,20	3,60	2,50	6,00	1,68	70,00	15,00	7,50	1,20	3,00	0,80
1,30	3,00	0,87	50,00	7,80	3,90	2,60	6,00	1,74	70,00	15,60	7,80	1,30	3,00	0,87
1,40	3,00	0,94	50,00	8,40	4,20	2,70	6,00	1,81	70,00	16,20	8,10	1,40	3,00	0,94
1,50	3,00	1,01	50,00	9,00	4,50	2,80	6,00	1,88	70,00	16,80	8,40	1,50	3,00	1,01
1,60	4,00	1,07	60,00	9,60	4,80	2,90	6,00	1,94	70,00	17,40	8,70	1,60	4,00	1,07
1,70	4,00	1,14	60,00	10,20	5,10	3,00	6,00	2,01	70,00	18,00	9,00	1,70	4,00	1,14



Micro centrino 90°-118°
Micro center drill 90°-118°
Micro foret à centrer 90°-118°
Mikro NC Anbohrer 90°-118°
マイクロセンタードリル 90°-118°
微型中心钻 90°-118°

MTB 43
MTB 44



SMG 10	Z 2
TUSA NORM	RH
MICRO	TIALN

Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 応用範囲 / 应用

HRC < 42	Inox Stainless	GG(G) / ghisa Ft / cast iron	Titanio Titan	ALU
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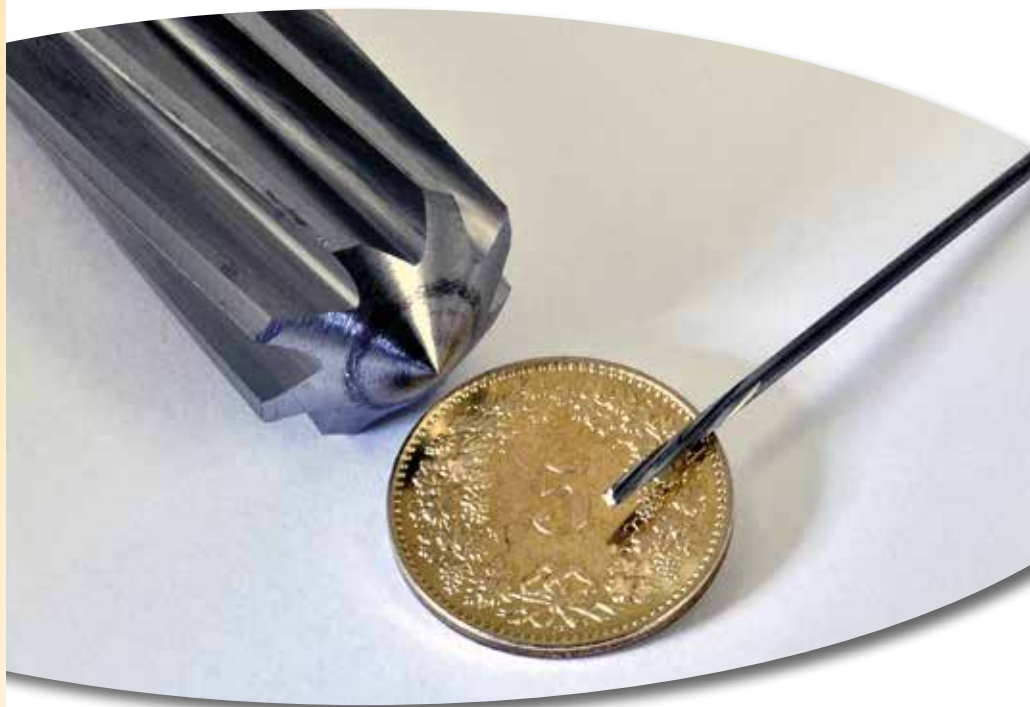
MTB 43

d ₁	d ₂ h ₆	l ₁	m
0,60	2,00	28,00	118°
1,20	2,00	28,00	118°
2,00	2,00	28,00	118°

MTB 44

d ₁	d ₂ h ₆	l ₁	m
0,60	2,00	28,00	90°
1,20	2,00	28,00	90°
2,00	2,00	28,00	90°





Alesatori cilindrici, spirale sinistra, taglio destro
Alésoirs cylindriques, hélice à gauche, coupe à droite
Spiralgenutet Reibahle, Linksdrahl, rechtsschneidend
Cylindrical reamer, left hand helix, right hand cut

Alesatori cilindrici, spirale sinistra, taglio destro
Alésoirs cylindriques, hélice à gauche, coupe à droite
Spiralgenutet Reibahle, Linksdrall, rechtsschneidend
Cylindrical reamer, left hand helix, right hand cut
超硬ソリッドリーマ、右刃左ねじれ、不規則形状
左旋铰刀，右旋切削 不规则分布

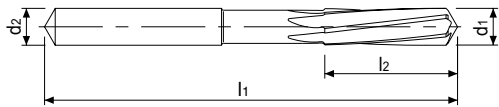
MS 402

SMG
10

Z
4 - 8

Similar
DIN 212

RH



d1	H7	l1	l2	z	d1	H7	l1	l2	z	d1	H7	l1	l2	z
1,00	40	5	4	4	2,30	53	12	4	4	3,70	70	18	4	4
1,05	40	5	4	4	2,35	53	12	4	4	3,75	70	18	4	4
1,10	40	7	4	4	2,40	57	14	4	4	3,80	75	19	4	4
1,15	40	7	4	4	2,45	57	14	4	4	3,85	75	19	4	4
1,20	40	7	4	4	2,50	57	14	4	4	3,90	75	19	4	4
1,25	40	7	4	4	2,55	57	14	4	4	3,97	75	19	4	4
1,30	40	7	4	4	2,60	61	14	4	4	3,98	75	19	4	4
1,35	40	7	4	4	2,65	61	14	4	4	3,99	75	19	4	4
1,40	40	8	4	4	2,70	61	15	4	4	4,00	75	19	4	4
1,45	40	8	4	4	2,75	61	15	4	4	4,50	80	21	4	4
1,50	40	8	4	4	2,80	61	15	4	4	5,00	86	23	6	6
1,55	43	8	4	4	2,85	61	15	4	4	5,50	93	26	6	6
1,60	43	9	4	4	2,90	61	15	4	4	6,00	93	26	6	6
1,65	43	9	4	4	2,97	61	15	4	4	6,50	101	28	6	6
1,70	46	10	4	4	2,98	61	15	4	4	7,00	109	31	6	6
1,75	46	10	4	4	2,99	61	15	4	4	7,50	109	31	6	6
1,80	46	10	4	4	3,00	61	15	4	4	8,00	117	33	6	6
1,85	46	10	4	4	3,01	65	16	4	4	8,50	117	33	6	6
1,90	46	11	4	4	3,02	65	16	4	4	9,00	125	36	6	6
1,95	46	11	4	4	3,03	65	16	4	4	9,50	125	36	6	6
1,97	49	11	4	4	3,06	65	16	4	4	10,00	133	38	6	6
1,98	49	11	4	4	3,10	65	16	4	4	10,50	133	38	6	*
1,99	49	11	4	4	3,15	65	16	4	4	11,00	142	41	6	*
2,00	49	11	4	4	3,20	65	16	4	4	11,50	142	41	6	*
2,01	49	11	4	4	3,25	65	16	4	4	12,00	151	44	6	*
2,02	49	11	4	4	3,30	65	16	4	4	12,50	151	44	6	*
2,03	49	11	4	4	3,35	70	18	4	4	13,00	151	44	6	*
2,06	49	11	4	4	3,40	70	18	4	4	13,50	160	47	8	*
2,10	49	11	4	4	3,45	70	18	4	4	14,00	160	47	8	*
2,15	49	11	4	4	3,50	70	18	4	4	14,50	162	50	8	*
2,20	53	12	4	4	3,55	70	18	4	4	15,00	162	50	8	*
2,25	53	12	4	4	3,60	70	18	4	4	15,50	170	52	8	*
					3,65	70	18	4	4	16,00	170	52	8	*



Alesatori Speciali

Una grande peculiarità della nostra azienda sono gli alesatori con diametri nominali speciali in metallo duro integrale.

Possiamo infatti fornire alesatori per ogni tipologia di utilizzo, anche rivestiti, con tolleranze certificate di 0.003 mm.

Da 4 a 8 denti irregolari, elica destra e taglio destro, elica sinistra e taglio destro oppure elica diritta e taglio destro.

Non esitate a contattare il nostro ufficio tecnico che potrà aiutarvi a trovare la soluzione ideale alla vostra tipologia di applicazione e a ottenere risultati di altissima qualità.



Special Reamers

A big peculiarity of our company is represented by tungsten carbide reamers with special nominal diameters.

We can supply you reamers suitable for any kind of applications, also coated ones, with certified tolerances of 0.003 mm.

Furthermore we can produce reamers with irregular teeth $Z=4-8$, with right helix and right cutting, links helix and right cutting or with straight helix and right cutting.

Therefore please do not hesitate to contact our technical office where you can find the ideal solution for your application and at the same time you can get high quality and favourable results.







Frese elicoidali, 3-4 taglienti
Fraises hélicoïdaux, 3-4 dents
3-4 Schneiden-Fräser
Twist end-mills, 3-4 flutes

MS 131 XL/XLS

MS 141 XL/XLS



SWISS MADE

精密超硬エンドミル、3枚刃
螺旋立铣刀，3刃，中心切割

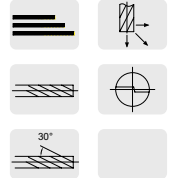
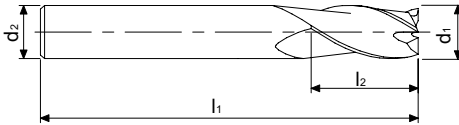
MS 131
XL/XLS

SMG
10

3
Z

**DIN
6528**

XL-XLS=
TUSA NORM



Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 応用範囲 / 应用

HRC < 48

Inox
Stainless

GG(G) / ghisa
Ft / cast iron

Titanio
Titan

ALU

[illegible]

Disponibili su richiesta*

Min. 5 pz

DIN 1835B su richiesta

Disponible sur demande*

Au moins 5 pièces

DIN 1835B sur demande

Available on request*

Minimum qty 5 pcs

DIN 1835B on request

Verfügbar auf Anfrage*

Mindestmenge 5 Stk

DIN 1835B auf Anfrage





Frese 2 taglienti
Fraises 2 dents
2 Schneiden-Fräser
End-mills with 2 flutes

MS 122 XL/XLS

MS 123 XL/XLS

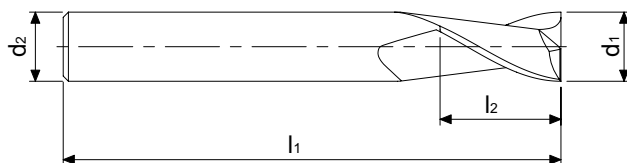
MS 124 per alluminio
for aluminium



SWISS MADE

End-mills with 2 flutes

螺旋立铣刀，2刃，中心切割



Campo d'impiego / Champ d'application / Einsatzbereich / Application field / 应用範圍 / 应用

ALU

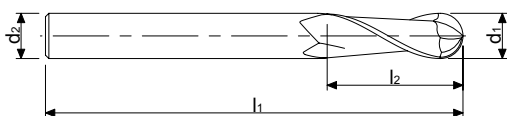
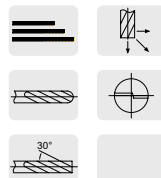
[illegible]

DIN 1835B auf Anfrage

超硬精密ボールエンドミル、2枚刃
球頭螺旋立铣刀、2刃

SMG
10

DIN 6528
XL-XLS=
TUSA NORM



HRC < 48

Inox
Stainless

GG(G) / ghisal
Ft / cast iron

Titanio
Titan

ALU

[illegible]

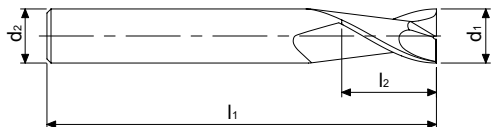
DIN 1835B su richiesta

DIN 1835B sur demande

DIN 1835B on request

DIN 1835B auf Anfrage

高性能精密超硬エンドミル、2枚刃、センターカット
高性能螺旋立铣刀、2刃、中心切割

SMG
10
$$Z_2$$
TUSA
NORM

0.05 - 0.1 x 45°



HSC

ALU

PLASTIC

CU
Rame/Copper

d ₁	h ₁₁	d ₂	h ₆	l ₁	l ₂
2,00		2,00		40	10
3,00		3,00		40	12
4,00		4,00		40	12
5,00		5,00		50	12
6,00		6,00		60	18
7,00		7,00		60	18
8,00		8,00		60	18
9,00		9,00		70	22
10,00		10,00		70	22
12,00		12,00		70	22
14,00		14,00		80	25
16,00		16,00		80	25
18,00		18,00		100	30
20,00		20,00		100	35

Verfügbar auf Anfrage*
Mindestmenge 5 Stk

Frese speciali

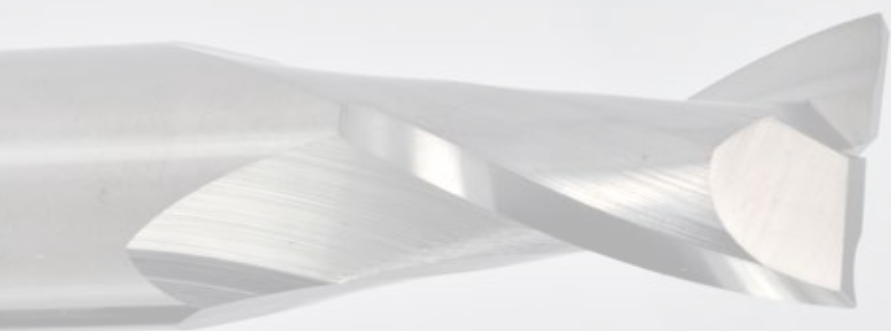
L'azienda TUSA PRECISION TOOLS propone e realizza un'ampia gamma di frese con caratteristiche specifiche per ogni esigenza produttiva, frutto di una vasta esperienza maturata negli anni e del continuo contatto con la clientela. Vi offriamo utensili performanti a prezzi competitivi, costruiti con metallo duro di prima scelta, ad elica destra, sinistra oppure dritta con profili più o meno complessi e dove necessario anche la possibilità di rivestire gli utensili. Il nostro ufficio tecnico sarà sicuramente in grado di trovare la soluzione ideale alla vostra tipologia di lavorazione, non esitate a contattarci.

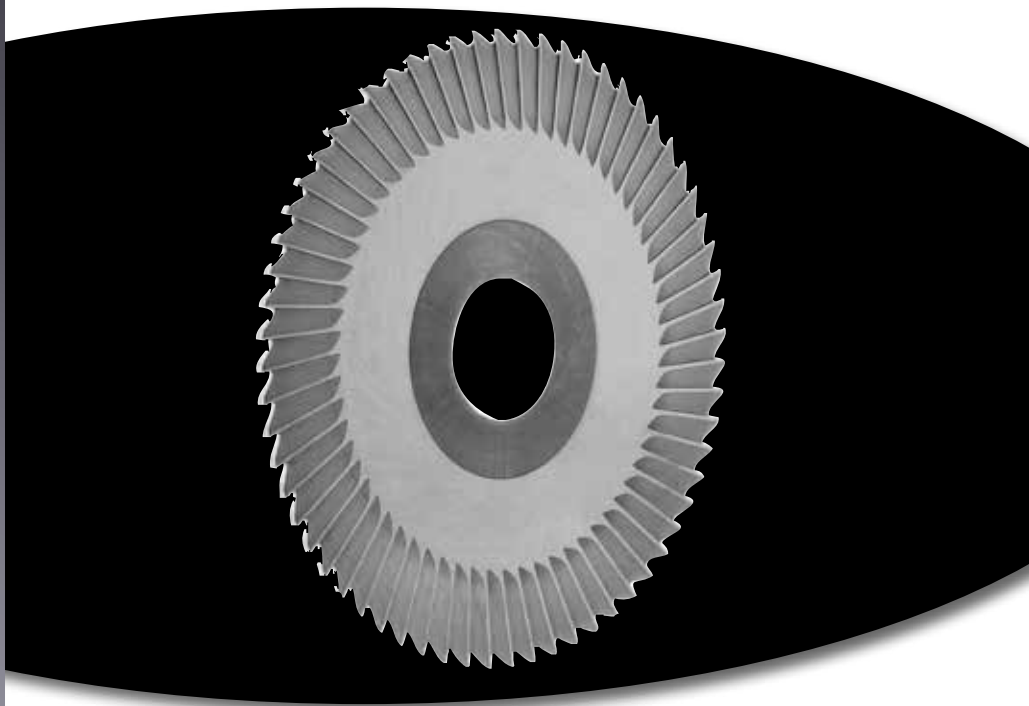
Special end mills

The company TUSA PRECISION TOOLS produces a wide range of endmills which have specific features Suitable for every kind of productive needs – our endmills are the result of a deep experience reached thank you to the continous mutual exchange with our customers. We produce high-performing tools at competitive prices, using carbide material of high-quality – the endmills can have right, link or straight helix – more or less complex profile and eventual coating.

Don't hesitate to contact us ! Our technical department will surely be able to find the ideal solution for your applications.







Seghe circolari in metallo duro
a dentatura fine e a dentatura grossa

*Fraises scie carbure
à denture fine et à denture grossière*

Hartmetall Kreissägeblätter - feine
Verzahnung und grosse Verzahnung

*Carbide slitting saws
with fine teeth and large teeth*



SWISS MADE



Frese circolari a profilo in metallo duro

Carbide form circular cutters

Le frese circolari profilate sono prodotte dal diametro 5 mm al diametro 160 mm. Siamo in grado di realizzare frese a profilo costante con spoglia logaritmica - indifferentemente con denti dritti e con denti elicoidali.

La spoglia logaritmica garantisce fedeltà al profilo e all'angolo di taglio anche dopo diverse riaffilature, riducendo i costi di utilizzo.

In base al materiale da lavorare e alle condizioni di utilizzo realizziamo specifiche costruzioni con vari tipi di dentatura (fine, grossa, extrafine, elicoidale ed alternata).

Inoltre per particolari impieghi le frese possono essere fornite con sede linguetta o fori di trascinamento.

Per tutte le frese, se l'impiego lo necessita, è possibile applicare il rivestimento più adatto.



Form circular cutters are produced from dia. 5.00 mm to dia. 160.00 mm.

Our production dept. can produce constant profile cutters with logarithmic relief grinding, with straight as well as with spiral toothing.

Logarithmic relief grinding guarantees faithfulness to profile and cutting angle, even after several re-sharpening operations. In this way labour costs are reduced.

Depending on working material and conditions of use, we can also produce specific tools with many different toothing types (fine, large, extrafine, spiral and alternate).

Furthermore, in case of particular applications, cutters can be provided with keyway or dragging holes.

For all cutters, it is possible to choose among a wide variety of coating types, according to the kind of application desired.



Significato dei simboli

Signification des symboles

Symbole

Icons

マークの見方

符号



Metallo duro micrograna
Carbure micro-grain
Feinkorn Hartmetall
Micro grain Carbide
超微粒子超硬合金
超微粒硬质合金



Norme TUSA
Normes TUSA
TUSA-Normung
TUSA norm
TUSA規格品
TUSA 标准



Geometria della testa
Géométrie de la tête
Kopfgeometrie
Head geometry
刃先形状
刀头几何形状



Lunghezza della serie
Longueur de série
Baulänge
Series length
長さ
系列长度



N° denti
N° dents
Zähnezahl
N° of teeth
刃先枚数
N° 刀刃数



Senso di lavorazione possibile
Sens d'usinage possible
Mögliche Bearbeitungsrichtung
Machining direction possibility
加工方向
可机械加工的方向



Angolo di punta
Angle de pointe
Spitzenwinkel
Point angle
先端角度
顶角



Taglio destro
Coupe à droite
Rechtsschneidend
Right hand cutting
右刃
右旋



Tagliente al centro
Coupe au centre
Zentrumschnitt
Center cutting
センターカットタイプ
中心切削



Angolo dell'elica
Angle d'hélice
Spiralwinkel
Flute angle
ねじれ角
刃角



Microspunta
Micro-foret
Mikrobohrer
Micro drill
マイクロドリル
微钻头



Gambo cilindrico
Queue cylindrique
Zylindrisches Schaft
Cylindrical shank
筒形状シャンク
圆柱型加强柄



Norme DIN
Normes DIN
DIN-Normung
DIN Norm
DIN規格品
德国工业标准 DIN



Profondità di foratura
Profondeur de perçage
Bohrungstiefe
Depth of drilling
加工深さ
钻削深度



Alta velocità (HSC)
Haute vitesse (UGV)
Hochgeschwindigkeit (HSC)
High speed cutting (HSC)
高速加工速度用
高速切削

Condizioni generali di vendita:

Per ogni ordine ricevuto sono valide esclusivamente le condizioni sottostanti. Condizioni diverse devono essere concordate e firmate da ambo le parti.

- In mancanza di accordi specifici, in riferimento alla clausola Incoterms 2010, tutti i prezzi sono da ritenersi: IVA esclusa, imballo escluso, costi di trasporto esclusi, tasse doganali ed altre eventuali escluse.
- In mancanza di accordi specifici, in riferimento alla clausola Incoterms 2010, per i termini di consegna fa fede esclusivamente la conferma d'ordine, e qualora la data di consegna dovesse subire ritardo, la mancata evasione dell'ordine nei termini stabiliti non dà comunque nessun diritto all'annullamento dell'ordine o ad eventuali risarcimenti danni.
- Relativamente agli utensili speciali ci riserviamo il diritto di consegnare +/-10% rispetto alla quantità ordinata; la fatturazione comunque si basa sulla quantità effettivamente consegnata e sul prezzo del singolo pezzo come stabilito in fase di conferma d'ordine.
- Salvo accordi diversi l'imballo e il trasporto sono a carico e rischio del cliente.
- Se non vengono concordati termini diversi il pagamento deve avvenire a 30 giorni data fattura.
- Modifiche costruttive su articoli già realizzati in precedenza possono comportare costi aggiuntivi e in ogni caso devono pervenire per iscritto prima della realizzazione degli utensili. In caso contrario verrà utilizzato l'ultimo disegno fornito.
- I reclami devono pervenire per iscritto entro 10 giorni dalla consegna della merce. La sostituzione o il rimborso di pezzi difettosi sarà decisione del produttore solo dopo aver visionato il difetto. Tutta la merce non conforme dovrà essere restituita a Tusa Precision Tools SA, non verranno presi in considerazione reclami senza la merce in restituzione.
- Per ogni controversia è applicabile esclusivamente il codice delle obbligazioni svizzero ed il foro competente è in via esclusiva quella di Tusa Precision Tools SA.

General Sales Conditions:

We provide our deliveries and services exclusively in accordance with the following General Sales Conditions. Different conditions shall be agreed and subscribed by both parties.

- Unless specified or agreed, with reference to Incoterms 2010 clause, all prices shall be considered EXCLUDED from: VAT, packaging, freight costs, customs costs and other eventual costs.
- Unless specified or agreed, with reference to Incoterms 2010 clause, only terms and conditions expressly indicated in the order confirmation shall be considered valid; by the way delays in delivery of the goods do not grant in any case the right to cancel an order or to ask for a refund.
- For internal processing reasons, delivered quantities of special items can vary by max. +/- 10%. Invoicing is based upon the effectively delivered quantity and price respects the conditions stated in the order confirmation.
- Forwarding costs and packaging are chargeable to the customer and at his own risk.
- If not differently and expressly agreed, standard payment term is 30 days net.
- The request of modifications on already produced articles might affect price by involving higher/additional costs. Those requests shall be forwarded in written form and promptly. Otherwise production shall be based on the last supplied drawing.
- Complaints shall be forwarded within 10 days after receiving the goods. Replacement or refunds of defective articles shall be exclusively up to the supplier after checking the goods. All defective items shall be returned to Tusa Precision Tools SA. Otherwise complaints shall not be taken into consideration; anyhow before returning the goods the customer shall inform Tusa Precision Tools SA about it in written form.
- The court of Tusa Precision Tools SA shall have exclusive jurisdiction over any disputes relating to the terms and conditions mentioned above and only the Swiss Law shall be applied to any controversies.



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