



# HARTNER

Precision Cutting Tools

## TS-DRILLS

CARBIDE SPECIAL PROGRAMME





# HARTNER

## TS-Drills, Solid carbide high performance drills

Standard	Type	Tool material	Surface finish	Cutting direction	Coolant	Shank form	Drilling depth	Diameter range	Article no.	Page
	DIN 6537K TS 100 U	Sol. carb.	F	rh		HA	3 x D	3,00 - 20,00	89413	3
	DIN 6537K TS 100 U	Sol. carb.	F	rh		HE	3 x D	3,00 - 20,00	89402	3
	DIN 6537L TS 100 U	Sol. carb.	F	rh		HA	5 x D	3,00 - 20,00	89414	3
	DIN 6537L TS 100 U	Sol. carb.	F	rh		HE	5 x D	3,00 - 20,00	89417	3
	DIN 6537K TS 100 U	Sol. carb.	F	rh	■	HA	3 x D	3,00 - 20,00	89410	11
	DIN 6537K TS 100 U	Sol. carb.	F	rh	■	HE	3 x D	3,00 - 20,00	89415	11
	DIN 6537L TS 100 U	Sol. carb.	F	rh	■	HA	5 x D	3,00 - 20,00	89411	11
	DIN 6537L TS 100 U	Sol. carb.	F	rh	■	HE	5 x D	3,00 - 20,00	89408	11
	Hartner std. TS 100 U	Sol. carb.	F	rh	■	HA	7 x D	3,00 - 20,00	89412	18
	Hartner std. TS 100 U	Sol. carb.	F	rh	■	HE	7 x D	3,00 - 20,00	89416	18
	Hartner std. TS 150 GG	Sol. carb.	○	rh	■	HA	10 x D	3,00 - 16,00	89293	21
	Hartner std. TS 100 U	Sol. carb.	F	rh	■	HA	12 x D	3,00 - 20,00	89418	23
	DIN 6537L TS 3 G	Sol. carb.	○	rh		HA	5 x D	3,00 - 20,00	89247	26
	DIN 6539 N	Sol. carb.	○	rh		DZ	3 x D	2,00 - 12,00	89235	29
	DIN 6539 N	Sol. carb.	F	rh		DZ	3 x D	1,00 - 16,00	89253	29
	Hartner std. N	Sol. carb.	○	rh		DZ	5 x D	2,00 - 12,00	89244	29
	Hartner std. N	Sol. carb.	F	rh		DZ	5 x D	1,00 - 12,00	89261	29

Application recommendations see page 34

○ bright      F FIRE      ■ with internal coolant



## TS-Drills without oil feed

### 3 x D

### Article no. 89413



High-performance drill for the drilling of long and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable steels and alloyed steels with a tensile strength of up to 1200 N/mm<sup>2</sup>, including carbon steels, cast iron and high-alloyed AlSi-alloys. For drilling depths up to 3 x D.

**Advantages:**

Highest speed and feed rates (see application recommendations page 40) possible, high

alignment accuracy with small diameter tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to straight cutting point geometry with special point grind and web thinning.

**Preconditions for use:**  
Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds. The tool is available without whistle notch flat for application in shrink fit or hydraulic chucks.

Standard	DIN 6537K
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HA
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7

### 3 x D

### Article no. 89402



High-performance drill for the drilling of long and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable steels and alloyed steels with a tensile strength of up to 1200 N/mm<sup>2</sup>, including carbon steels, cast iron and high-alloyed AlSi-alloys. For drilling depths up to 3 x D.

**Advantages:**

Highest speed and feed rates (see application recommendations page 40) possible, high

alignment accuracy with small diameter tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to a straight cutting point geometry with special point grind and web thinning.

**Preconditions for use:**

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds.

Standard	DIN 6537K
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HE
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7

### 5 x D

### Article no. 89414



High-performance drill for the drilling of long- and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable steels and alloyed steels with a tensile strength of up to 1200 N/mm<sup>2</sup>, including carbon steels, cast iron and high-alloyed AlSi-alloys. For drilling depths up to 5 x D.

**Advantages:**

Highest speed and feed rates (see application recommendations page 40) possible, high

alignment accuracy with tight tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to a straight cutting point geometry with special point grind and web thinning.

**Preconditions for use:**

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds. The The tool is available without whistle notch flat for application in shrink fit/hydraulic chucks.

Standard	DIN 6537L
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HA
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7

### 5 x D

### Article no. 89417



High-performance drill for the drilling of long- and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable steels and alloyed steels with a tensile strength of up to 1200 N/mm<sup>2</sup>, including carbon steels, cast iron and high-alloyed AlSi-alloys. For drilling depths up to 5 x D.

**Advantages:**

Highest speed and feed rates (see application recommendations page 40) possible, high

alignment accuracy with tight tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to a straight cutting point geometry with special point grind and web thinning.

**Preconditions for use:**

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds.

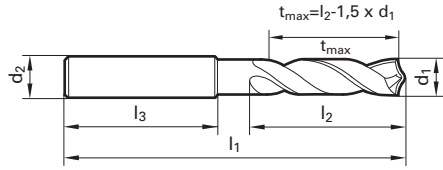
Standard	DIN 6537L
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HE
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7

○ bright

● F FIRE



## TS-Drills without oil feed, 3 x D



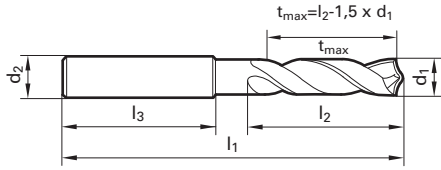
d1		d2	l1	l2	l3	89413	89402
mm	inch	mm	mm	mm	mm	Solid carbide	
3.000		6.000	62.00	20.00	36.00	155	155
3.100		6.000	62.00	20.00	36.00	HA	HE
3.170	1/8	6.000	62.00	20.00	36.00	TS 100 U	TS 100 U
3.200		6.000	62.00	20.00	36.00	Ⓡ	Ⓡ
3.250		6.000	62.00	20.00	36.00	●	●
3.300		6.000	62.00	20.00	36.00	●	●
3.400		6.000	62.00	20.00	36.00	●	●
3.500		6.000	62.00	20.00	36.00	●	●
3.570	9/64	6.000	62.00	20.00	36.00	●	●
3.600		6.000	62.00	20.00	36.00	●	●
3.700		6.000	62.00	20.00	36.00	●	●
3.800		6.000	66.00	24.00	36.00	●	●
3.900		6.000	66.00	24.00	36.00	●	●
3.970	5/32	6.000	66.00	24.00	36.00	●	●
4.000		6.000	66.00	24.00	36.00	●	●
4.100		6.000	66.00	24.00	36.00	●	●
4.200		6.000	66.00	24.00	36.00	●	●
4.300		6.000	66.00	24.00	36.00	●	●
4.370	11/64	6.000	66.00	24.00	36.00	●	●
4.400		6.000	66.00	24.00	36.00	●	●
4.500		6.000	66.00	24.00	36.00	●	●
4.600		6.000	66.00	24.00	36.00	●	●
4.650		6.000	66.00	24.00	36.00	●	●
4.700		6.000	66.00	24.00	36.00	●	●
4.760	3/16	6.000	66.00	28.00	36.00	●	●
4.800		6.000	66.00	28.00	36.00	●	●
4.900		6.000	66.00	28.00	36.00	●	●
5.000		6.000	66.00	28.00	36.00	●	●
5.100		6.000	66.00	28.00	36.00	●	●
5.160	13/64	6.000	66.00	28.00	36.00	●	●
5.200		6.000	66.00	28.00	36.00	●	●
5.300		6.000	66.00	28.00	36.00	●	●
5.400		6.000	66.00	28.00	36.00	●	●
5.500		6.000	66.00	28.00	36.00	●	●
5.550		6.000	66.00	28.00	36.00	●	●
5.560	7/32	6.000	66.00	28.00	36.00	●	●
5.600		6.000	66.00	28.00	36.00	●	●
5.700		6.000	66.00	28.00	36.00	●	●
5.800		6.000	66.00	28.00	36.00	●	●
5.900		6.000	66.00	28.00	36.00	●	●
5.950	15/64	6.000	66.00	28.00	36.00	●	●
6.000		6.000	66.00	28.00	36.00	●	●
6.100		8.000	79.00	34.00	36.00	●	●
6.200		8.000	79.00	34.00	36.00	●	●
6.300		8.000	79.00	34.00	36.00	●	●
6.350	1/4	8.000	79.00	34.00	36.00	●	●
6.400		8.000	79.00	34.00	36.00	●	●
6.500		8.000	79.00	34.00	36.00	●	●
6.600		8.000	79.00	34.00	36.00	●	●
6.700		8.000	79.00	34.00	36.00	●	●
6.750	17/64	8.000	79.00	34.00	36.00	●	●
6.800		8.000	79.00	34.00	36.00	●	●
6.900		8.000	79.00	34.00	36.00	●	●
7.000		8.000	79.00	34.00	36.00	●	●

○ bright

Ⓡ FIRE



## TS-Drills without oil feed, 3 x D



						89413	89402
						Solid carbide	
						155	155
						HA	HE
						TS 100 U	TS 100 U
						F	F
						Availability	
d1	d2	l1	l2	l3			
mm	inch	mm	mm	mm			
7.100		8.000	79.00	41.00	●	●	
7.140	9/32	8.000	79.00	41.00	●	●	
7.200		8.000	79.00	41.00	●	●	
7.300		8.000	79.00	41.00	●	●	
7.400		8.000	79.00	41.00	●	●	
7.500		8.000	79.00	41.00	●	●	
7.540	19/64	8.000	79.00	41.00	●	●	
7.600		8.000	79.00	41.00	●	●	
7.700		8.000	79.00	41.00	●	●	
7.800		8.000	79.00	41.00	●	●	
7.900		8.000	79.00	41.00	●	●	
7.940	5/16	8.000	79.00	41.00	●	●	
8.000		8.000	79.00	41.00	●	●	
8.100		10.000	89.00	47.00	●	●	
8.200		10.000	89.00	47.00	●	●	
8.300		10.000	89.00	47.00	●	●	
8.330	21/64	10.000	89.00	47.00	●	●	
8.400		10.000	89.00	47.00	●	●	
8.500		10.000	89.00	47.00	●	●	
8.600		10.000	89.00	47.00	●	●	
8.700		10.000	89.00	47.00	●	●	
8.730	11/32	10.000	89.00	47.00	●	●	
8.800		10.000	89.00	47.00	●	●	
8.900		10.000	89.00	47.00	●	●	
9.000		10.000	89.00	47.00	●	●	
9.100		10.000	89.00	47.00	●	●	
9.130	23/64	10.000	89.00	47.00	●	●	
9.200		10.000	89.00	47.00	●	●	
9.250		10.000	89.00	47.00	●	●	
9.300		10.000	89.00	47.00	●	●	
9.400		10.000	89.00	47.00	●	●	
9.500		10.000	89.00	47.00	●	●	
9.520	3/8	10.000	89.00	47.00	●	●	
9.600		10.000	89.00	47.00	●	●	
9.700		10.000	89.00	47.00	●	●	
9.800		10.000	89.00	47.00	●	●	
9.900		10.000	89.00	47.00	●	●	
9.920	25/64	10.000	89.00	47.00	●	●	
10.000		10.000	89.00	47.00	●	●	
10.100		12.000	102.00	55.00	●	●	
10.200		12.000	102.00	55.00	●	●	
10.300		12.000	102.00	55.00	●	●	
10.320	13/32	12.000	102.00	55.00	●	●	
10.400		12.000	102.00	55.00	●	●	
10.500		12.000	102.00	55.00	●	●	
10.600		12.000	102.00	55.00	●	●	
10.700		12.000	102.00	55.00	●	●	
10.800		12.000	102.00	55.00	●	●	
10.900		12.000	102.00	55.00	●	●	
11.000		12.000	102.00	55.00	●	●	
11.100		12.000	102.00	55.00	●	●	
11.110	7/16	12.000	102.00	55.00	●	●	
11.200		12.000	102.00	55.00	●	●	
11.300		12.000	102.00	55.00	●	●	

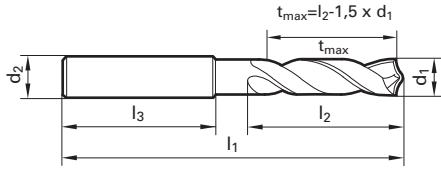
○ bright

● FIRE



# HARTNER

## TS-Drills without oil feed, 3 x D



d1		d2	l1	l2	l3	89413	89402
mm	inch	mm	mm	mm	mm	Solid carbide	
						155	155
						HA	HE
						TS 100 U	TS 100 U
						<b>F</b>	<b>F</b>
						Availability	
11.400		12.000	102.00	55.00	45.00	●	●
11.500		12.000	102.00	55.00	45.00	●	●
11.600		12.000	102.00	55.00	45.00	●	●
11.700		12.000	102.00	55.00	45.00	●	●
11.800		12.000	102.00	55.00	45.00	●	●
11.900		12.000	102.00	55.00	45.00	●	●
11.910	15/32	12.000	102.00	55.00	45.00	●	●
12.000		12.000	102.00	55.00	45.00	●	●
12.200		14.000	107.00	60.00	45.00	●	●
12.500		14.000	107.00	60.00	45.00	●	●
12.700	1/2	14.000	107.00	60.00	45.00	●	●
13.000		14.000	107.00	60.00	45.00	●	●
13.500		14.000	107.00	60.00	45.00	●	●
13.700		14.000	107.00	60.00	45.00	●	●
14.000		14.000	107.00	60.00	45.00	●	●
14.200		16.000	115.00	65.00	48.00	●	●
14.290	9/16	16.000	115.00	65.00	48.00	●	●
14.500		16.000	115.00	65.00	48.00	●	●
14.700		16.000	115.00	65.00	48.00	●	●
15.000		16.000	115.00	65.00	48.00	●	●
15.200		16.000	115.00	65.00	48.00	●	●
15.500		16.000	115.00	65.00	48.00	●	●
15.700		16.000	115.00	65.00	48.00	●	●
16.000		16.000	115.00	65.00	48.00	●	●
16.500		18.000	123.00	73.00	48.00	●	●
17.000		18.000	123.00	73.00	48.00	●	●
17.500		18.000	123.00	73.00	48.00	●	●
18.000		18.000	123.00	73.00	48.00	●	●
18.500		20.000	131.00	79.00	50.00	●	●
19.000		20.000	131.00	79.00	50.00	●	●
19.500		20.000	131.00	79.00	50.00	●	●
20.000		20.000	131.00	79.00	50.00	●	●

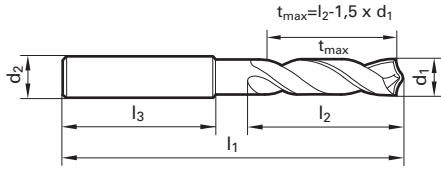
○ bright

**F** FIRE



# HARTNER

## TS-Drills without oil feed, 5 x D



d1		d2	l1	l2	l3	89414	89417
mm	inch	mm	mm	mm	mm	Solid carbide	
						155	155
						HA	HE
						TS 100 U	TS 100 U
						F	F
						Availability	
3.000		6.000	66.00	28.00	36.00	●	●
3.100		6.000	66.00	28.00	36.00	●	●
3.170	1/8	6.000	66.00	28.00	36.00	●	●
3.200		6.000	66.00	28.00	36.00	●	●
3.250		6.000	66.00	28.00	36.00	●	●
3.300		6.000	66.00	28.00	36.00	●	●
3.400		6.000	66.00	28.00	36.00	●	●
3.500		6.000	66.00	28.00	36.00	●	●
3.570	9/64	6.000	66.00	28.00	36.00	●	●
3.600		6.000	66.00	28.00	36.00	●	●
3.700		6.000	66.00	28.00	36.00	●	●
3.800		6.000	74.00	36.00	36.00	●	●
3.900		6.000	74.00	36.00	36.00	●	●
3.970	5/32	6.000	74.00	36.00	36.00	●	●
4.000		6.000	74.00	36.00	36.00	●	●
4.100		6.000	74.00	36.00	36.00	●	●
4.200		6.000	74.00	36.00	36.00	●	●
4.300		6.000	74.00	36.00	36.00	●	●
4.370	11/64	6.000	74.00	36.00	36.00	●	●
4.400		6.000	74.00	36.00	36.00	●	●
4.500		6.000	74.00	36.00	36.00	●	●
4.600		6.000	74.00	36.00	36.00	●	●
4.650		6.000	74.00	36.00	36.00	●	●
4.700		6.000	74.00	36.00	36.00	●	●
4.760	3/16	6.000	82.00	44.00	36.00	●	●
4.800		6.000	82.00	44.00	36.00	●	●
4.900		6.000	82.00	44.00	36.00	●	●
5.000		6.000	82.00	44.00	36.00	●	●
5.100		6.000	82.00	44.00	36.00	●	●
5.160	13/64	6.000	82.00	44.00	36.00	●	●
5.200		6.000	82.00	44.00	36.00	●	●
5.300		6.000	82.00	44.00	36.00	●	●
5.400		6.000	82.00	44.00	36.00	●	●
5.500		6.000	82.00	44.00	36.00	●	●
5.550		6.000	82.00	44.00	36.00	●	●
5.560	7/32	6.000	82.00	44.00	36.00	●	●
5.600		6.000	82.00	44.00	36.00	●	●
5.700		6.000	82.00	44.00	36.00	●	●
5.800		6.000	82.00	44.00	36.00	●	●
5.900		6.000	82.00	44.00	36.00	●	●
5.950	15/64	6.000	82.00	44.00	36.00	●	●
6.000		6.000	82.00	44.00	36.00	●	●
6.100		8.000	91.00	53.00	36.00	●	●
6.200		8.000	91.00	53.00	36.00	●	●
6.300		8.000	91.00	53.00	36.00	●	●
6.350	1/4	8.000	91.00	53.00	36.00	●	●
6.400		8.000	91.00	53.00	36.00	●	●
6.500		8.000	91.00	53.00	36.00	●	●
6.600		8.000	91.00	53.00	36.00	●	●
6.700		8.000	91.00	53.00	36.00	●	●
6.750	17/64	8.000	91.00	53.00	36.00	●	●
6.800		8.000	91.00	53.00	36.00	●	●
6.900		8.000	91.00	53.00	36.00	●	●
7.000		8.000	91.00	53.00	36.00	●	●

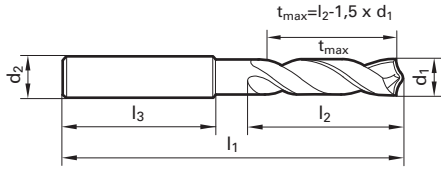
○ bright

● FIRE



# HARTNER

## TS-Drills without oil feed, 5 x D



d1		d2	l1	l2	l3	89414	89417
mm	inch	mm	mm	mm	mm	Solid carbide	
						155 HA TS 100 U F	155 HE TS 100 U F
						Availability	
7.100		8.000	91.00	53.00	36.00	●	●
7.140	9/32	8.000	91.00	53.00	36.00	●	●
7.200		8.000	91.00	53.00	36.00	●	●
7.300		8.000	91.00	53.00	36.00	●	●
7.400		8.000	91.00	53.00	36.00	●	●
7.500		8.000	91.00	53.00	36.00	●	●
7.540	19/64	8.000	91.00	53.00	36.00	●	●
7.600		8.000	91.00	53.00	36.00	●	●
7.700		8.000	91.00	53.00	36.00	●	●
7.800		8.000	91.00	53.00	36.00	●	●
7.900		8.000	91.00	53.00	36.00	●	●
7.940	5/16	8.000	91.00	53.00	36.00	●	●
8.000		8.000	91.00	53.00	36.00	●	●
8.100		10.000	103.00	61.00	40.00	●	●
8.200		10.000	103.00	61.00	40.00	●	●
8.300		10.000	103.00	61.00	40.00	●	●
8.330	21/64	10.000	103.00	61.00	40.00	●	●
8.400		10.000	103.00	61.00	40.00	●	●
8.500		10.000	103.00	61.00	40.00	●	●
8.600		10.000	103.00	61.00	40.00	●	●
8.700		10.000	103.00	61.00	40.00	●	●
8.730	11/32	10.000	103.00	61.00	40.00	●	●
8.800		10.000	103.00	61.00	40.00	●	●
8.900		10.000	103.00	61.00	40.00	●	●
9.000		10.000	103.00	61.00	40.00	●	●
9.100		10.000	103.00	61.00	40.00	●	●
9.130	23/64	10.000	103.00	61.00	40.00	●	●
9.200		10.000	103.00	61.00	40.00	●	●
9.250		10.000	103.00	61.00	40.00	●	●
9.300		10.000	103.00	61.00	40.00	●	●
9.400		10.000	103.00	61.00	40.00	●	●
9.500		10.000	103.00	61.00	40.00	●	●
9.520	3/8	10.000	103.00	61.00	40.00	●	●
9.600		10.000	103.00	61.00	40.00	●	●
9.700		10.000	103.00	61.00	40.00	●	●
9.800		10.000	103.00	61.00	40.00	●	●
9.900		10.000	103.00	61.00	40.00	●	●
9.920	25/64	10.000	103.00	61.00	40.00	●	●
10.000		10.000	103.00	61.00	40.00	●	●
10.100		12.000	118.00	71.00	45.00	●	●
10.200		12.000	118.00	71.00	45.00	●	●
10.300		12.000	118.00	71.00	45.00	●	●
10.320	13/32	12.000	118.00	71.00	45.00	●	●
10.400		12.000	118.00	71.00	45.00	●	●
10.500		12.000	118.00	71.00	45.00	●	●
10.600		12.000	118.00	71.00	45.00	●	●
10.700		12.000	118.00	71.00	45.00	●	●
10.800		12.000	118.00	71.00	45.00	●	●
10.900		12.000	118.00	71.00	45.00	●	●
11.000		12.000	118.00	71.00	45.00	●	●
11.100		12.000	118.00	71.00	45.00	●	●
11.110	7/16	12.000	118.00	71.00	45.00	●	●
11.200		12.000	118.00	71.00	45.00	●	●
11.300		12.000	118.00	71.00	45.00	●	●

○ bright

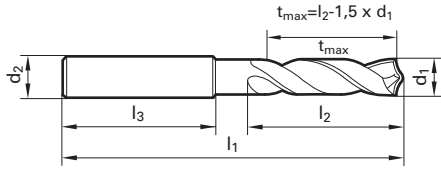
● FIRE





# HARTNER

## TS-Drills without oil feed, 5 x D



d1		d2	l1	l2	l3	89414	89417
mm	inch	mm	mm	mm	mm	Solid carbide	
						155	155
						HA	HE
						TS 100 U	TS 100 U
						Ⓡ	Ⓡ
						Availability	
11.400		12.000	118.00	71.00	45.00	●	●
11.500		12.000	118.00	71.00	45.00	●	●
11.600		12.000	118.00	71.00	45.00	●	●
11.700		12.000	118.00	71.00	45.00	●	●
11.800		12.000	118.00	71.00	45.00	●	●
11.900		12.000	118.00	71.00	45.00	●	●
11.910	15/32	12.000	118.00	71.00	45.00	●	●
12.000		12.000	118.00	71.00	45.00	●	●
12.200		14.000	124.00	77.00	45.00	●	●
12.500		14.000	124.00	77.00	45.00	●	●
12.700	1/2	14.000	124.00	77.00	45.00	●	●
13.000		14.000	124.00	77.00	45.00	●	●
13.500		14.000	124.00	77.00	45.00	●	●
13.700		14.000	124.00	77.00	45.00	●	●
14.000		14.000	124.00	77.00	45.00	●	●
14.200		16.000	133.00	83.00	48.00	●	●
14.290	9/16	16.000	133.00	83.00	48.00	●	●
14.500		16.000	133.00	83.00	48.00	●	●
14.700		16.000	133.00	83.00	48.00	●	●
15.000		16.000	133.00	83.00	48.00	●	●
15.200		16.000	133.00	83.00	48.00	●	●
15.500		16.000	133.00	83.00	48.00	●	●
15.700		16.000	133.00	83.00	48.00	●	●
16.000		16.000	133.00	83.00	48.00	●	●
16.500		18.000	143.00	93.00	48.00	●	●
17.000		18.000	143.00	93.00	48.00	●	●
17.500		18.000	143.00	93.00	48.00	●	●
18.000		18.000	143.00	93.00	48.00	●	●
18.500		20.000	153.00	101.00	50.00	●	●
19.000		20.000	153.00	101.00	50.00	●	●
19.500	3/4	20.000	153.00	101.00	50.00	●	●
20.000		20.000	153.00	101.00	50.00	●	●

○ bright

Ⓡ FIRE



**HARTNER**

Precision Cutting Tools

## TM MULTI VENDING MACHINE

Intelligent tool management  
around the clock



# HARTNER

## TS-Drills with oil feed

### 3 x D



High-performance drill for the drilling of long and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable steels and alloyed steels with a tensile strength of up to 1200 N/mm<sup>2</sup>, including carbon steels, cast iron and high-alloyed AlSi-alloys.

For drilling depths up to 3 x D.

Advantages:

Highest speed and feed rates (see application recommendations page 40) possible, high

alignment accuracy with tight tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to a straight cutting point geometry with special point grind and web thinning.

Preconditions for use:

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds. The tool is available without whistle notch flat for application in shrink fit or hydraulic chucks.

### Article no. 89410

Standard	DIN 6537K
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HA
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7

### 3 x D



High-performance drill for the drilling of long and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable steels and alloyed steels with a tensile strength of up to 1200 N/mm<sup>2</sup>, including carbon steels, cast iron and high-alloyed AlSi-alloys.

For drilling depths up to 3 x D.

Advantages:

Highest speed and feed rates (see application recommendations page 40) possible, high

alignment accuracy with tight tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to a straight cutting point geometry with special point grind and web thinning.

Preconditions for use:

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds.

### Article no. 89415

Standard	DIN 6537K
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HE
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7

### 5 x D



High-performance drill for the drilling of long- and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable steels and alloyed steels with a tensile strength of up to 1200 N/mm<sup>2</sup>, including carbon steels, cast iron and high-alloyed AlSi-alloys. For drilling depths up to 5 x D.

Advantages:

Highest speed and feed rates (see application recommendations page 40) possible, high

alignment accuracy with tight tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to a straight cutting point geometry with special point grind and web thinning.

Preconditions for use:

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds. The tool is available without whistle notch flat for application in shrink fit/hydraulic chucks.

### Article no. 89411

Standard	DIN 6537L
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HA
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7

### 5 x D



High-performance drill for the drilling of long- and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable steels and alloyed steels with a tensile strength of up to 1200 N/mm<sup>2</sup>, including carbon steels, cast iron and high-alloyed AlSi-alloys. For drilling depths up to 5 x D.

Advantages:

Highest speed and feed rates (see application recommendations page 40) possible, high

alignment accuracy with tight tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to a straight cutting point geometry with special point grind and web thinning.

Preconditions for use:

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds.

### Article no. 89408

Standard	DIN 6537L
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HE
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7

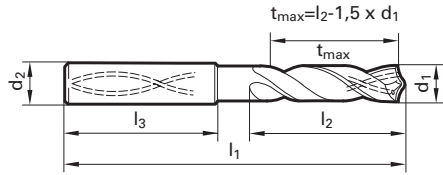
○ bright

● FIRE



# HARTNER

## TS-Drills with oil feed, 3 x D



d1		d2	l1	l2	l3	89410	89415
mm	inch	mm	mm	mm	mm	Solid carbide	
3.000		6.000	62.00	20.00	36.00	155	155
3.100		6.000	62.00	20.00	36.00	HA	HE
3.170	1/8	6.000	62.00	20.00	36.00	TS 100 U	TS 100 U
3.200		6.000	62.00	20.00	36.00	F	F
3.250		6.000	62.00	20.00	36.00		
3.300		6.000	62.00	20.00	36.00		
3.400		6.000	62.00	20.00	36.00		
3.500		6.000	62.00	20.00	36.00		
3.570	9/64	6.000	62.00	20.00	36.00		
3.600		6.000	62.00	20.00	36.00		
3.700		6.000	62.00	20.00	36.00		
3.800		6.000	66.00	24.00	36.00		
3.900		6.000	66.00	24.00	36.00		
3.970	5/32	6.000	66.00	24.00	36.00		
4.000		6.000	66.00	24.00	36.00		
4.100		6.000	66.00	24.00	36.00		
4.200		6.000	66.00	24.00	36.00		
4.300		6.000	66.00	24.00	36.00		
4.370	11/64	6.000	66.00	24.00	36.00		
4.400		6.000	66.00	24.00	36.00		
4.500		6.000	66.00	24.00	36.00		
4.600		6.000	66.00	24.00	36.00		
4.650		6.000	66.00	24.00	36.00		
4.700		6.000	66.00	24.00	36.00		
4.760	3/16	6.000	66.00	28.00	36.00		
4.800		6.000	66.00	28.00	36.00		
4.900		6.000	66.00	28.00	36.00		
5.000		6.000	66.00	28.00	36.00		
5.100		6.000	66.00	28.00	36.00		
5.160	13/64	6.000	66.00	28.00	36.00		
5.200		6.000	66.00	28.00	36.00		
5.300		6.000	66.00	28.00	36.00		
5.400		6.000	66.00	28.00	36.00		
5.500		6.000	66.00	28.00	36.00		
5.550		6.000	66.00	28.00	36.00		
5.560	7/32	6.000	66.00	28.00	36.00		
5.600		6.000	66.00	28.00	36.00		
5.700		6.000	66.00	28.00	36.00		
5.800		6.000	66.00	28.00	36.00		
5.900		6.000	66.00	28.00	36.00		
5.950	15/64	6.000	66.00	28.00	36.00		
6.000		6.000	66.00	28.00	36.00		
6.100		8.000	79.00	34.00	36.00		
6.200		8.000	79.00	34.00	36.00		
6.300		8.000	79.00	34.00	36.00		
6.350	1/4	8.000	79.00	34.00	36.00		
6.400		8.000	79.00	34.00	36.00		
6.500		8.000	79.00	34.00	36.00		
6.600		8.000	79.00	34.00	36.00		
6.700		8.000	79.00	34.00	36.00		
6.750	17/64	8.000	79.00	34.00	36.00		
6.800		8.000	79.00	34.00	36.00		
6.900		8.000	79.00	34.00	36.00		
7.000		8.000	79.00	34.00	36.00		

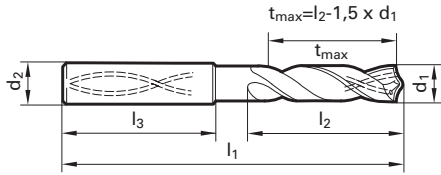
○ bright

● FIRE



# HARTNER

## TS-Drills with oil feed, 3 x D



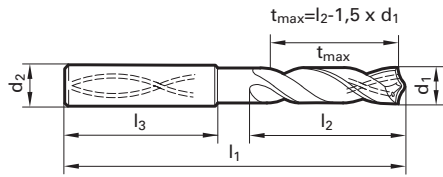
d1		d2	l1	l2	l3	89410	89415
mm	inch	mm	mm	mm	mm	Solid carbide	
						155	155
						HA	HE
						TS 100 U	TS 100 U
						F	F
						Availability	
7.100		8.000	79.00	41.00	36.00	●	●
7.140	9/32	8.000	79.00	41.00	36.00	●	●
7.200		8.000	79.00	41.00	36.00	●	●
7.300		8.000	79.00	41.00	36.00	●	●
7.400		8.000	79.00	41.00	36.00	●	●
7.500		8.000	79.00	41.00	36.00	●	●
7.540	19/64	8.000	79.00	41.00	36.00	●	●
7.600		8.000	79.00	41.00	36.00	●	●
7.700		8.000	79.00	41.00	36.00	●	●
7.800		8.000	79.00	41.00	36.00	●	●
7.900		8.000	79.00	41.00	36.00	●	●
7.940	5/16	8.000	79.00	41.00	36.00	●	●
8.000		8.000	79.00	41.00	36.00	●	●
8.100		10.000	89.00	47.00	40.00	●	●
8.200		10.000	89.00	47.00	40.00	●	●
8.300		10.000	89.00	47.00	40.00	●	●
8.330	21/64	10.000	89.00	47.00	40.00	●	●
8.400		10.000	89.00	47.00	40.00	●	●
8.500		10.000	89.00	47.00	40.00	●	●
8.600		10.000	89.00	47.00	40.00	●	●
8.700		10.000	89.00	47.00	40.00	●	●
8.730	11/32	10.000	89.00	47.00	40.00	●	●
8.800		10.000	89.00	47.00	40.00	●	●
8.900		10.000	89.00	47.00	40.00	●	●
9.000		10.000	89.00	47.00	40.00	●	●
9.100		10.000	89.00	47.00	40.00	●	●
9.130	23/64	10.000	89.00	47.00	40.00	●	●
9.200		10.000	89.00	47.00	40.00	●	●
9.250		10.000	89.00	47.00	40.00	●	●
9.300		10.000	89.00	47.00	40.00	●	●
9.400		10.000	89.00	47.00	40.00	●	●
9.500		10.000	89.00	47.00	40.00	●	●
9.520	3/8	10.000	89.00	47.00	40.00	●	●
9.600		10.000	89.00	47.00	40.00	●	●
9.700		10.000	89.00	47.00	40.00	●	●
9.800		10.000	89.00	47.00	40.00	●	●
9.900		10.000	89.00	47.00	40.00	●	●
9.920	25/64	10.000	89.00	47.00	40.00	●	●
10.000		10.000	89.00	47.00	40.00	●	●
10.100		12.000	102.00	55.00	45.00	●	●
10.200		12.000	102.00	55.00	45.00	●	●
10.300		12.000	102.00	55.00	45.00	●	●
10.320	13/32	12.000	102.00	55.00	45.00	●	●
10.400		12.000	102.00	55.00	45.00	●	●
10.500		12.000	102.00	55.00	45.00	●	●
10.600		12.000	102.00	55.00	45.00	●	●
10.700		12.000	102.00	55.00	45.00	●	●
10.800		12.000	102.00	55.00	45.00	●	●
10.900		12.000	102.00	55.00	45.00	●	●
11.000		12.000	102.00	55.00	45.00	●	●
11.100		12.000	102.00	55.00	45.00	●	●
11.110	7/16	12.000	102.00	55.00	45.00	●	●
11.200		12.000	102.00	55.00	45.00	●	●
11.300		12.000	102.00	55.00	45.00	●	●

○ bright

● FIRE



## TS-Drills with oil feed, 3 x D



d1		d2	l1	l2	l3	89410	89415
mm	inch	mm	mm	mm	mm	Availability	
11.400		12.000	102.00	55.00	45.00	●	●
11.500		12.000	102.00	55.00	45.00	●	●
11.600		12.000	102.00	55.00	45.00	●	●
11.700		12.000	102.00	55.00	45.00	●	●
11.800		12.000	102.00	55.00	45.00	●	●
11.900		12.000	102.00	55.00	45.00	●	●
11.910	15/32	12.000	102.00	55.00	45.00	●	●
12.000		12.000	102.00	55.00	45.00	●	●
12.200		14.000	107.00	60.00	45.00	●	●
12.500		14.000	107.00	60.00	45.00	●	●
12.700	1/2	14.000	107.00	60.00	45.00	●	●
13.000		14.000	107.00	60.00	45.00	●	●
13.500		14.000	107.00	60.00	45.00	●	●
13.700		14.000	107.00	60.00	45.00	●	●
14.000		14.000	107.00	60.00	45.00	●	●
14.200		16.000	115.00	65.00	48.00	●	●
14.290	9/16	16.000	115.00	65.00	48.00	●	●
14.500		16.000	115.00	65.00	48.00	●	●
14.700		16.000	115.00	65.00	48.00	●	●
15.000		16.000	115.00	65.00	48.00	●	●
15.200		16.000	115.00	65.00	48.00	●	●
15.500		16.000	115.00	65.00	48.00	●	●
15.700		16.000	115.00	65.00	48.00	●	●
16.000		16.000	115.00	65.00	48.00	●	●
16.500		18.000	123.00	73.00	48.00	●	●
17.000		18.000	123.00	73.00	48.00	●	●
17.500		18.000	123.00	73.00	48.00	●	●
18.000		18.000	123.00	73.00	48.00	●	●
18.500		20.000	131.00	79.00	50.00	●	●
19.000		20.000	131.00	79.00	50.00	●	●
19.500		20.000	131.00	79.00	50.00	●	●
20.000		20.000	131.00	79.00	50.00	●	●

89410	89415
<b>Solid carbide</b>	
<b>155</b>	<b>155</b>
<b>HA</b>	<b>HE</b>
<b>TS 100 U</b>	<b>TS 100 U</b>
<b>F</b>	<b>F</b>

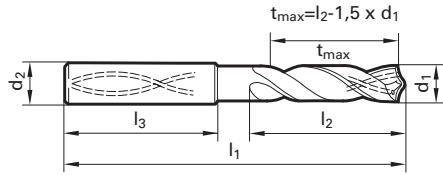
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● FIRE



# HARTNER

## TS-Drills with oil feed, 5 x D



d1		d2	l1	l2	l3	89411	89408
mm	inch	mm	mm	mm	mm	Solid carbide	
3.000		6.000	66.00	28.00	36.00	155	155
3.100		6.000	66.00	28.00	36.00	HA	HE
3.170	1/8	6.000	66.00	28.00	36.00	TS 100 U	TS 100 U
3.200		6.000	66.00	28.00	36.00	F	F
3.250		6.000	66.00	28.00	36.00		
3.300		6.000	66.00	28.00	36.00		
3.400		6.000	66.00	28.00	36.00		
3.500		6.000	66.00	28.00	36.00		
3.570	9/64	6.000	66.00	28.00	36.00		
3.600		6.000	66.00	28.00	36.00		
3.700		6.000	66.00	28.00	36.00		
3.800		6.000	74.00	36.00	36.00		
3.900		6.000	74.00	36.00	36.00		
3.970	5/32	6.000	74.00	36.00	36.00		
4.000		6.000	74.00	36.00	36.00		
4.100		6.000	74.00	36.00	36.00		
4.200		6.000	74.00	36.00	36.00		
4.300		6.000	74.00	36.00	36.00		
4.370	11/64	6.000	74.00	36.00	36.00		
4.400		6.000	74.00	36.00	36.00		
4.500		6.000	74.00	36.00	36.00		
4.600		6.000	74.00	36.00	36.00		
4.650		6.000	74.00	36.00	36.00		
4.700		6.000	74.00	36.00	36.00		
4.760	3/16	6.000	82.00	44.00	36.00		
4.800		6.000	82.00	44.00	36.00		
4.900		6.000	82.00	44.00	36.00		
5.000		6.000	82.00	44.00	36.00		
5.100		6.000	82.00	44.00	36.00		
5.160	13/64	6.000	82.00	44.00	36.00		
5.200		6.000	82.00	44.00	36.00		
5.300		6.000	82.00	44.00	36.00		
5.400		6.000	82.00	44.00	36.00		
5.500		6.000	82.00	44.00	36.00		
5.550		6.000	82.00	44.00	36.00		
5.560	7/32	6.000	82.00	44.00	36.00		
5.600		6.000	82.00	44.00	36.00		
5.700		6.000	82.00	44.00	36.00		
5.800		6.000	82.00	44.00	36.00		
5.900		6.000	82.00	44.00	36.00		
5.950	15/64	6.000	82.00	44.00	36.00		
6.000		6.000	82.00	44.00	36.00		
6.100		8.000	91.00	53.00	36.00		
6.200		8.000	91.00	53.00	36.00		
6.300		8.000	91.00	53.00	36.00		
6.350	1/4	8.000	91.00	53.00	36.00		
6.400		8.000	91.00	53.00	36.00		
6.500		8.000	91.00	53.00	36.00		
6.600		8.000	91.00	53.00	36.00		
6.700		8.000	91.00	53.00	36.00		
6.750	17/64	8.000	91.00	53.00	36.00		
6.800		8.000	91.00	53.00	36.00		
6.900		8.000	91.00	53.00	36.00		
7.000		8.000	91.00	53.00	36.00		

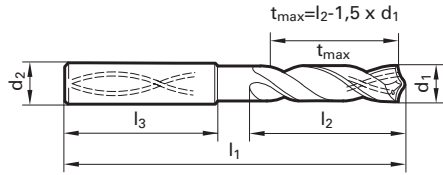
○ bright

● FIRE



# HARTNER

## TS-Drills with oil feed, 5 x D



d1		d2	l1	l2	l3	89411	89408
mm	inch	mm	mm	mm	mm	Solid carbide	
						155	155
						HA	HE
						TS 100 U	TS 100 U
						<b>F</b>	<b>F</b>
						Availability	
7.100		8.000	91.00	53.00	36.00	●	●
7.140	9/32	8.000	91.00	53.00	36.00	●	●
7.200		8.000	91.00	53.00	36.00	●	●
7.300		8.000	91.00	53.00	36.00	●	●
7.400		8.000	91.00	53.00	36.00	●	●
7.500		8.000	91.00	53.00	36.00	●	●
7.540	19/64	8.000	91.00	53.00	36.00	●	●
7.600		8.000	91.00	53.00	36.00	●	●
7.700		8.000	91.00	53.00	36.00	●	●
7.800		8.000	91.00	53.00	36.00	●	●
7.900		8.000	91.00	53.00	36.00	●	●
7.940	5/16	8.000	91.00	53.00	36.00	●	●
8.000		8.000	91.00	53.00	36.00	●	●
8.100		10.000	103.00	61.00	40.00	●	●
8.200		10.000	103.00	61.00	40.00	●	●
8.300		10.000	103.00	61.00	40.00	●	●
8.330	21/64	10.000	103.00	61.00	40.00	●	●
8.400		10.000	103.00	61.00	40.00	●	●
8.500		10.000	103.00	61.00	40.00	●	●
8.600		10.000	103.00	61.00	40.00	●	●
8.700		10.000	103.00	61.00	40.00	●	●
8.730	11/32	10.000	103.00	61.00	40.00	●	●
8.800		10.000	103.00	61.00	40.00	●	●
8.900		10.000	103.00	61.00	40.00	●	●
9.000		10.000	103.00	61.00	40.00	●	●
9.100		10.000	103.00	61.00	40.00	●	●
9.130	23/64	10.000	103.00	61.00	40.00	●	●
9.200		10.000	103.00	61.00	40.00	●	●
9.250		10.000	103.00	61.00	40.00	●	●
9.300		10.000	103.00	61.00	40.00	●	●
9.400		10.000	103.00	61.00	40.00	●	●
9.500		10.000	103.00	61.00	40.00	●	●
9.520	3/8	10.000	103.00	61.00	40.00	●	●
9.600		10.000	103.00	61.00	40.00	●	●
9.700		10.000	103.00	61.00	40.00	●	●
9.800		10.000	103.00	61.00	40.00	●	●
9.900		10.000	103.00	61.00	40.00	●	●
9.920	25/64	10.000	103.00	61.00	40.00	●	●
10.000		10.000	103.00	61.00	40.00	●	●
10.100		12.000	118.00	71.00	45.00	●	●
10.200		12.000	118.00	71.00	45.00	●	●
10.300		12.000	118.00	71.00	45.00	●	●
10.320	13/32	12.000	118.00	71.00	45.00	●	●
10.400		12.000	118.00	71.00	45.00	●	●
10.500		12.000	118.00	71.00	45.00	●	●
10.600		12.000	118.00	71.00	45.00	●	●
10.700		12.000	118.00	71.00	45.00	●	●
10.800		12.000	118.00	71.00	45.00	●	●
10.900		12.000	118.00	71.00	45.00	●	●
11.000		12.000	118.00	71.00	45.00	●	●
11.100		12.000	118.00	71.00	45.00	●	●
11.110	7/16	12.000	118.00	71.00	45.00	●	●
11.200		12.000	118.00	71.00	45.00	●	●
11.300		12.000	118.00	71.00	45.00	●	●

○ bright

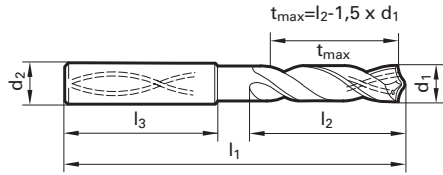
**F** FIRE





# HARTNER

## TS-Drills with oil feed, 5 x D



d1		d2	l1	l2	l3	89411	89408
mm	inch	mm	mm	mm	mm	Solid carbide	
						155	155
						HA	HE
						TS 100 U	TS 100 U
						<b>F</b>	<b>F</b>
						Availability	
11.400		12.000	118.00	71.00	45.00	●	●
11.500		12.000	118.00	71.00	45.00	●	●
11.600		12.000	118.00	71.00	45.00	●	●
11.700		12.000	118.00	71.00	45.00	●	●
11.800		12.000	118.00	71.00	45.00	●	●
11.900		12.000	118.00	71.00	45.00	●	●
11.910	15/32	12.000	118.00	71.00	45.00	●	●
12.000		12.000	118.00	71.00	45.00	●	●
12.200		14.000	124.00	77.00	45.00	●	●
12.500		14.000	124.00	77.00	45.00	●	●
12.700	1/2	14.000	124.00	77.00	45.00	●	●
13.000		14.000	124.00	77.00	45.00	●	●
13.500		14.000	124.00	77.00	45.00	●	●
13.700		14.000	124.00	77.00	45.00	●	●
14.000		14.000	124.00	77.00	45.00	●	●
14.200		16.000	133.00	83.00	48.00	●	●
14.290	9/16	16.000	133.00	83.00	48.00	●	●
14.500		16.000	133.00	83.00	48.00	●	●
14.700		16.000	133.00	83.00	48.00	●	●
15.000		16.000	133.00	83.00	48.00	●	●
15.200		16.000	133.00	83.00	48.00	●	●
15.500		16.000	133.00	83.00	48.00	●	●
15.700		16.000	133.00	83.00	48.00	●	●
16.000		16.000	133.00	83.00	48.00	●	●
16.500		18.000	143.00	93.00	48.00	●	●
17.000		18.000	143.00	93.00	48.00	●	●
17.500		18.000	143.00	93.00	48.00	●	●
18.000		18.000	143.00	93.00	48.00	●	●
18.500		20.000	153.00	101.00	50.00	●	●
19.000		20.000	153.00	101.00	50.00	●	●
19.050	3/4	20.000	153.00	101.00	50.00	●	●
19.500		20.000	153.00	101.00	50.00	●	●
20.000		20.000	153.00	101.00	50.00	●	●

○ bright

**F** FIRE



## TS-Drills with internal coolant

### 7 x D

### Article no. 89412



For drilling of long- and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable and alloyed steels with tensile strength of up to 1200 N/mm<sup>2</sup>, incl. carbon steels, bronze, cast iron and high-alloyed AlSi-alloys. For drilling depths up to 7 x D.

#### Advantages:

Highest speed and feed rates (see application recommendations page 40) possible, double

margins for high alignment accuracy with tight tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to a optimised cutting point geometry with special point grind and web thinning.

#### Preconditions for use:

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds. The tool is available without whistle notch flat for the application in hydraulic/shrink fit chucks.

Standard	Hartner std.
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HA
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7

### 7 x D

### Article no. 89416



For drilling of long- and short-chipping materials such as structural and case hardened steels, cast steels, heat-treatable and alloyed steels with tensile strength of up to 1200 N/mm<sup>2</sup>, incl. carbon steels, bronze, cast iron and high-alloyed AlSi-alloys. For drilling depths up to 7 x D.

#### Advantages:

Highest speed and feed rates (see application recommendations page 40) possible, double

margins for high alignment accuracy with tight tolerance and excellent surface finish. Excellent self-centering qualities as well as producing short chips thanks to a optimised cutting point geometry with special point grind and web thinning.

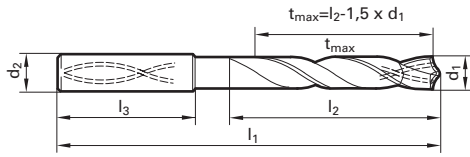
#### Preconditions for use:

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. Chatterfree, mechanical feeds.

Standard	Hartner std.
Tool material	Solid carbide
Surface finish	F
Type	TS 100 U
Shank	HE
Cutting direction	rh
Point grinding	2-facet
Point angle °	140
Tolerance on Ø	m7



## TS-Drills with internal coolant, 7 x D



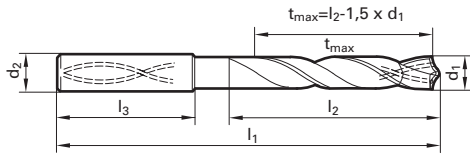
d1		d2	l1	l2	l3	89412	89416
mm	inch	mm	mm	mm	mm	Solid carbide	
						155 HA TS 100 U F	155 HE TS 100 U F
						Availability	
3.000		6.000	70.00	30.00	36.00	●	●
3.100		6.000	70.00	30.00	36.00	●	●
3.170	1/8	6.000	70.00	30.00	36.00	●	●
3.200		6.000	70.00	30.00	36.00	●	●
3.250		6.000	70.00	30.00	36.00	●	●
3.300		6.000	70.00	30.00	36.00	●	●
3.400		6.000	75.00	35.50	36.00	●	●
3.500		6.000	75.00	35.50	36.00	●	●
3.570	9/64	6.000	75.00	35.50	36.00	●	●
3.600		6.000	75.00	35.50	36.00	●	●
3.700		6.000	75.00	35.50	36.00	●	●
3.800		6.000	75.00	37.50	36.00	●	●
3.900		6.000	75.00	37.50	36.00	●	●
3.970	5/32	6.000	75.00	37.50	36.00	●	●
4.000		6.000	75.00	37.50	36.00	●	●
4.100		6.000	75.00	37.50	36.00	●	●
4.200		6.000	75.00	37.50	36.00	●	●
4.300		6.000	85.00	45.00	36.00	●	●
4.370	11/64	6.000	85.00	45.00	36.00	●	●
4.400		6.000	85.00	45.00	36.00	●	●
4.500		6.000	85.00	45.00	36.00	●	●
4.600		6.000	85.00	45.00	36.00	●	●
4.650		6.000	85.00	45.00	36.00	●	●
4.700		6.000	85.00	45.00	36.00	●	●
4.760	3/16	6.000	90.00	50.00	36.00	●	●
4.800		6.000	90.00	50.00	36.00	●	●
4.900		6.000	90.00	50.00	36.00	●	●
5.000		6.000	90.00	50.00	36.00	●	●
5.100		6.000	90.00	50.00	36.00	●	●
5.160	13/64	6.000	90.00	50.00	36.00	●	●
5.200		6.000	90.00	50.00	36.00	●	●
5.300		6.000	90.00	50.00	36.00	●	●
5.400		6.000	97.00	57.00	36.00	●	●
5.500		6.000	97.00	57.00	36.00	●	●
5.700		6.000	97.00	57.00	36.00	●	●
5.800		6.000	97.00	57.00	36.00	●	●
5.900		6.000	97.00	57.00	36.00	●	●
6.000		6.000	97.00	57.00	36.00	●	●
6.200		8.000	106.00	66.00	36.00	●	●
6.300		8.000	106.00	66.00	36.00	●	●
6.350	1/4	8.000	106.00	66.00	36.00	●	●
6.500		8.000	106.00	66.00	36.00	●	●
6.600		8.000	106.00	66.00	36.00	●	●
6.700		8.000	106.00	66.00	36.00	●	●
6.800		8.000	106.00	66.00	36.00	●	●
6.900		8.000	116.00	76.00	36.00	●	●
7.000		8.000	116.00	76.00	36.00	●	●
7.100		8.000	116.00	76.00	36.00	●	●
7.200		8.000	116.00	76.00	36.00	●	●
7.500		8.000	116.00	76.00	36.00	●	●
7.600		8.000	116.00	76.00	36.00	●	●
7.700		8.000	116.00	76.00	36.00	●	●
7.800		8.000	116.00	76.00	36.00	●	●
8.000		8.000	116.00	76.00	36.00	●	●

○ bright

● FIRE



## TS-Drills with internal coolant, 7 x D



d1		d2	l1	l2	l3	89412	89416
mm	inch	mm	mm	mm	mm	Availability	
8.100		10.000	131.00	87.00	40.00	●	●
8.200		10.000	131.00	87.00	40.00	●	●
8.400		10.000	131.00	87.00	40.00	●	●
8.500		10.000	131.00	87.00	40.00	●	●
8.600		10.000	131.00	87.00	40.00	●	●
8.700		10.000	131.00	87.00	40.00	●	●
8.800		10.000	131.00	87.00	40.00	●	●
9.000		10.000	131.00	87.00	40.00	●	●
9.100		10.000	139.00	95.00	40.00	●	●
9.200		10.000	139.00	95.00	40.00	●	●
9.300		10.000	139.00	95.00	40.00	●	●
9.400		10.000	139.00	95.00	40.00	●	●
9.500		10.000	139.00	95.00	40.00	●	●
9.520	3/8	10.000	139.00	95.00	40.00	●	●
9.700		10.000	139.00	95.00	40.00	●	●
9.800		10.000	139.00	95.00	40.00	●	●
9.900		10.000	139.00	95.00	40.00	●	●
10.000		10.000	139.00	95.00	40.00	●	●
10.200		12.000	155.00	106.00	45.00	●	●
10.500		12.000	155.00	106.00	45.00	●	●
10.800		12.000	155.00	106.00	45.00	●	●
11.000		12.000	155.00	106.00	45.00	●	●
11.200		12.000	163.00	114.00	45.00	●	●
11.500		12.000	163.00	114.00	45.00	●	●
11.800		12.000	163.00	114.00	45.00	●	●
12.000		12.000	163.00	114.00	45.00	●	●
12.200		14.000	182.00	133.00	45.00	●	●
12.500		14.000	182.00	133.00	45.00	●	●
12.700	1/2	14.000	182.00	133.00	45.00	●	●
13.000		14.000	182.00	133.00	45.00	●	●
13.500		14.000	182.00	133.00	45.00	●	●
14.000		14.000	182.00	133.00	45.00	●	●
14.200		16.000	204.00	152.00	48.00	●	●
14.500		16.000	204.00	152.00	48.00	●	●
15.000		16.000	204.00	152.00	48.00	●	●
15.500		16.000	204.00	152.00	48.00	●	●
16.000		16.000	204.00	152.00	48.00	●	●
16.500		18.000	223.00	171.00	48.00	●	●
17.000		18.000	223.00	171.00	48.00	●	●
17.500		18.000	223.00	171.00	48.00	●	●
18.000		18.000	223.00	171.00	48.00	●	●
18.500		20.000	244.00	190.00	50.00	●	●
19.000		20.000	244.00	190.00	50.00	●	●
19.050	3/4	20.000	244.00	190.00	50.00	●	●
19.500		20.000	244.00	190.00	50.00	●	●
20.000		20.000	244.00	190.00	50.00	●	●

○ bright

● FIRE



# HARTNER

## TS-Drills with internal coolant

10 x D

Article no. 89293



Straight fluted drill for the drilling of short-chipping materials such as cast iron, grey cast iron, spheroidal graphite and malleable cast iron. For the production of holes with high alignment accuracy (minimal deviation from straightness).

The drills are available bright or with T-, A-, C- and F-coating, for further performance in special machining processes. Recoating is not necessary when regrinding.

For drilling depths up to 10 x D.

Advantages: Extremely good self-centering qualities, small diameter tolerances (to H7), excellent surface finish, high cutting rates, high productivity (see application recommendations page 40).

Preconditions for use:

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. We recommend the application of shrink fit/hydraulic chucks.

Standard Hartner std.

Tool material **Solid carbide**

Surface finish ○

Type TS 150 GG

Shank HA

Cutting direction rh

Point grinding relieved cone

Point angle ° 120

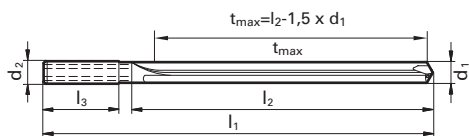
Tolerance on Ø m7

○ bright

● FIRE



## TS-Drills with internal coolant, 10 x D



d1		d2	l1	l2	l3
mm	inch	mm	mm	mm	mm
3.000		6.000	91.00	42.00	36.00
3.170	1/8	6.000	91.00	42.00	36.00
3.250		6.000	91.00	42.00	36.00
3.300		6.000	91.00	42.00	36.00
3.500		6.000	91.00	48.00	36.00
3.570	9/64	6.000	91.00	48.00	36.00
3.800		6.000	121.00	77.00	36.00
3.970	5/32	6.000	121.00	77.00	36.00
4.000		6.000	121.00	77.00	36.00
4.200		6.000	121.00	77.00	36.00
4.500		6.000	121.00	77.00	36.00
5.000		6.000	121.00	82.00	36.00
5.500		6.000	121.00	82.00	36.00
6.000		6.000	121.00	82.00	36.00
6.350	1/4	8.000	146.00	106.00	36.00
6.500		8.000	146.00	106.00	36.00
6.800		8.000	146.00	106.00	36.00
7.000		8.000	146.00	106.00	36.00
7.500		8.000	146.00	106.00	36.00
7.800		8.000	146.00	106.00	36.00
8.000		8.000	146.00	106.00	36.00
8.500		10.000	175.00	130.00	40.00
9.000		10.000	175.00	130.00	40.00
9.500		10.000	175.00	130.00	40.00
9.520	3/8	10.000	175.00	130.00	40.00
10.000		10.000	175.00	130.00	40.00
10.200		12.000	209.00	159.00	45.00
10.500		12.000	209.00	159.00	45.00
11.000		12.000	209.00	159.00	45.00
11.500		12.000	209.00	159.00	45.00
12.000		12.000	209.00	159.00	45.00
12.500		14.000	233.00	183.00	45.00
12.700	1/2	14.000	233.00	183.00	45.00
13.000		14.000	233.00	183.00	45.00
13.500		14.000	233.00	183.00	45.00
14.000		14.000	233.00	183.00	45.00
14.500		16.000	260.00	207.00	48.00
15.000		16.000	260.00	207.00	48.00
15.500		16.000	260.00	207.00	48.00
16.000		16.000	260.00	207.00	48.00

89293

Solid carbide

155

HA

TS 150 GG



Availability





# HARTNER

## TS-Drills with internal coolant

12 x D

Article no. 89418



High-performance drill for drilling deep holes in steel, cast iron and non-ferrous metals. For drilling depths up to 12 x D.

**Advantages:**

Excellent self-centering qualities thanks to special point grind. Provides safe chip flow even with tough and long-chipping materials due to adapted drill profile and large flute space. Double margins for excellent hole alignment and with good surface

qualities and optimal support of the tool during exit.

**Preconditions for use:**

Powerful machines. No play in spindle bearings. Alignment accurate tool holders. Max. concentricity error of clamped tools: 0.02 mm. We recommend the application of hydraulic chucks.

Standard Hartner std.

Tool material **Solid carbide**

Surface finish **F**

Type TS 100 U

Shank HA

Cutting direction rh

Point grinding 2-facet

Point angle ° 135

Tolerance on Ø h7

○ bright

**F** FIRE

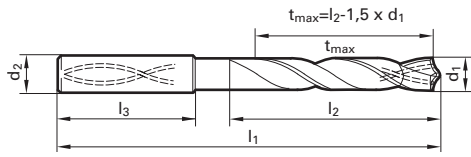






# HARTNER

## TS-Drills with internal coolant, 12 x D



d1		d2	l1	l2	l3
mm	inch	mm	mm	mm	mm
8.200		10.000	162.00	120.00	40.00
8.300		10.000	162.00	120.00	40.00
8.400		10.000	162.00	120.00	40.00
8.500		10.000	162.00	120.00	40.00
8.600		10.000	162.00	120.00	40.00
8.700		10.000	162.00	120.00	40.00
8.800		10.000	162.00	120.00	40.00
8.900		10.000	162.00	120.00	40.00
9.000		10.000	162.00	120.00	40.00
9.100		10.000	162.00	120.00	40.00
9.200		10.000	162.00	120.00	40.00
9.300		10.000	162.00	120.00	40.00
9.400		10.000	162.00	120.00	40.00
9.500		10.000	162.00	120.00	40.00
9.520	3/8	10.000	162.00	120.00	40.00
9.600		10.000	162.00	120.00	40.00
9.700		10.000	162.00	120.00	40.00
9.800		10.000	162.00	120.00	40.00
9.900		10.000	162.00	120.00	40.00
10.000		10.000	162.00	120.00	40.00
10.200		12.000	204.00	156.00	45.00
10.500		12.000	204.00	156.00	45.00
11.000		12.000	204.00	156.00	45.00
11.500		12.000	204.00	156.00	45.00
12.000		12.000	204.00	156.00	45.00
12.500		14.000	230.00	182.00	45.00
12.700	1/2	14.000	230.00	182.00	45.00
13.000		14.000	230.00	182.00	45.00
13.500		14.000	230.00	182.00	45.00
14.000		14.000	230.00	182.00	45.00
14.500		16.000	260.00	208.00	48.00
15.000		16.000	260.00	208.00	48.00
15.500		16.000	260.00	208.00	48.00
16.000		16.000	260.00	208.00	48.00
16.500		18.000	285.00	234.00	48.00
17.000		18.000	285.00	234.00	48.00
17.500		18.000	285.00	234.00	48.00
18.000		18.000	285.00	234.00	48.00
18.500		20.000	310.00	258.00	50.00
19.000		20.000	310.00	258.00	50.00
19.050	3/4	20.000	310.00	258.00	50.00
19.500		20.000	310.00	258.00	50.00
20.000		20.000	310.00	258.00	50.00

89418

Solid carbide

155

HA

TS 100



Availability



○ bright

● FIRE



# HARTNER

## TS-Drills without oil feed, 3-flute

5 x D

Article no. 89247



A tool for heavy duty drilling from the solid, giving precise centering and accurate hole form. This includes applications such as oblique centering or interrupted drilling. Precision in size and surface finish correspond to those achieved with core drills. Centering or spotting is not normally required. Suitable for drilling cast iron and long-chipping aluminium alloys. For drilling depths up to 5 x D.

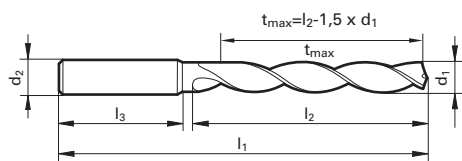
Standard	DIN 6537L
Tool material	Solid carbide
Surface finish	○
Type	TS 3 G
Shank	HA
Cutting direction	rh
Point grinding	Spiropoint
Point angle °	130
Tolerance on Ø	m7

○ bright

● FIRE



## TS-Drills without oil feed, 3-flute, 5 x D

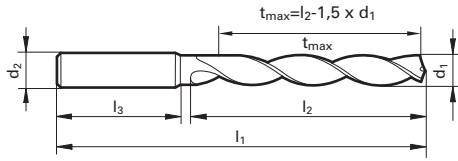


d1		d2	l1	l2	l3	Availability
mm	inch	mm	mm	mm	mm	
3.000		6.000	66.00	28.00	36.00	●
3.100		6.000	66.00	28.00	36.00	●
3.200		6.000	66.00	28.00	36.00	●
3.300		6.000	66.00	28.00	36.00	●
3.500		6.000	66.00	28.00	36.00	●
3.700		6.000	66.00	28.00	36.00	●
3.800		6.000	74.00	36.00	36.00	●
4.000		6.000	74.00	36.00	36.00	●
4.100		6.000	74.00	36.00	36.00	●
4.200		6.000	74.00	36.00	36.00	●
4.500		6.000	74.00	36.00	36.00	●
4.800		6.000	82.00	44.00	36.00	●
5.000		6.000	82.00	44.00	36.00	●
5.100		6.000	82.00	44.00	36.00	●
5.200		6.000	82.00	44.00	36.00	●
5.300		6.000	82.00	44.00	36.00	●
5.500		6.000	82.00	44.00	36.00	●
5.800		6.000	82.00	44.00	36.00	●
6.000		6.000	82.00	44.00	36.00	●
6.100		8.000	91.00	53.00	36.00	●
6.200		8.000	91.00	53.00	36.00	●
6.400		8.000	91.00	53.00	36.00	●
6.500		8.000	91.00	53.00	36.00	●
6.700		8.000	91.00	53.00	36.00	●
6.800		8.000	91.00	53.00	36.00	●
7.000		8.000	91.00	53.00	36.00	●
7.100		8.000	91.00	53.00	36.00	●
7.400		8.000	91.00	53.00	36.00	●
7.500		8.000	91.00	53.00	36.00	●
7.800		8.000	91.00	53.00	36.00	●
8.000		8.000	91.00	53.00	36.00	●
8.100		10.000	103.00	61.00	40.00	●
8.200		10.000	103.00	61.00	40.00	●
8.400		10.000	103.00	61.00	40.00	●
8.500		10.000	103.00	61.00	40.00	●
8.600		10.000	103.00	61.00	40.00	●
8.700		10.000	103.00	61.00	40.00	●
8.800		10.000	103.00	61.00	40.00	●
9.000		10.000	103.00	61.00	40.00	●
9.100		10.000	103.00	61.00	40.00	●
9.500		10.000	103.00	61.00	40.00	●
9.800		10.000	103.00	61.00	40.00	●
10.000		10.000	103.00	61.00	40.00	●
10.100		12.000	118.00	71.00	45.00	●
10.200		12.000	118.00	71.00	45.00	●
10.300		12.000	118.00	71.00	45.00	●
10.500		12.000	118.00	71.00	45.00	●
11.000		12.000	118.00	71.00	45.00	●
11.200		12.000	118.00	71.00	45.00	●
11.500		12.000	118.00	71.00	45.00	●
11.800		12.000	118.00	71.00	45.00	●
12.000		12.000	118.00	71.00	45.00	●
12.100		14.000	124.00	77.00	45.00	●
12.500		14.000	124.00	77.00	45.00	●

89247  
 Solid carbide  
 155  
 HA  
 TS 3 G  
 ○



## TS-Drills without oil feed, 3-flute, 5 x D



89247

Solid carbide

155

HA

TS 3 G



Availability

d1		d2	l1	l2	l3
mm	inch	mm	mm	mm	mm
13.000		14.000	124.00	77.00	45.00
13.500		14.000	124.00	77.00	45.00
14.000		14.000	124.00	77.00	45.00
14.500		16.000	133.00	83.00	48.00
15.000		16.000	133.00	83.00	48.00
15.500		16.000	133.00	83.00	48.00
16.000		16.000	133.00	83.00	48.00
16.500		18.000	143.00	93.00	48.00
17.000		18.000	143.00	93.00	48.00
17.500		18.000	143.00	93.00	48.00
18.000		18.000	143.00	93.00	48.00
18.500		20.000	153.00	101.00	50.00
19.000		20.000	153.00	101.00	50.00
19.500		20.000	153.00	101.00	50.00
20.000		20.000	153.00	101.00	50.00



○ bright

● FIRE



## Solid carbide twist drills without internal coolant

### Stub drills 3 x D

Article no. 89235



A standard drill for use in grey cast iron, bronzes, light metals and nonferrous metals. Ideally suited to the economic machining of abrasive materials (AlSi-alloys), fibre-reinforced plastics and other Duroplastics that are liable to cause severe abrasion on cutting lips and lands.

Standard	DIN 6539
Tool material	Solid carbide
Surface finish	○
Type	N
Shank	rh
Cutting direction	2-facet
Point grinding	118
Point angle °	2.00
Tolerance on Ø	h7

### Stub drills 3 x D

Bestell-Nr. 89253



A standard drill for use in general-purpose constructional steels, free-cutting steels, case hardening steels, heat-treatable steels, cast steel, grey cast iron, chilled cast iron and austenitic manganese steel. Ideally suited to the economic machining of abrasive materials (AlSi-alloys), fibre-reinforced plastics and other Duroplastics that are liable to cause severe abrasion on cutting lips and lands.

Standard	DIN 6539
Tool material	Solid carbide
Surface finish	Ⓡ
Type	N
Shank	rh
Cutting direction	2-facet
Point grinding	118
Point angle °	1.00
Tolerance on Ø	h7

### Jobber drills 5 x D

Article no. 89244



A standard drill for application in grey cast iron, bronzes, light metals and nonferrous metals. Ideally suited to the economic machining of abrasive materials (AlSi-alloys), fiber-reinforced plastics and other Duroplastics liable to cause severe abrasion on cutting lip and lands.

Standard	Hartner std.
Tool material	Solid carbide
Surface finish	○
Type	N
Shank	rh
Cutting direction	2-facet
Point grinding	118
Point angle °	2.00
Tolerance on Ø	h7

### Jobber drills 5 x D

Bestell-Nr. 89261



A standard drill for use in general-purpose constructional steels, free-cutting steels, case hardening steels, heat-treatable steels, cast steel, grey cast iron, chilled cast iron and austenitic manganese steel. Ideally suited to the economic machining of abrasive materials (AlSi-alloys), fibre-reinforced plastics and other Duroplastics that are liable to cause severe abrasion on cutting lips and lands.

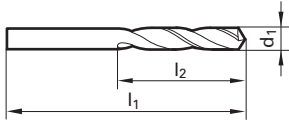
Standard	Hartner std.
Tool material	Solid carbide
Surface finish	Ⓡ
Type	N
Shank	rh
Cutting direction	2-facet
Point grinding	118
Point angle °	1.00

○ bright

Ⓡ FIRE



## Stub drills without internal coolant, 3 x D



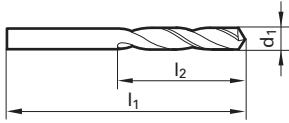
				89235	
				Solid carbide	
				155	
				DZ	
				N	
				○	
				Availability	
d1		l1	l2		
mm	inch	mm	mm		
2.000		38.00	12.00	●	
2.100		38.00	12.00	●	
2.200		40.00	13.00	●	
2.300		40.00	13.00	●	
2.380	3/32	43.00	14.00	●	
2.400		43.00	14.00	●	
2.500		43.00	14.00	●	
2.600		43.00	14.00	●	
2.700		46.00	16.00	●	
2.780	7/64	46.00	16.00	●	
2.800		46.00	16.00	●	
2.900		46.00	16.00	●	
3.000		46.00	16.00	●	
3.100		49.00	18.00	●	
3.170	1/8	49.00	18.00	●	
3.200		49.00	18.00	●	
3.300		49.00	18.00	●	
3.400		52.00	20.00	●	
3.500		52.00	20.00	●	
3.570	9/64	52.00	20.00	●	
3.600		52.00	20.00	●	
3.700		52.00	20.00	●	
3.800		55.00	22.00	●	
3.900		55.00	22.00	●	
3.970	5/32	55.00	22.00	●	
4.000		55.00	22.00	●	
4.100		55.00	22.00	●	
4.200		55.00	22.00	●	
4.300		58.00	24.00	●	
4.370	11/64	58.00	24.00	●	
4.400		58.00	24.00	●	
4.500		58.00	24.00	●	
4.600		58.00	24.00	●	
4.700		58.00	24.00	●	
4.760	3/16	62.00	26.00	●	
4.800		62.00	26.00	●	
4.900		62.00	26.00	●	
5.000		62.00	26.00	●	
5.200		62.00	26.00	●	
5.500		66.00	28.00	●	
5.800		66.00	28.00	●	
6.000		66.00	28.00	●	
6.350	1/4	70.00	31.00	●	
6.500		70.00	31.00	●	
6.800		74.00	34.00	●	
7.000		74.00	34.00	●	
7.140	9/32	74.00	34.00	●	
7.500		74.00	34.00	●	
7.940	5/16	79.00	37.00	●	
8.000		79.00	37.00	●	
8.500		79.00	37.00	●	
8.730	11/32	84.00	40.00	●	
8.800		84.00	40.00	●	
9.000		84.00	40.00	●	

○ bright

● FIRE



## Stub drills without internal coolant, 3 x D



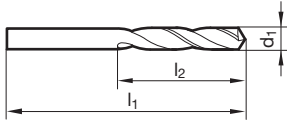
				89235	
				Solid carbide	
				155	
				DZ	
				N	
				<input type="radio"/>	
				Availability	
mm	d1 inch	l1 mm	l2 mm		
9.500		84.00	40.00		●
10.000		89.00	43.00		●
10.200		89.00	43.00		●
10.500		89.00	43.00		●
11.000		95.00	47.00		●
11.110	7/16	95.00	47.00		●
11.500		95.00	47.00		●
11.910		102.00	51.00		●
12.000		102.00	51.00		●

bright       FIRE



# HARTNER

## Stub drills without internal coolant, 3 x D



				89253
				Solid carbide
				102
				DZ
				N
				<b>F</b>
				Availability
d1		l1	l2	
mm	inch	mm	mm	
1.000		26.00	6.00	●
1.100		28.00	7.00	●
1.190	3/64	30.00	8.00	●
1.200		30.00	8.00	●
1.300		30.00	8.00	●
1.400		32.00	9.00	●
1.500		32.00	9.00	●
1.590	1/16	34.00	10.00	●
1.600		34.00	10.00	●
1.700		34.00	10.00	●
1.800		36.00	11.00	●
1.850		36.00	11.00	●
1.900		36.00	11.00	●
1.980	5/64	38.00	12.00	●
2.000		38.00	12.00	●
2.060		38.00	12.00	●
2.100		38.00	12.00	●
2.200		40.00	13.00	●
2.250		40.00	13.00	●
2.300		40.00	13.00	●
2.380	3/32	43.00	14.00	●
2.400		43.00	14.00	●
2.500		43.00	14.00	●
2.530		43.00	14.00	●
2.600		43.00	14.00	●
2.700		46.00	16.00	●
2.780	7/64	46.00	16.00	●
2.800		46.00	16.00	●
2.900		46.00	16.00	●
2.950		46.00	16.00	●
3.000		46.00	16.00	●
3.050		49.00	18.00	●
3.100		49.00	18.00	●
3.170	1/8	49.00	18.00	●
3.200		49.00	18.00	●
3.300		49.00	18.00	●
3.400		52.00	20.00	●
3.450		52.00	20.00	●
3.500		52.00	20.00	●
3.570	9/64	52.00	20.00	●
3.600		52.00	20.00	●
3.700		52.00	20.00	●
3.800		55.00	22.00	●
3.900		55.00	22.00	●
3.970	5/32	55.00	22.00	●
4.000		55.00	22.00	●
4.040		55.00	22.00	●
4.100		55.00	22.00	●
4.200		55.00	22.00	●
4.300		58.00	24.00	●
4.370	11/64	58.00	24.00	●
4.400		58.00	24.00	●
4.500		58.00	24.00	●
4.570		58.00	24.00	●

○ bright

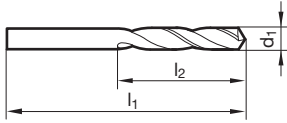
**F** FIRE





# HARTNER

## Stub drills without internal coolant, 3 x D



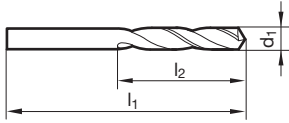
				89253
				Solid carbide
				102
				DZ
				N
				<b>F</b>
				Availability
d1		l1	l2	
mm	inch	mm	mm	
4.600		58.00	24.00	●
4.700		58.00	24.00	●
4.760	3/16	62.00	26.00	●
4.800		62.00	26.00	●
4.900		62.00	26.00	●
4.980		62.00	26.00	●
5.000		62.00	26.00	●
5.060		62.00	26.00	●
5.100		62.00	26.00	●
5.160	13/64	62.00	26.00	●
5.200		62.00	26.00	●
5.300		62.00	26.00	●
5.400		66.00	28.00	●
5.500		66.00	28.00	●
5.560	7/32	66.00	28.00	●
5.600		66.00	28.00	●
5.700		66.00	28.00	●
5.800		66.00	28.00	●
5.900		66.00	28.00	●
5.950	15/64	66.00	28.00	●
6.000		66.00	28.00	●
6.040		70.00	31.00	●
6.100		70.00	31.00	●
6.150		70.00	31.00	●
6.200		70.00	31.00	●
6.250		70.00	31.00	●
6.300		70.00	31.00	●
6.350	1/4	70.00	31.00	●
6.400		70.00	31.00	●
6.500		70.00	31.00	●
6.600		70.00	31.00	●
6.700		70.00	31.00	●
6.800		74.00	34.00	●
6.900		74.00	34.00	●
7.000		74.00	34.00	●
7.030		74.00	34.00	●
7.100		74.00	34.00	●
7.140	9/32	74.00	34.00	●
7.200		74.00	34.00	●
7.300		74.00	34.00	●
7.400		74.00	34.00	●
7.500		74.00	34.00	●
7.540	19/64	79.00	37.00	●
7.600		79.00	37.00	●
7.800		79.00	37.00	●
7.900		79.00	37.00	●
7.940	5/16	79.00	37.00	●
8.000		79.00	37.00	●
8.030		79.00	37.00	●
8.100		79.00	37.00	●
8.200		79.00	37.00	●
8.300		79.00	37.00	●
8.330	21/64	79.00	37.00	●
8.400		79.00	37.00	●

○ bright

**F** FIRE



## Stub drills without internal coolant, 3 x D



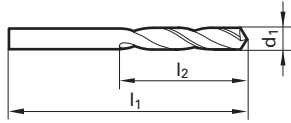
				89253	
				Solid carbide	
				102	
				DZ	
				N	
				F	
				Availability	
d1		l1	l2		
mm	inch	mm	mm		
8.50		79.00	37.00	●	
8.60		84.00	40.00	●	
8.70		84.00	40.00	●	
8.73	11/32	84.00	40.00	●	
8.80		84.00	40.00	●	
8.90		84.00	40.00	●	
9.00		84.00	40.00	●	
9.13	23/64	84.00	40.00	●	
9.30		84.00	40.00	●	
9.50		84.00	40.00	●	
9.52	3/8	89.00	43.00	●	
9.60		89.00	43.00	●	
9.70		89.00	43.00	●	
9.80		89.00	43.00	●	
9.92	25/64	89.00	43.00	●	
10.00		89.00	43.00	●	
10.08		89.00	43.00	●	
10.20		89.00	43.00	●	
10.32	13/32	89.00	43.00	●	
10.50		89.00	43.00	●	
10.72	27/64	95.00	47.00	●	
11.00		95.00	47.00	●	
11.11	7/16	95.00	47.00	●	
11.50		95.00	47.00	●	
11.51	29/64	95.00	47.00	●	
11.91	15/32	102.00	51.00	●	
12.00		102.00	51.00	●	
12.30	31/64	102.00	51.00	●	
12.70	1/2	102.00	51.00	●	
13.00		102.00	51.00	●	
13.50		107.00	54.00	●	
14.00		107.00	54.00	●	
14.29	9/16	111.00	56.00	●	
14.50		111.00	56.00	●	
15.00		111.00	56.00	●	
16.00		115.00	58.00	●	

○ bright

● FIRE



## Jobber drills without internal coolant, 5 x D



				89244	
				Solid carbide	
				155	
				DZ	
				N	
				○	
				Availability	
d1		l1	l2		
mm	inch	mm	mm		
2.000		49.00	24.00	●	
2.100		49.00	24.00	●	
2.200		53.00	27.00	●	
2.300		53.00	27.00	●	
2.380	3/32	57.00	30.00	●	
2.400		57.00	30.00	●	
2.500		57.00	30.00	●	
2.600		57.00	30.00	●	
2.700		61.00	33.00	●	
2.780	7/64	61.00	33.00	●	
2.800		61.00	33.00	●	
2.900		61.00	33.00	●	
3.000		61.00	33.00	●	
3.100		65.00	36.00	●	
3.170	1/8	65.00	36.00	●	
3.200		65.00	36.00	●	
3.300		65.00	36.00	●	
3.400		70.00	39.00	●	
3.500		70.00	39.00	●	
3.570	9/64	70.00	39.00	●	
3.600		70.00	39.00	●	
3.700		70.00	39.00	●	
3.800		75.00	43.00	●	
3.900		75.00	43.00	●	
3.970	5/32	75.00	43.00	●	
4.000		75.00	43.00	●	
4.100		75.00	43.00	●	
4.200		75.00	43.00	●	
4.300		80.00	47.00	●	
4.370	11/64	80.00	47.00	●	
4.400		80.00	47.00	●	
4.500		80.00	47.00	●	
4.600		80.00	47.00	●	
4.700		80.00	47.00	●	
4.760	3/16	86.00	52.00	●	
4.800		86.00	52.00	●	
4.900		86.00	52.00	●	
5.000		86.00	52.00	●	
5.160	13/64	86.00	52.00	●	
5.500		93.00	57.00	●	
5.560	7/32	93.00	57.00	●	
5.950	15/64	93.00	57.00	●	
6.000		93.00	57.00	●	
6.350	1/4	101.00	63.00	●	
6.500		101.00	63.00	●	
6.800		109.00	69.00	●	
7.000		109.00	69.00	●	
7.140	9/32	109.00	69.00	●	
7.500		109.00	69.00	●	
7.940	5/16	117.00	75.00	●	
8.000		117.00	75.00	●	
8.500		117.00	75.00	●	
8.730	11/32	125.00	81.00	●	
9.000		125.00	81.00	●	

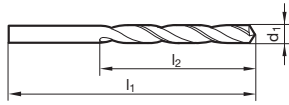
○ bright

● FIRE





## Jobber drills without internal coolant, 5 x D



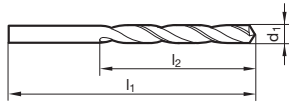
				89261
				Solid carbide
				102
				DZ
				N
				<b>F</b>
				Availability
d1		l1	l2	
mm	inch	mm	mm	
1.00		34.00	12.00	●
1.10		36.00	14.00	●
1.19	3/64	38.00	16.00	●
1.20		38.00	16.00	●
1.30		38.00	16.00	●
1.40		40.00	18.00	●
1.50		40.00	18.00	●
1.59	1/16	43.00	20.00	●
1.60		43.00	20.00	●
1.70		43.00	20.00	●
1.78		46.00	22.00	●
1.80		46.00	22.00	●
1.85		46.00	22.00	●
1.90		46.00	22.00	●
1.98	5/64	49.00	24.00	●
2.00		49.00	24.00	●
2.06		49.00	24.00	●
2.10		49.00	24.00	●
2.20		53.00	27.00	●
2.30		53.00	27.00	●
2.38	3/32	57.00	30.00	●
2.40		57.00	30.00	●
2.50		57.00	30.00	●
2.53		57.00	30.00	●
2.60		57.00	30.00	●
2.70		61.00	33.00	●
2.78	7/64	61.00	33.00	●
2.80		61.00	33.00	●
2.90		61.00	33.00	●
2.95		61.00	33.00	●
3.00		61.00	33.00	●
3.05		65.00	36.00	●
3.10		65.00	36.00	●
3.17	1/8	65.00	36.00	●
3.20		65.00	36.00	●
3.30		65.00	36.00	●
3.40		70.00	39.00	●
3.45		70.00	39.00	●
3.50		70.00	39.00	●
3.57	9/64	70.00	39.00	●
3.60		70.00	39.00	●
3.70		70.00	39.00	●
3.80		75.00	43.00	●
3.90		75.00	43.00	●
3.97	5/32	75.00	43.00	●
4.00		75.00	43.00	●
4.04		75.00	43.00	●
4.10		75.00	43.00	●
4.20		75.00	43.00	●
4.30		80.00	47.00	●
4.37	11/64	80.00	47.00	●
4.40		80.00	47.00	●
4.50		80.00	47.00	●
4.60		80.00	47.00	●

○ bright

**F** FIRE



## Jobber drills without internal coolant, 5 x D



				89261	
				Solid carbide	
				102	
				DZ	
				N	
				F	
				Availability	
d1		l1	l2		
mm	inch	mm	mm		
4.70		80.00	47.00	●	
4.76	3/16	86.00	52.00	●	
4.80		86.00	52.00	●	
4.85		86.00	52.00	●	
4.90		86.00	52.00	●	
5.00	7/16	86.00	52.00	●	
5.06		86.00	52.00	●	
5.10		86.00	52.00	●	
5.16	13/64	86.00	52.00	●	
5.20		86.00	52.00	●	
5.30		86.00	52.00	●	
5.40		93.00	57.00	●	
5.50		93.00	57.00	●	
5.56	7/32	93.00	57.00	●	
5.60		93.00	57.00	●	
5.70		93.00	57.00	●	
5.80		93.00	57.00	●	
5.90		93.00	57.00	●	
5.95	15/64	93.00	57.00	●	
6.00		93.00	57.00	●	
6.10		101.00	63.00	●	
6.20		101.00	63.00	●	
6.30		101.00	63.00	●	
6.35	1/4	101.00	63.00	●	
6.40		101.00	63.00	●	
6.50		101.00	63.00	●	
6.60		101.00	63.00	●	
6.70		101.00	63.00	●	
6.75	17/64	109.00	69.00	●	
6.80		109.00	69.00	●	
6.90		109.00	69.00	●	
7.00		109.00	69.00	●	
7.10		109.00	69.00	●	
7.14	9/32	109.00	69.00	●	
7.30		109.00	69.00	●	
7.40		109.00	69.00	●	
7.50		109.00	69.00	●	
7.54	19/64	117.00	75.00	●	
7.60		117.00	75.00	●	
7.80		117.00	75.00	●	
7.90		117.00	75.00	●	
7.94	5/16	117.00	75.00	●	
8.00		117.00	75.00	●	
8.03		117.00	75.00	●	
8.10		117.00	75.00	●	
8.20		117.00	75.00	●	
8.33	21/64	117.00	75.00	●	
8.40		117.00	75.00	●	
8.50		117.00	75.00	●	
8.60		125.00	81.00	●	
8.70		125.00	81.00	●	
8.73	11/32	125.00	81.00	●	
9.00		125.00	81.00	●	
9.10		125.00	81.00	●	

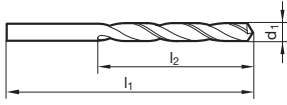
○ bright

● FIRE



# HARTNER

## Jobber drills without internal coolant, 5 x D



				89261
				Solid Carbide
				102
				DZ
				N
				<b>F</b>
				Availability
d1		l1	l2	
mm	inch	mm	mm	
9.13	23/64	125.00	81.00	●
9.20		125.00	81.00	●
9.50		125.00	81.00	●
9.52	3/8	133.00	87.00	●
9.60		133.00	87.00	●
9.80		133.00	87.00	●
9.92	25/64	133.00	87.00	●
10.00		133.00	87.00	●
10.20		133.00	87.00	●
10.30		133.00	87.00	●
10.32	13/32	133.00	87.00	●
10.50		133.00	87.00	●
10.72	27/64	142.00	94.00	●
11.00		142.00	94.00	●
11.11	7/16	142.00	94.00	●
11.50		142.00	94.00	●
12.00		151.00	101.00	●

○ bright

**F** FIRE



## Application recommendations for solid carbide twist drills

Tools with **bold** feed column no. are preferred choice.

### General hints:

For safety reasons it is very important, that a drill does not exceed a speed of  $n = 6\,000$  rev./min when not supported. The centrifugal forces could break these long tools before reaching the workpiece surface!

### Pilot holes are always necessary for drilling depths over 7xD-, 10xD- and 12xD:

- 1.) The pilot hole can be produced with a short, rigid drill. The diameter should be 0.01 - 0.02 mm larger than the diameter of the Ratio drill. Drilling depth  $\geq 1 \times D$ .
- 2.) Alternatively, the Ratio Drills can produce their own pilot hole. Cutting speed and feed rate must therefore be reduced by 30-40%.

A coolant pressure of 40 bar is recommended.

drill dia. mm	Feed column nos.								
	1	2	3	4	5	6	7	8	9
	f (mm/rev.)								
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

with coolant ducts

bright

F FIRE-coated

UF Ultra fine grain

\* Cutting lip corrected to appr. 10°

- Coolant
- soluble oil
  - oil
  - air

$\leq 3xD$  drilling depth

Tool material	Sol. carb.	Sol. carb.
Carbide grade	K10/K20	K10/K20
Carbide description	Carbide	Carbide
Surface finish	○	⦿
Type	N	N
Coolant ducts	-	-

Article no.	Form HA, plain shank		Form HE, whistle notch	
	DIN 6537			
	DIN 6539			
Hartner std.		<b>89235</b>	<b>89253</b>	



Material group	Material examples, <b>new description</b> (old description in brackets) Figures in bold = material no. to DIN EN	Tensile str. MPa (N/mm <sup>2</sup> )	Hard- ness	Cool- ant	v <sub>c</sub> m/min	Feed column no.	v <sub>c</sub> m/min	Feed column no.
Free-cutting steels	<b>1.0718</b> 11SMnPb30 (9SMnPb28), <b>1.0736</b> 11SMn37 (9SMn36) <b>1.0727</b> 46S20 (45S20), <b>1.0728</b> (60S20), <b>1.0757</b> 46SPb20 (45SPb20)	≤850 ≤1000		○			104 91	<b>6</b> <b>5</b>
Unalloyed heat-treatable steels	<b>1.0402</b> C22, <b>1.1178</b> C30E (Ck30) <b>1.0503</b> C45, <b>1.1191</b> C45E (Ck45) <b>1.0601</b> C60, <b>1.1221</b> C60E (Ck60)	≤700 ≤850 ≤1000		○			104 91 78	5 5 5
Alloyed heat-treatable steels	<b>1.5131</b> 50MnSi4, <b>1.7003</b> 38Cr2, <b>1.7030</b> 28Cr4 <b>1.5710</b> 36NiCr6, <b>1.7035</b> 41Cr4, <b>1.7225</b> 42CrMo4	≤1000 ≤1400		○			78	5
Unalloyed case hardened steels	<b>1.0301</b> (C10), <b>1.1121</b> C10E (Ck10)	≤850		○			104	<b>6</b>
Alloyed case hardened steels	<b>1.7043</b> 38Cr4 <b>1.5752</b> 15NiCr13 (15NiCr13), <b>1.7131</b> 16MnCr5, <b>1.7264</b> 20CrMo5	≤1000 ≤1400		●			78	5
Nitriding steels	<b>1.8504</b> 34CrAl6 <b>1.8519</b> 31CrMoV9, <b>1.8550</b> 34CrAlNi7	≤1000 ≤1400		○			65	5
Tool steels	<b>1.1750</b> C75W, <b>1.2067</b> 102Cr6, <b>1.2307</b> 29CrMoV9 <b>1.2080</b> X210Cr12, <b>1.2083</b> X42Cr13, <b>1.2419</b> 105WCr6, <b>1.2767</b> X45NiCrMo4	≤850 ≤1400		○			65	4
High speed steels	<b>1.3243</b> S 6-5-2-5, <b>1.3343</b> S 6-5-2, <b>1.3344</b> S 6-5-3	≤1400		●				
Spring steels	<b>1.5026</b> 55Si7, <b>1.7176</b> 55Cr3, <b>1.8159</b> 51CrV4 (51CrV4)	≤350 HB		○			32	3
Stainless steels, sulphured	<b>1.4005</b> X12CrS13, <b>1.4104</b> X14CrMoS17, <b>1.4105</b> X6CrMoS17, <b>1.4305</b>	≤900		○			32	<b>2</b>
	<b>1.4301</b> X5CrNi18-10 (V2A), <b>1.4541</b> X6CrNiTi18-10, <b>1.4571</b> X6CrNiMoTi	≤1100		○			20	<b>1</b>
	<b>1.4057</b> X20CrNi17.2 (X17CrNi16-2), <b>1.4122</b> X39CrMo17-1, <b>1.4521</b> X2CrMoTi18-2	≤1500		○			32	<b>2</b>
Hardened steels	-	≤48 HRC ≤66 HRC		●			26	4
	Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000	○				
Cast iron	<b>0.6010</b> EN-GJL-100(GG10), <b>0.6020</b> EN-GJL-200(GG20) <b>0.6025</b> EN-GJL-250(GG25), <b>0.6035</b> EN-GJL-350(GG35)	≤240 HB ≤350 HB		○	15 90	<b>2</b> <b>4</b>	20 117	<b>2</b> <b>5</b>
	Spheroidal graphite iron and malleable cast iron	<b>0.7050</b> EN-GJS-500-7(GGG50), <b>0.8035</b> EN-GJMW-350-4(GTW35) <b>0.7070</b> EN-GJS-700-2(GGG70), <b>0.8170</b> EN-GJMB-700-2(GTS70)	≤240 HB ≤350 HB	○	80 70	<b>4</b> <b>4</b>	91 104	<b>5</b> <b>5</b>
Chilled cast iron	-	≤350 HB		○				
Ti and Ti-alloys	<b>3.7024</b> Ti99.5, <b>3.7114</b> TiAl5Sn2.5, <b>3.7124</b> TiCu2 <b>3.7154</b> TiAl6Zr5, <b>3.7165</b> TiAl6V4, <b>3.7184</b> TiAl4Mo4Sn2.5, - TiAl8Mo1V1	≤850 ≤1400		○	15 15	<b>1</b> <b>1</b>	15 15	<b>1</b> <b>1</b>
	Aluminium and Al-alloys	<b>3.0255</b> Al99.5, <b>3.2315</b> AlMgSi1, <b>3.3515</b> AlMg1	≤400	○	200	<b>7</b>	260	<b>8</b>
Al wrought alloys	<b>3.0615</b> AlMgSiPb, <b>3.1325</b> AlCuMg1, <b>3.3245</b> AlMg3Si, <b>3.4365</b> AlZnMgCu1.5	≤650		○	200	<b>7</b>	260	<b>8</b>
Al cast alloys ≤ 10 % Si	<b>3.2131</b> G-AlSi5Cu1, <b>3.2153</b> G-AlSi7Cu3, <b>3.2573</b> G-AlSi9	≤600		○	150	<b>6</b>	195	<b>7</b>
	<b>3.2581</b> G-AlSi12, <b>3.2583</b> G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○	120	<b>6</b>	156	<b>7</b>
Magnesium alloys	<b>3.5200</b> MgMn2, <b>3.5812.05</b> G-MgAl8Zn1, <b>3.5612.05</b> G-MgAl6Zn1	≤400		○	180	<b>5</b>	234	<b>6</b>
Copper, low-alloyed	<b>2.0070</b> SE-Cu, <b>2.1020</b> CuSn6, <b>2.1096</b> G-CuSn5ZnPb	≤500		○	80	<b>5*</b>	104	<b>6</b>
Brass, short-chipping	<b>2.0380</b> CuZn39Pb2, <b>2.0401</b> CuZn39Pb3, <b>2.0410</b> CuZn43Pb2	≤600		○	180	<b>5*</b>	234	<b>6</b>
	long-chipping	<b>2.0250</b> CuZn20, <b>2.0280</b> CuZn33, <b>2.0332</b> CuZn37Pb0.5	≤600		180	<b>5*</b>	234	<b>6</b>
Bronze, short-chipping	<b>2.1090</b> CuSn7ZnPb, <b>2.1170</b> CuPb5Sn5, <b>2.1176</b> CuPb10Sn	≤600		○	120	5	156	<b>6</b>
	<b>2.0790</b> CuNi18Zn19Pb	≤850		○	120	5	156	<b>6</b>
Bronze, long-chipping	<b>2.0916</b> CuAl5, <b>2.0960</b> CuAl9Mn, <b>2.1050</b> CuSn10	≤850		○	70	4	91	5
	<b>2.0980</b> CuAl11Ni, <b>2.1247</b> CuBe2	≤1000		○	50	3	65	4
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren	≤150		○	50	4	65	5
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100		○	40	3	52	4
Kevlar	Kevlar	≤1000		○				
Glass, carbon concent. plastics	GFK/CFK	≤1000		○	80	3	104	4





## ≤5xD drilling depth

## ≤7xD ≤10xD ≤12xD

Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.
K/P	K/P	K10/K20	K10/K20	K/P	K/P	K	K/P	K	K/P
Carbide-UF	Carbide-UF	Carbide	Carbide	Carbide-UF	Carbide-UF	Carbide-UF	Carbide-UF	Carbide-UF	Carbide-UF
TS 100 U	TS 100 U	N	N	TS 100 U	TS 100 U	TS 3 G	TS 100 U	TS 150 GG	TS 100 U
	-	-	-		-	-			
<b>89410</b>	<b>89413</b>			<b>89411</b>	<b>89414</b>	<b>89247</b>	<b>89412</b>		
<b>89415</b>	<b>89402</b>			<b>89408</b>	<b>89417</b>		<b>89416</b>		
		<b>89244</b>	<b>89261</b>					<b>89293</b>	<b>89418</b>

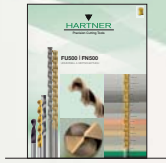


V <sub>c</sub> m/min	Feed column no.	V <sub>c</sub> m/min	Feed column no.	V <sub>c</sub> m/min	Feed column no.	V <sub>c</sub> m/min	Feed column no.	V <sub>c</sub> m/min	Feed column no.	V <sub>c</sub> m/min	Feed column no.	V <sub>c</sub> m/min	Feed column no.	V <sub>c</sub> m/min	Feed column no.	V <sub>c</sub> m/min	Feed column no.	V <sub>c</sub> m/min	Feed column no.
145	7	130	7			100	5	145	7	130	7								
120	6	110	6			90	5	120	6	110	6								
170	8	145	8			100	6	170	8	145	8								
145	8	110	7			90	4	145	8	110	7								
130	8	120	7			100	5	130	8	120	7								
125	7	110	7			90	5	125	7	110	7								
120	7	105	7			80	5	120	7	105	7								
120	7	105	7			80	5	120	7	105	7								
105	7	100	6			80	5	105	7	100	6								
145	8	130	8			100	6	145	8	130	8								
120	7	120	7			80	5	120	7	120	7								
85	5	85	5					85	5	85	5								
110	7	100	6			65	5	105	7	100	6								
105	5	90	5					100	5	90	5								
80	6	65	6			65	3	70	6	65	6								
65	5	55	5					55	5	55	5								
60	4							60	5										
60	3	45	3					60	3	45	3								
60	5	55	4			30	3	60	5	55	4								
55	5	45	4			20	1	55	5	45	4								
45	5	45	3			30	2	50	5	45	3								
55	3	45	3			20	2	55	3	45	3								
35	2	25	2					35	2	25	2								
35	4	25	4	15	2	20	2	35	4	25	4								
210	9	210	8	90	4	115	5	195	9	210	8								
160	9	155	8	80	4	100	5	160	9	155	8								
140	9	155	7	80	4	90	5	140	9	145	7								
130	8	125	7	70	4	80	5	130	8	125	7								
40	3	35	3					40	3	35	3								
45	4	40	4	15	1	15	1	45	4	40	4								
40	3	35	3	15	1	15	1	40	3	35	3								
310	9	260	9	200	7	260	8	310	9	260	9								
310	9	260	9	200	7	260	8	310	9	260	9								
260	9	220	8	150	6	195	7	260	9	235	9								
220	9	180	8	120	6	155	7	220	9	170	8								
280	8	260	8	180	5*	235	6	280	8	260	8								
125	7	105	7	80	5*	100	6	125	7	105	7								
325	8	270	8	180	5*	235	6	325	8	270	8								
220	7	180	7	180	5*	235	6	220	7	180	7								
125	7	105	6	120	5	155	6	125	7	105	6								
105	6	85	6	120	5	155	6	105	6	85	6								
90	6	80	5	70	4	90	5	90	6	80	5								
80	6	60	5	50	3	65	4	80	6	60	5								
				50	4	50	5												
				40	3	65	4												
				80	3	100	4												





## Our programme:



FU 500/FN500



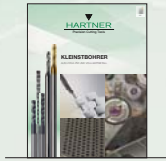
Gun Drills



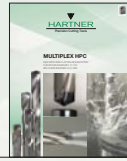
INOX Drills



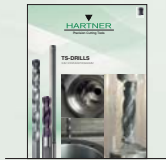
Multiplex



Micro Precision Drills



Multiplex HPC



TS-Drills



Standard Range



Highlights



TM Vending Machines



Threading Tools



Solid Carbide  
High Performance Milling Cutters



De-burring Tools



Chamfering Milling Cutters



TF 100 Multi-Mill

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