

botek[®]

DEEP HOLE DRILLING SYSTEMS
SOLID CARBIDE TOOLS

Deep hole drilling tools

System BTA (STS)



botek



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botek – the company

botek is a globally active specialist for cutting tools with around 750 employees at the main plant in Riederich at the foot of the Swabian Alb. With production facilities in France, Hungary and India as well as over 50 international sales and support partners worldwide, we are always at your side around the globe.

For over 50 years, our focus has been on the development and production of drilling tools: deep hole drilling tools with diameters from 0.5 mm to 1500 mm, milling cutters and reaming tools as well as the associated services. Today, we continue this specialisation successfully, sustainably and keep our innovation-oriented values for the next generation as well.

In the age of technological change, however, new demands also require new thinking.

Our focus is no longer solely on tool development and production but is being meaningfully complemented by innovative and goal-oriented project management.

Our objectives are the design and conception of optimisation processes along with the development and implementation of complete turnkey projects, which we implement effectively with the cooperation of our experienced team of technician and project managers as well as our customers.

This is why botek technology leads the way – now and in the future.



- Please note our safety pointers at www.botek.de.
- Our General Standard Terms and Conditions, which we assume as known, apply.
- We reserve the right to make modifications in the interest of technical improvement. Such modifications cannot, in principle, be accepted as justifiable reasons for complaints.
- Subject to change. The manufacturer accepts no responsibility for misprints and other errors.

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Overview of types






1-start connection thread internal	4-start connection thread external	
		Type 14 solid drilling tool - High cutting capacity and simple handling - Stable tool - Suitable for extremely close tolerances - Low up-front costs for small batches
		Type 20 solid drilling tool - Simple handling - Stable tool - Tools can be reground several times - Suitable for extremely close tolerances - Low up-front costs for small batches
		Type 11 / 61 solid drilling tool - Indexable inserts with various chip breakers available to suit processed material - Very economical, with optimal cutting capacity - No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm - Tool adjustment range up to 0.5 mm using suitable replacement parts - Ø fine adjustment with stop plate
		Type 12 / 64 solid drilling tool - New chip breakers for large feed rates and high productivity - No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm - Tool adjustment range up to 0.5 mm using suitable replacement parts - Minimal axis deviation at large drilling depths - Ø fine adjustment with stop plate
		Type 70 A / B solid drilling tool - Very few wear parts over the whole drilling range - New chip breakers for large feed rates and high productivity - No adjustment after a change of indexable inserts - We keep wear parts in stock
		Type 43 A / B / F solid drilling tool - Simplest operation, change of wear parts without readjustment within +/- 0.01 mm - Wear parts can be exchanged on the machine - Tool adjustment range up to 10 mm using suitable replacement parts - New cutting geometries for high cutting capacity - Minimal axis deviation at large drilling depths - Ø fine adjustment with stop plate
		Type 13 A / B counterboring tool - New chip breakers for large feed rates and high productivity - No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm - Tool adjustment range up to 0.5 mm using suitable replacement parts - Maximum shape accuracy and hole straightness - Ø fine adjustment with stop plate
		Type 34 / 35 counterboring tool - Tool adjustment range up to 50 mm - Low requirement for tools over the whole drilling range - Adjustment system for easy change of diameter - New patented adjustment system with a central adjusting ring from Ø 149 mm - No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm - Ø fine adjustment with stop plate
 1-start	 1-start	Type 33 / 36 counterboring tool - Tool with fixed adjustment - No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm - Type 33 tool adjustment range up to 50 mm - For internal machining of hydraulic cylinders
		Type 38 / 58 pullboring tool - Bore tolerance in the range of IT7 (IT6) roundness/diameter - Tool adjustment range up to 5 mm - No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm - Special tool for smallest centerline deviations
		Type 28 / 48 trepanning tool - Tool adjustment range up to 5 mm - No adjustment required when changing wearing parts, no readjustment within +/- 0.01 mm - For machines with insufficient spindle power - The core may be reused for new workpieces - Ø fine adjustment with stop plate

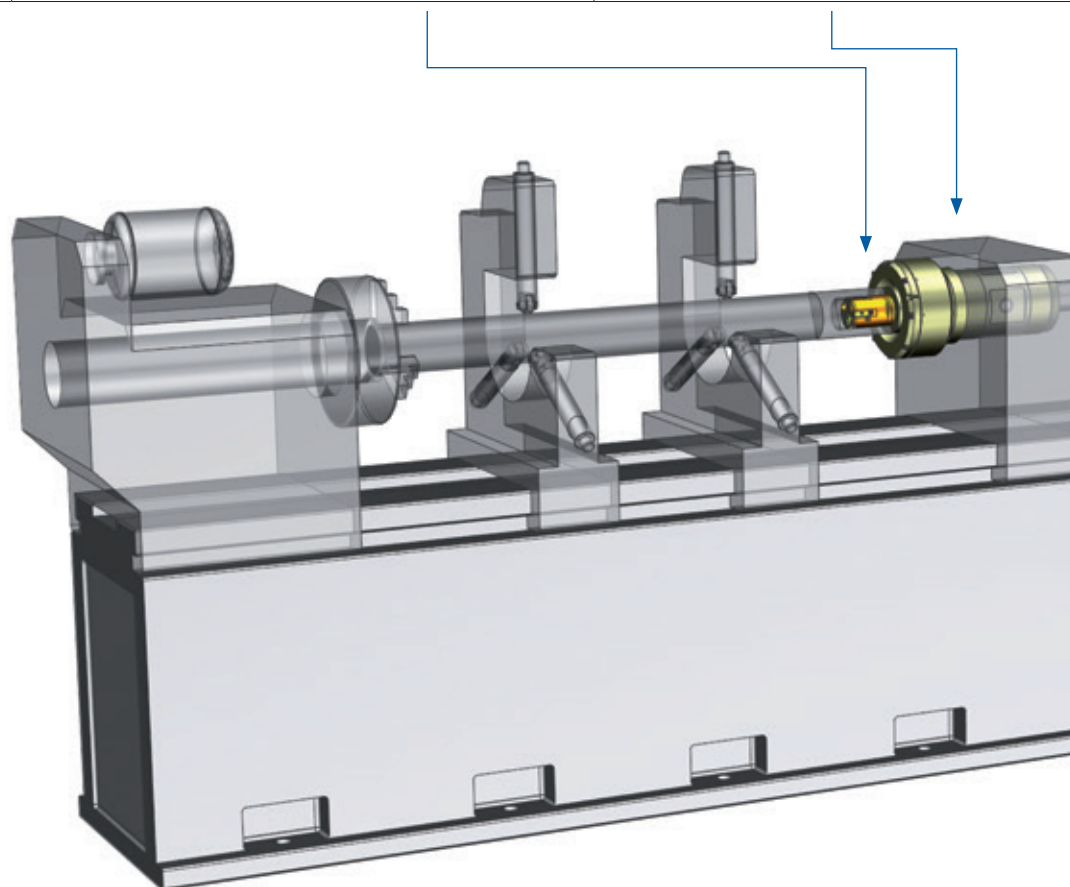
Areas of application




Page	Surface quality Ra	Drilling tolerance	Workpiece material				
			Steel	Stainless steel	Cast iron	Aluminium alloys	Heat resisting alloys
8, 9	2 µm	IT 8 (IT 7)	• • •	• • •	• • •	• • •	• • •
10, 11	2 µm	IT 8 (IT 7)	• • •	• •	• • •	• •	•
12, 13, 14, 15	2 µm	IT 8 (IT 7)	• • •	• • •	• • •	• • •	• • •
16, 17	2 µm	IT 8	• • •	• • •	• • •	• • •	• • •
18, 19	2 µm	IT 10	• • •	• • •	• • •	• • •	• • •
20, 21, 22, 23	2 µm	IT 8	• • •	• • •	• • •	• • •	• • •
24, 25	2 µm	IT 7	• • •	• • •	• • •	• • •	• • •
26, 27, 28, 29	2 µm	IT 7	• • •	• • •	• • •	• • •	• • •
30, 31	2 µm	IT 12	• • •	• •	• • •	• • •	• •
32, 33	2 µm	IT 7 (IT 6)	• • •	• • •	• • •	• • •	• • •
34, 35	2 µm	IT 9	• • •	• •	• • •	• •	•

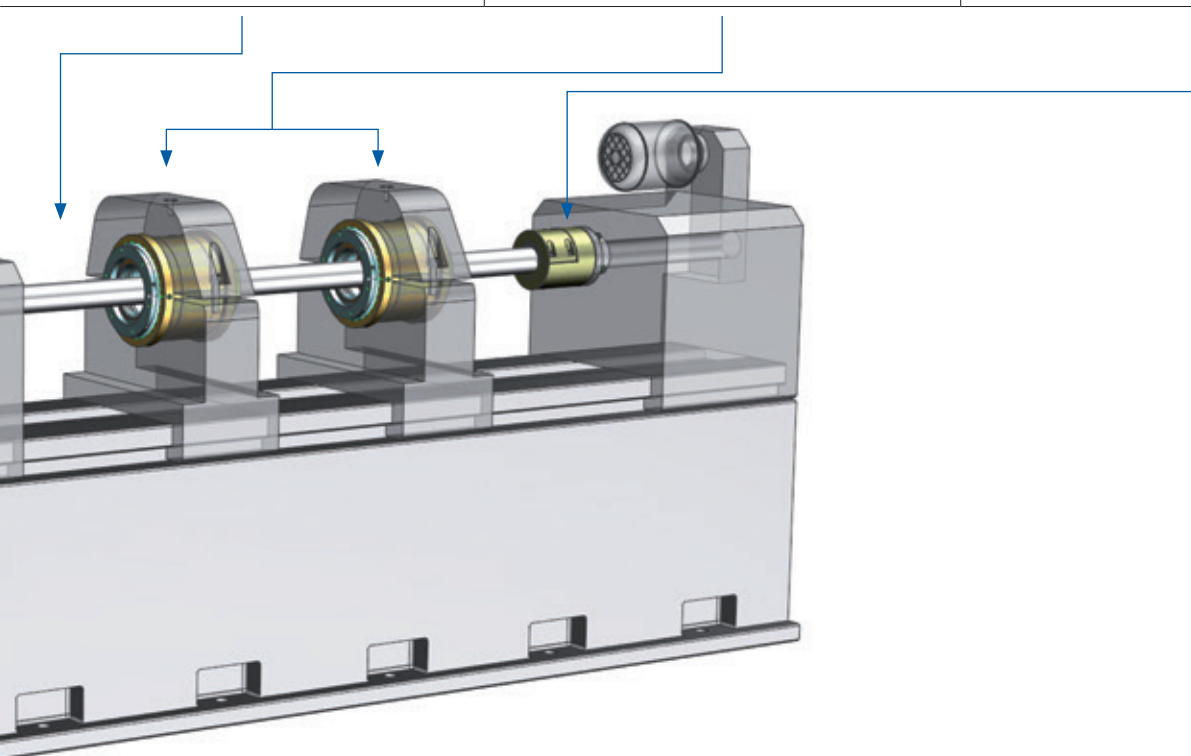
• • • = good • = on average

BTA (STS) system Deep-hole drilling

Drilling diameter (mm)	Drilling methods	Oil pressure head (BOZA)
7.76 - 700 Page 8 - 23	Page 54, 55 Solid drilling 	Page 45 
28.71 - 800 Page 24 - 33	Counterboring 	
55.00 - 600 Page 34 - 35	Trepanning 	
15.00 - 300 Page 37	Formboring 	



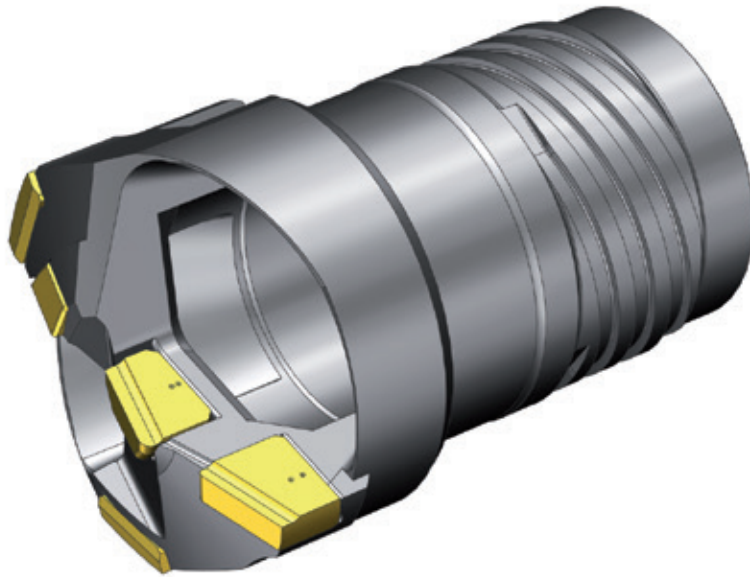
Drill tube	Vibration damper	Drill tube clamping
Page 38 - 41	Page 46, 47	Page 48, 49
		



Type 14

Solid drill head, brazed type

Ø 15.60 to 65.00 mm



Type 14

Advantages:

- High cutting capacity and simple handling
- Stable tool
- Suitable for extremely close tolerances
- Low up-front costs for small batches

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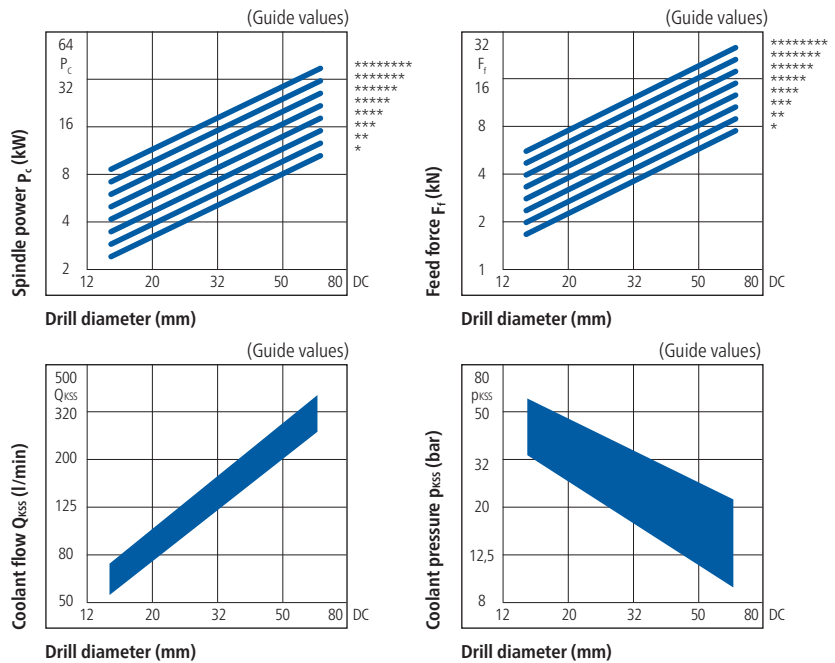
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

*****	f = 0.4 (mm/rev)
*****	f = 0.32 (mm/rev)
*****	f = 0.25 (mm/rev)
*****	f = 0.2 (mm/rev)
****	f = 0.16 (mm/rev)
***	f = 0.125 (mm/rev)
**	f = 0.1 (mm/rev)
*	f = 0.08 (mm/rev)

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for deep hole drilling of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

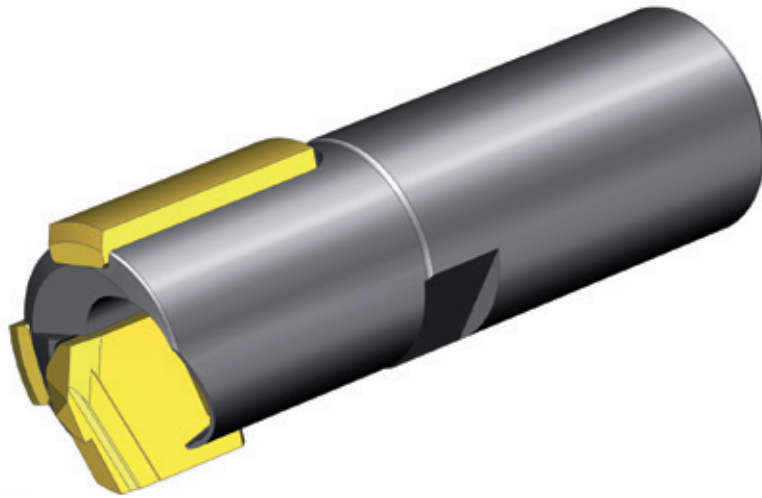
Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)				Carbide grade combination
		15.60 - 20.00	20.01 - 31.00	31.01 - 43.00	43.01 - 65.00	
Structural steel Rm ≤ 700 N/mm ²	70 - 120	0.10 - 0.20	0.15 - 0.25	0.15 - 0.30	0.18 - 0.32	020
Case hardening steel Rm ≤ 750 N/mm ²	70 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	
Case hardening steel Rm ≤ 1100 N/mm ²	55 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	
Ferritic steel Rm ≤ 900 N/mm ²	40 - 85	0.12 - 0.20	0.18 - 0.25	0.22 - 0.30	0.24 - 0.36	029*/020
Austenitic steel	40 - 85	0.10 - 0.20	0.18 - 0.25	0.22 - 0.30	0.24 - 0.36	
Heat resisting steel Tool steel	50 - 100	0.10 - 0.20	0.17 - 0.25	0.20 - 0.30	0.24 - 0.32	020
Steel castings Rm ≤ 700 N/mm ²	50 - 100	0.12 - 0.20	0.15 - 0.25	0.20 - 0.30	0.24 - 0.36	029*/020
Nodular cast iron Rm ≤ 1000 N/mm ²	50 - 100	0.10 - 0.18	0.15 - 0.22	0.20 - 0.28	0.24 - 0.32	020
Cast iron	60 - 100	0.10 - 0.18	0.15 - 0.22	0.20 - 0.28	0.24 - 0.32	
Aluminium Aluminium alloys	65 - 130	0.10 - 0.20	0.16 - 0.25	0.20 - 0.28	0.20 - 0.45	
Copper Cu-content < 99%	65 - 130	0.05 - 0.20	0.05 - 0.25	0.05 - 0.30	0.05 - 0.45	

* first recommendation (Guide values)

Type 20

Solid drill head, brazed type

Ø 14.51 to 36.99 mm



Type 20
1-start internal thread

Advantages:

- Simple handling
- Tools can be reground several times
- Stable tool
- Suitable for extremely close tolerances
- Low up-front costs for small batches

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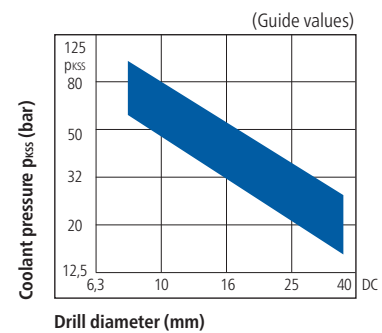
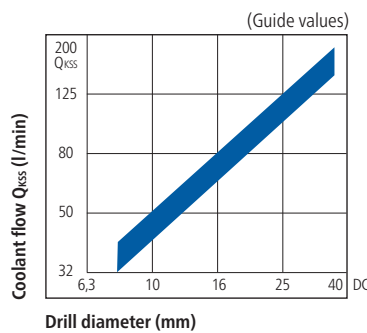
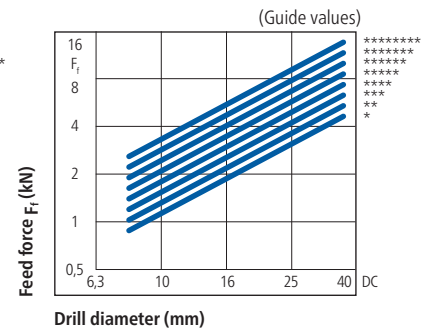
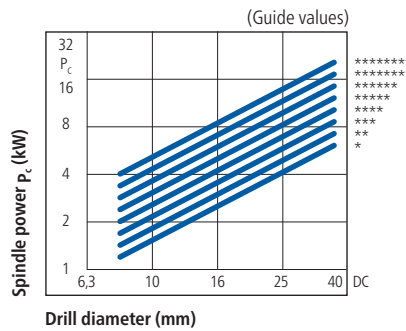
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

*****	f = 0.4 (mm/rev)
*****	f = 0.32 (mm/rev)
*****	f = 0.25 (mm/rev)
*****	f = 0.2 (mm/rev)
****	f = 0.16 (mm/rev)
***	f = 0.125 (mm/rev)
**	f = 0.1 (mm/rev)
*	f = 0.08 (mm/rev)

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for deep hole drilling of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)			Carbide grade
		14.51 - 15.99	16.00 - 24.99	25.00 - 36.99	Insert
					Type 20
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.02 - 0.04	0.03 - 0.10	0.05 - 0.18	010
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.02 - 0.04	0.03 - 0.10	0.05 - 0.18	
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.02 - 0.04	0.05 - 0.12	0.10 - 0.18	
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.02 - 0.04	0.05 - 0.12	0.10 - 0.20	
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.02 - 0.04	0.05 - 0.12	0.10 - 0.20	
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.02 - 0.04	0.05 - 0.12	0.05 - 0.18	
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.02 - 0.04	0.02 - 0.06	0.02 - 0.10	022
Austenitic steel	60 - 80	0.02 - 0.04	0.02 - 0.06	0.02 - 0.10	
Heat resisting steel Tool steel	50 - 70	0.02 - 0.04	0.05 - 0.12	0.05 - 0.18	010
Steel castings Rm ≤ 700 N/mm ²	60 - 80	0.02 - 0.04	0.03 - 0.10	0.05 - 0.18	
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.02 - 0.04	0.05 - 0.15	0.10 - 0.23	
Cast iron alloyed and unalloyed	70 - 100	0.02 - 0.04	0.05 - 0.12	0.05 - 0.18	022
Aluminium Aluminium alloys	100 - 200	0.02 - 0.04	0.02 - 0.06	0.02 - 0.10	
Copper Cu-content < 99%	120 - ...	0.02 - 0.04	0.02 - 0.10	0.02 - 0.15	

Type 11 / 61

Solid drill head with exchangeable inserts and guide pads

Ø 14.55 to 17.95 mm



Type 11

Drilling range Ø 14.55 - 17.95 mm



Type 61

Drilling range Ø 15.65 – 17.95 mm

Advantages:

- Very economical, with optimal cutting performance
- Cutting inserts with various chip breakers available to suit processed material
- No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm
- Tool adjustment range up to 0.5 mm using suitable replacement parts
- Ø-fine adjustment with stop plate



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New carbide grade for
cutting inserts available

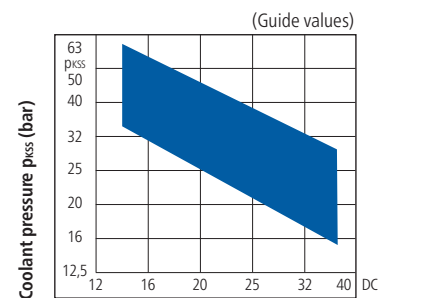
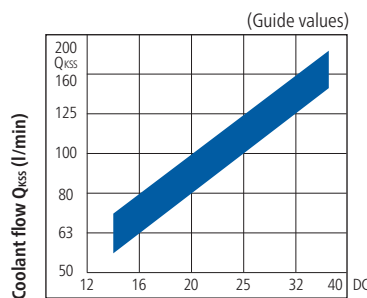
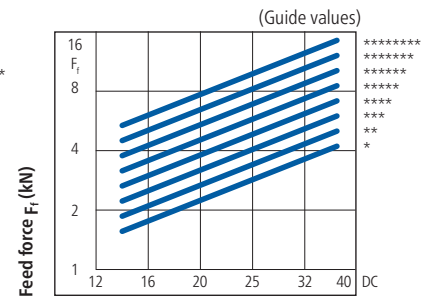
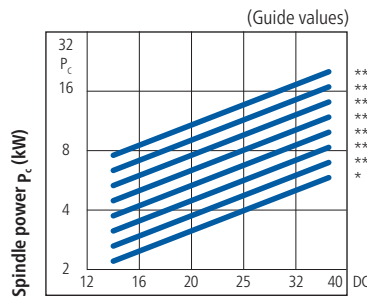
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

*****	f = 0.4 (mm/rev)
*****	f = 0.32 (mm/rev)
*****	f = 0.25 (mm/rev)
*****	f = 0.2 (mm/rev)
****	f = 0.16 (mm/rev)
****	f = 0.125 (mm/rev)
***	f = 0.1 (mm/rev)
**	f = 0.08 (mm/rev)
*	f = 0.08 (mm/rev)

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for deep hole drilling of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)				Carbide grade		
		14.55 - 17.99	18.00 - 24.99	25.00 - 31.99	32.00 - 36.99	Insert		Guide pads
						to 17.99	from 18.00	
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16	K 30 B - 1	P 25 B - 2	P 20 B
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16			
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.06 - 0.10	0.08 - 0.11	0.10 - 0.13	0.12 - 0.15	225 S - 91	225 S - 91	
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16			
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.06 - 0.10	0.08 - 0.11	0.10 - 0.13	0.12 - 0.15			
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.06 - 0.09	0.08 - 0.10	0.09 - 0.12	0.11 - 0.14	K 10 B - 1	K 10 B - 2	
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16			
Austenitic steel	60 - 80	0.06 - 0.09	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14			
Heat resisting steel Tool steel	50 - 70	0.06 - 0.09	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14			
Steel castings Rm ≤ 700 N/mm ²	60 - 80	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16	225 S - 91	225 S - 91	
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.08 - 0.12	0.10 - 0.13	0.12 - 0.15	0.14 - 0.18			
Cast iron alloyed and unalloyed	70 - 100	0.08 - 0.12	0.10 - 0.13	0.12 - 0.15	0.14 - 0.18	K 10 - 1	K 10 - 1	
Aluminium Aluminium alloys	100 - 200	0.07 - 0.11	0.09 - 0.12	0.10 - 0.14	0.12 - 0.18			
Copper Cu-content < 99%	120 - ...	0.04 - 0.09	0.06 - 0.10	0.08 - 0.12	0.10 - 0.14			

Type 11 / 61

Solid drill head with exchangeable inserts and guide pads

Ø 18.00 to 36.99 mm



Type 11

Drilling range Ø 18.00 - 36.99 mm

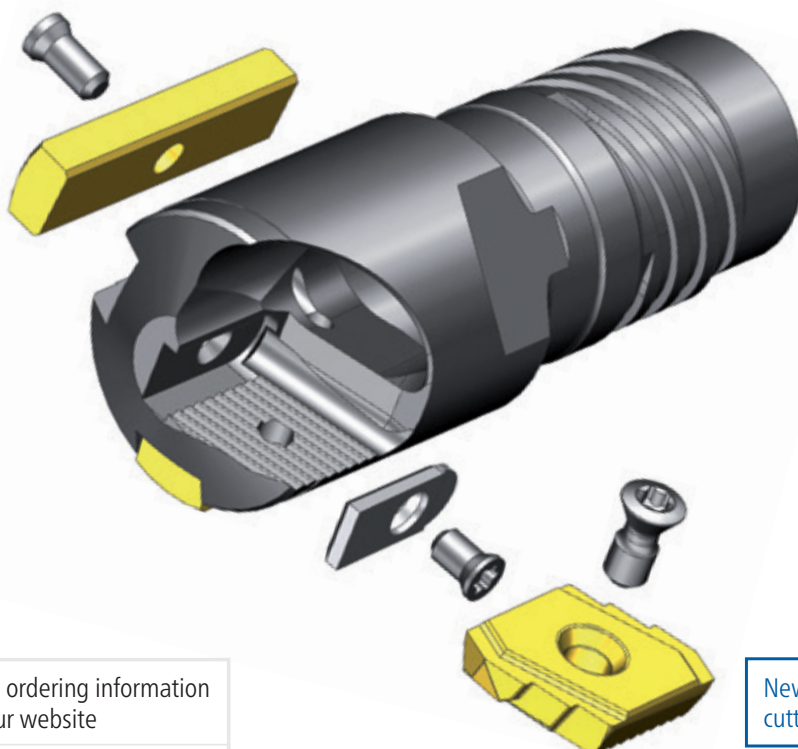


Type 61

Drilling range Ø 18.00 - 36.20 mm

Advantages:

- Very economical, with optimal cutting performance
- Indexable inserts with various chip breakers available to suit processed material
- Tool adjustment range up to 0.5 mm using suitable replacement parts
- Ø-fine adjustment with stop plate
- No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm



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New carbide grade for
cutting inserts available

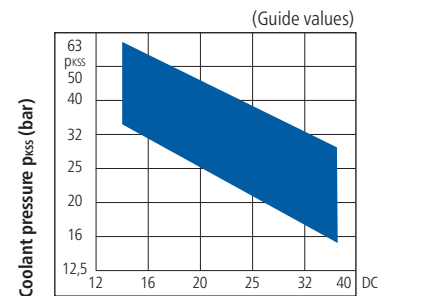
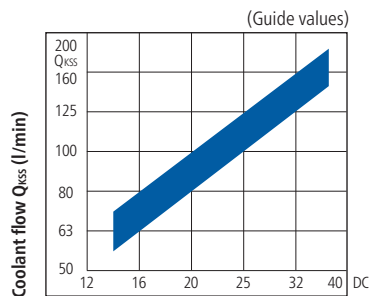
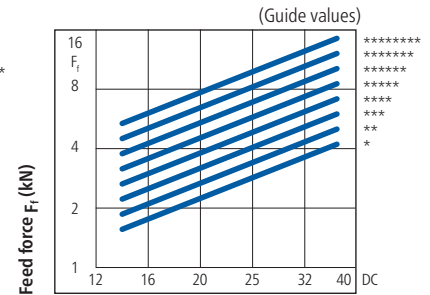
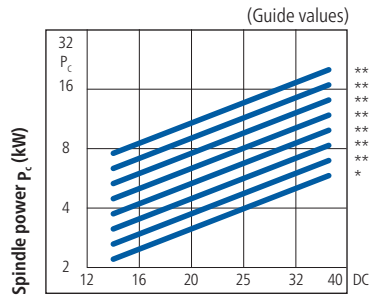
Power requirements:

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*****	f = 0.4 (mm/rev)
*****	f = 0.32 (mm/rev)
*****	f = 0.25 (mm/rev)
*****	f = 0.2 (mm/rev)
****	f = 0.16 (mm/rev)
****	f = 0.125 (mm/rev)
***	f = 0.1 (mm/rev)
**	f = 0.08 (mm/rev)
*	f = 0.08 (mm/rev)

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for deep hole drilling of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)				Carbide grade		Guide pads
		14.55 - 17.99	18.00 - 24.99	25.00 - 31.99	32.00 - 36.99	Insert		
						to 17.99	from 18.00	
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16	K 30 B - 1	P 25 B - 2	P 20 B
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16			
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.06 - 0.10	0.08 - 0.11	0.10 - 0.13	0.12 - 0.15	225 S - 91	225 S - 91	
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16			
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.06 - 0.10	0.08 - 0.11	0.10 - 0.13	0.12 - 0.15			
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.06 - 0.09	0.08 - 0.10	0.09 - 0.12	0.11 - 0.14	K 10 B - 1	K 10 B - 2	
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16			
Austenitic steel	60 - 80	0.06 - 0.09	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14			
Heat resisting steel Tool steel	50 - 70	0.06 - 0.09	0.08 - 0.10	0.10 - 0.12	0.12 - 0.14			
Steel castings Rm ≤ 700 N/mm ²	60 - 80	0.06 - 0.10	0.08 - 0.11	0.10 - 0.14	0.13 - 0.16	225 S - 91	225 S - 91	
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.08 - 0.12	0.10 - 0.13	0.12 - 0.15	0.14 - 0.18			
Cast iron alloyed and unalloyed	70 - 100	0.08 - 0.12	0.10 - 0.13	0.12 - 0.15	0.14 - 0.18	K 10 - 1	K 10 - 1	
Aluminium Aluminium alloys	100 - 200	0.07 - 0.11	0.09 - 0.12	0.10 - 0.14	0.12 - 0.18			
Copper Cu-content < 99%	120 - ...	0.04 - 0.09	0.06 - 0.10	0.08 - 0.12	0.10 - 0.14			

Type 12 / 64

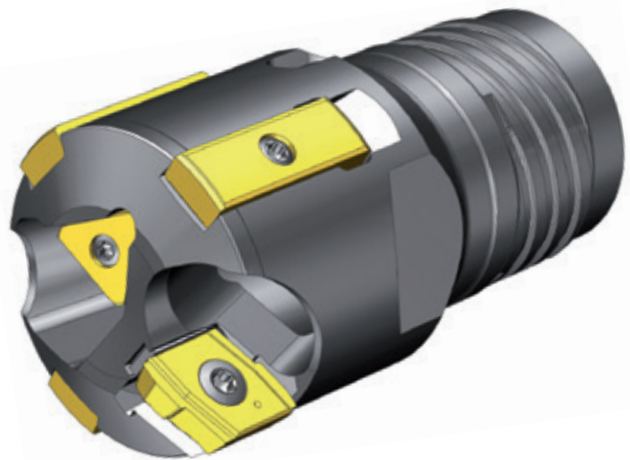
Solid drill head with indexable inserts and guide pads

Ø 28.50 to 74.99 mm



Type 12

Drilling range Ø 28.50 - 74.99 mm

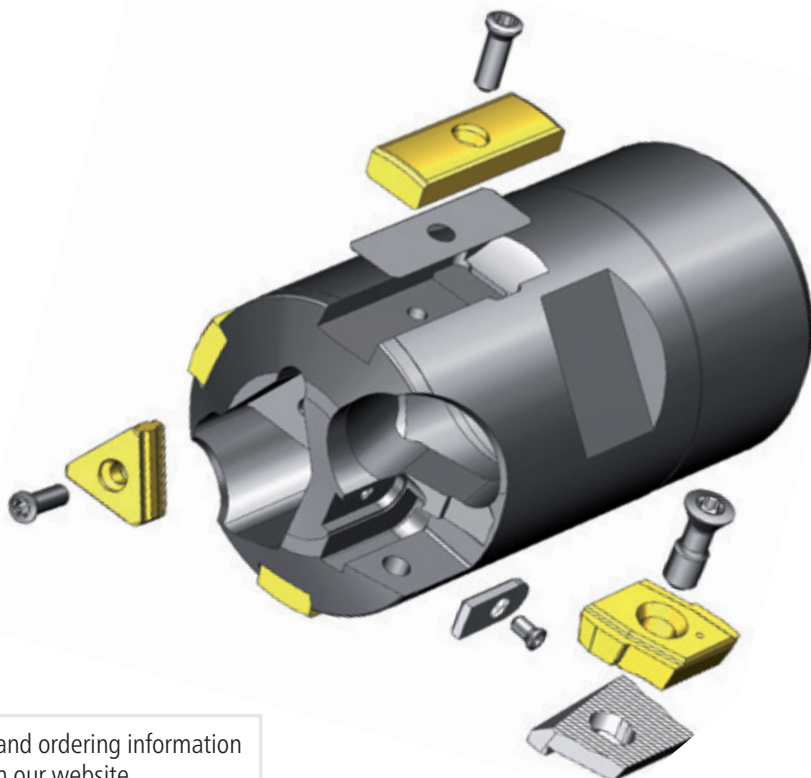


Type 64

Drilling range Ø 28.71 - 74.99 mm

Advantages:

- New chip breakers for high feed rates and high productivity
- No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm
- Tool adjustment range up to 0.5 mm using suitable replacement parts
- Minimal axis deviation at large drilling depths
- Ø-fine adjustment with stop plate



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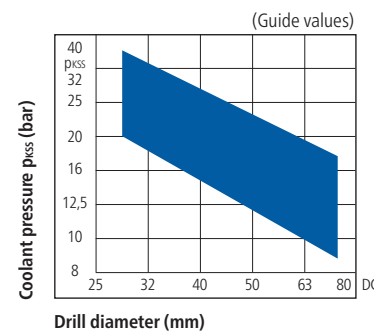
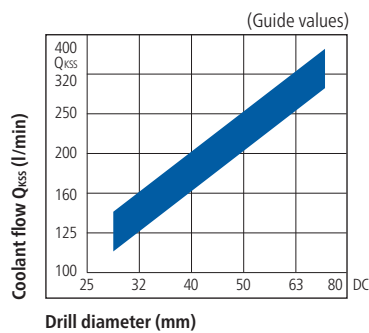
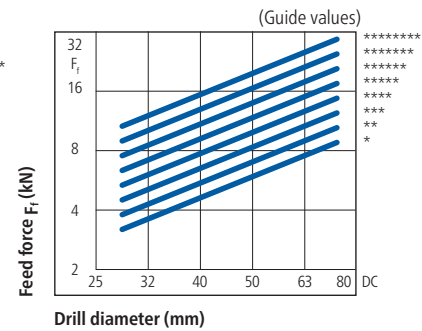
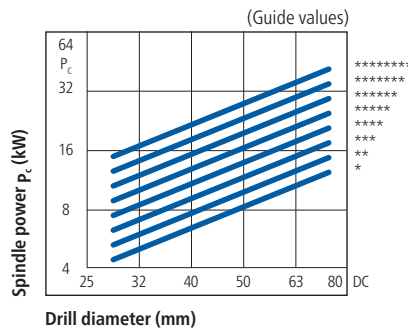
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

*****	f = 0.4 (mm/rev)
*****	f = 0.32 (mm/rev)
*****	f = 0.25 (mm/rev)
*****	f = 0.2 (mm/rev)
****	f = 0.16 (mm/rev)
***	f = 0.125 (mm/rev)
**	f = 0.1 (mm/rev)
*	f = 0.08 (mm/rev)

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for deep hole drilling of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)			Carbide grade		
		28.70 - 39.99	40.00 - 51.99	52.00 - 74.99	Outer insert	Intermediate insert	Guide pads
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.12 - 0.18	0.15 - 0.20	0.15 - 0.22	P 25 B - 2	P 40 B - 1	P 20 B
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.12 - 0.18	0.15 - 0.20	0.15 - 0.22	P 25 B - 1		
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.20 - 0.25	0.20 - 0.30	0.20 - 0.35	P 25 B - 5		
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.20 - 0.28	0.20 - 0.35	0.20 - 0.40			
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.20 - 0.25	0.20 - 0.30	0.20 - 0.30	P 25 B - 1		
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.20 - 0.25	0.20 - 0.30	0.20 - 0.30	K 10 BX - 2	K 10 BX - 1	
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.15 - 0.25	0.15 - 0.30	0.20 - 0.30			
Austenitic steel	60 - 80	0.08 - 0.12	0.10 - 0.18	0.10 - 0.22	P 25 B - 5	P 40 B - 1	
Heat resisting steel Tool steel	50 - 70	0.15 - 0.25	0.20 - 0.25	0.20 - 0.30			
Cast iron alloyed and unalloyed	60 - 80	0.20 - 0.25	0.20 - 0.35	0.20 - 0.35			
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.20 - 0.35	0.25 - 0.40	0.25 - 0.50			
Steel castings Rm ≤ 700 N/mm ²	70 - 100	0.20 - 0.35	0.20 - 0.40	0.20 - 0.50	K 10 B - 5	K 10 BX - 1	
Aluminium Aluminium alloys	100 - 200	0.08 - 0.25	0.10 - 0.30	0.10 - 0.45			
Copper Cu-content < 99%	120 - ...	0.07 - 0.15	0.10 - 0.25	0.10 - 0.25	K 10 - 1		

Type 70 A / B

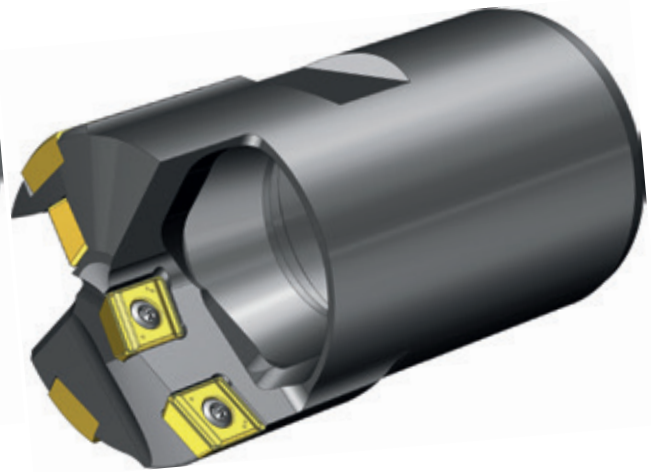
Solid drill head with indexable inserts and guide pads

Ø 25.00 to 65.00 mm



Type 70 A

Drilling range Ø 25.00 - 65.00 mm

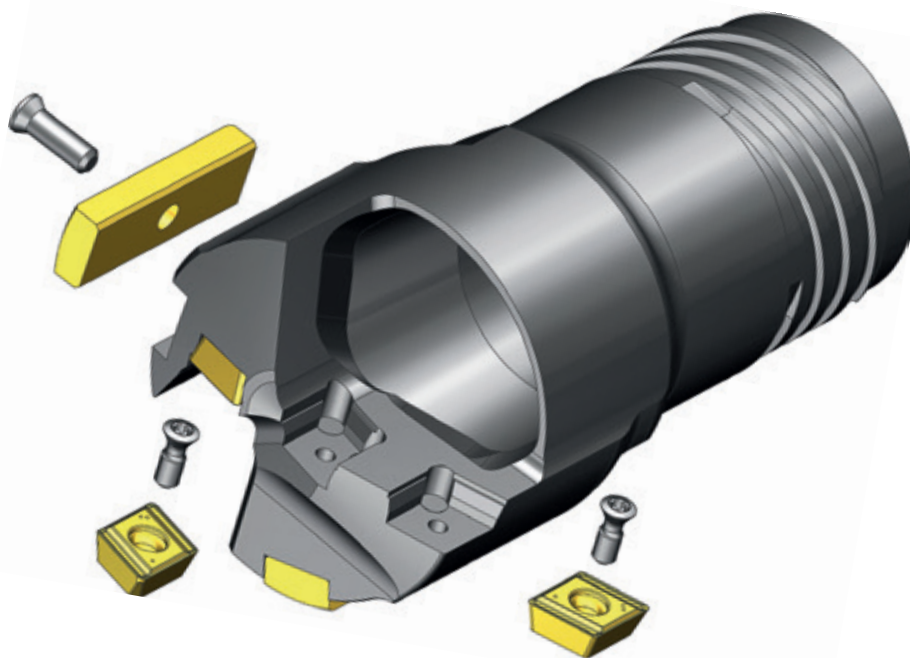


Type 70 B

Drilling range Ø 25.00 - 65.00 mm

Advantages:

- Very few wear parts over the whole drilling range
- New chip breakers for high feed rates and high productivity
- No adjustment after a change of indexable inserts
- We keep wear parts in stock
- Newly designed tool shape for optimum cooling lubricant flow
- Reinforced drill head body in the area of the peripheral insert
- Maximum protection of guide pads against damage due to enhanced embedding
- Highly wear-resistant drill head body



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New:
Stock program Type 70

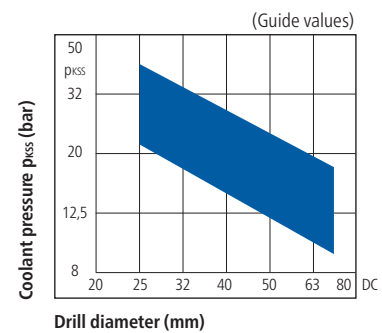
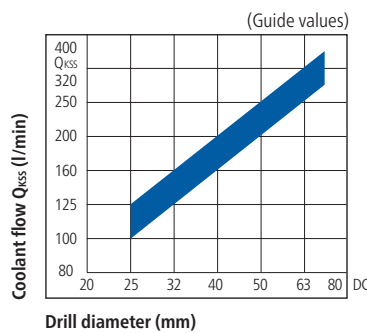
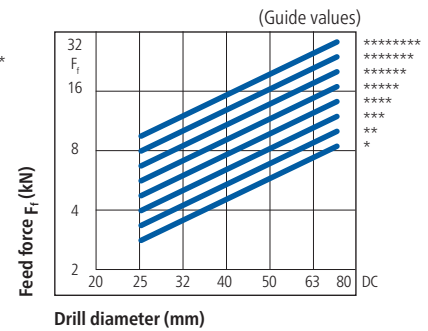
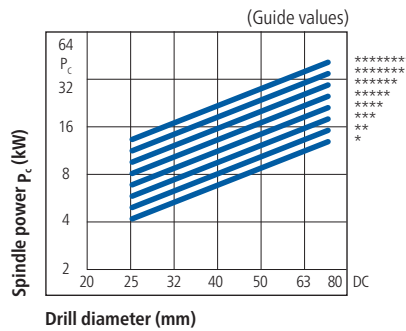
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

*****	f = 0.4 (mm/rev)
*****	f = 0.32 (mm/rev)
*****	f = 0.25 (mm/rev)
*****	f = 0.2 (mm/rev)
****	f = 0.16 (mm/rev)
***	f = 0.125 (mm/rev)
**	f = 0.1 (mm/rev)
*	f = 0.08 (mm/rev)

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for deep hole drilling of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)			Carbide grade combination			
		25.00 - 29.99	30.00 - 44.99	45.00 - 65.00	Outer insert / Intermediate insert	Intermediate insert	Centre insert	Guide pad
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.10 - 0.20	0.10 - 0.25	0.15 - 0.30	U 225 BX - 2			
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.10 - 0.25	0.10 - 0.35	0.15 - 0.40	U 225 BX - 5	U 225 BX - 5	U 440 BX - 5	P 20 B
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.20 - 0.25	0.20 - 0.30	0.20 - 0.35				
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.20 - 0.25	0.25 - 0.30	0.25 - 0.40				
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.20 - 0.25	0.25 - 0.30	0.25 - 0.30				
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.15 - 0.20	0.15 - 0.20	0.15 - 0.25				
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.10 - 0.20	0.10 - 0.25	0.15 - 0.25	U 225 BX - 2			
Austenitic steel	60 - 80	0.10 - 0.20	0.10 - 0.25	0.15 - 0.25				
Heat resisting steel Tool steel	50 - 70	0.15 - 0.20	0.15 - 0.20	0.15 - 0.25				
Steel castings Rm ≤ 700 N/mm ²	60 - 80	0.20 - 0.25	0.25 - 0.30	0.20 - 0.35	U 225 BX - 5			
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.20 - 0.35	0.25 - 0.40	0.30 - 0.40				
Cast iron alloyed and unalloyed	70 - 100	0.20 - 0.35	0.30 - 0.40	0.30 - 0.40				
Aluminium Aluminium alloys	100 - 200	0.10 - 0.25	0.15 - 0.30	0.15 - 0.45				
Copper Cu-content < 99%	120 - ...	0.05 - 0.15	0.05 - 0.15	0.05 - 0.15	U 225 BX - 2			

Type 43 A / B

Solid drill head with indexable inserts and guide pads

Ø 60.00 to 149.99 mm



Type 43 A

Drilling range Ø 60.00 - 149.99 mm

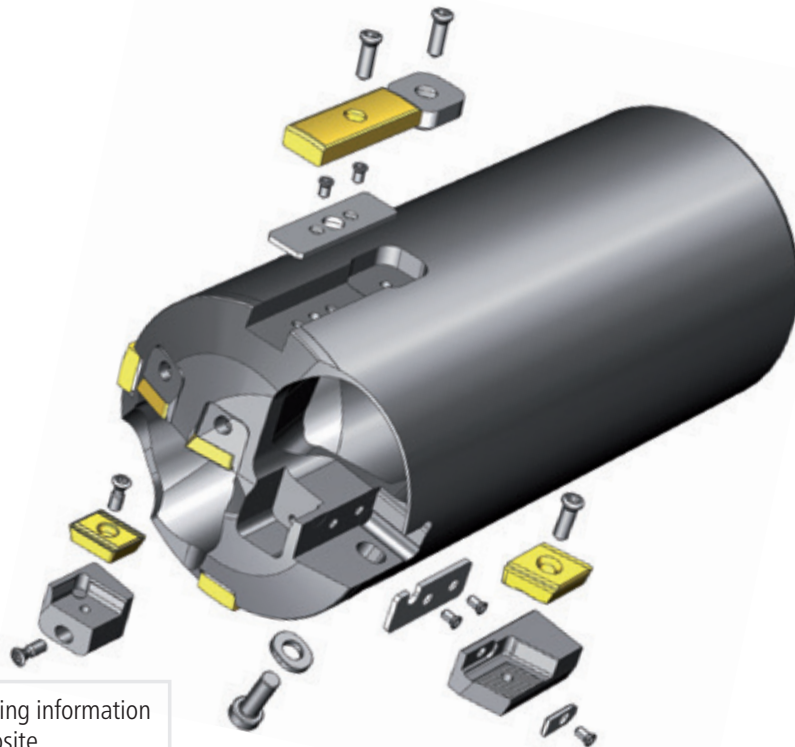


Type 43 B

Drilling range Ø 60.00 - 149.99 mm

Advantages:

- Simplest operation, change of wear parts without readjustment within +/- 0.01 mm
- Wear parts can be exchanged on the machine
- Tool adjustment range depending on tool diameter up to 5 mm with replacement parts
- New cutting geometry for high cutting performance
- Minimal axis deviation at large drilling depths
- Ø-fine adjustment with stop plate
- Recommended as variant G in the drilling range 95.00 - 149.99 mm for use in structural steel, case-hardened steel, ferritic steel, and austenitic steel



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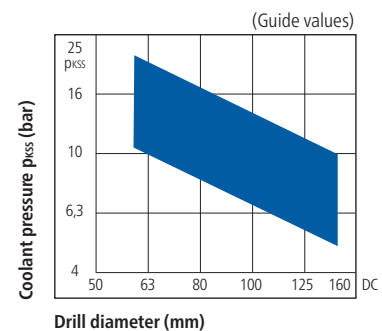
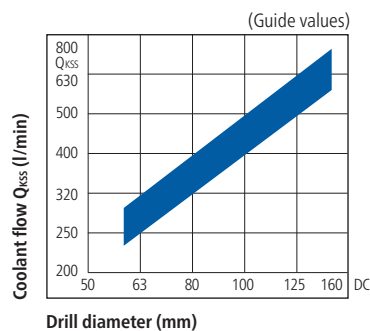
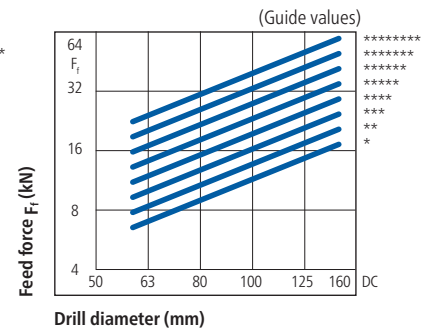
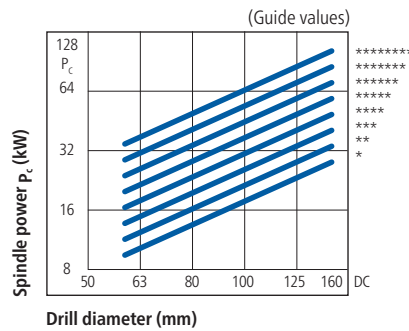
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

*****	f = 0.4 (mm/rev)
*****	f = 0.32 (mm/rev)
*****	f = 0.25 (mm/rev)
*****	f = 0.2 (mm/rev)
****	f = 0.16 (mm/rev)
***	f = 0.125 (mm/rev)
**	f = 0.1 (mm/rev)
*	f = 0.08 (mm/rev)

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for deep hole drilling of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)	Carbide grade / chip breaker								
			D60.00 - 149.99		D60.00 - 69.99		D70.00 - 94.99		D95.00 - 149.99		
			60.00 - 149.99	Outer insert	Guide pads	Intermediate insert	Centre insert	Intermediate insert	Centre insert	Intermediate insert	Centre insert
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.15 - 0.35	P 25 B - 1							Option G	
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.15 - 0.35								225 S - 1	225 S - 5
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.15 - 0.35	P 25 B - 5		U 225 BX - 6	U 225 BX - 6	U 225 BX - 5			P 25 B - 5	P 25 B - 5
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.20 - 0.40									
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.15 - 0.30									
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.15 - 0.30	P 25 B - 1	K 10 BX - 2	P 20 B	U 225 BX - 2	U 225 BX - 2	U 225 BX - 2	U 440 BX - 6	Option G	
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.12 - 0.30								225 S - 1	225 S - 5
Austenitic steel	60 - 80	0.12 - 0.25	P 25 B - 5							P 25 B - 5	P 25 B - 5
Heat resisting steel Tool steel	50 - 70	0.15 - 0.30									
Steel castings Rm ≤ 700 N/mm ²	60 - 80	0.15 - 0.35									
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.20 - 0.50									
Cast iron alloyed and unalloyed	70 - 100	0.15 - 0.50									
Aluminium Aluminium alloys	80 - 150	0.15 - 0.45	K 10 BX - 1							K 10 BX - 2	K 10 BX - 2
Copper Cu-content ≤ 99%	120 - ...	0.05 - 0.25									

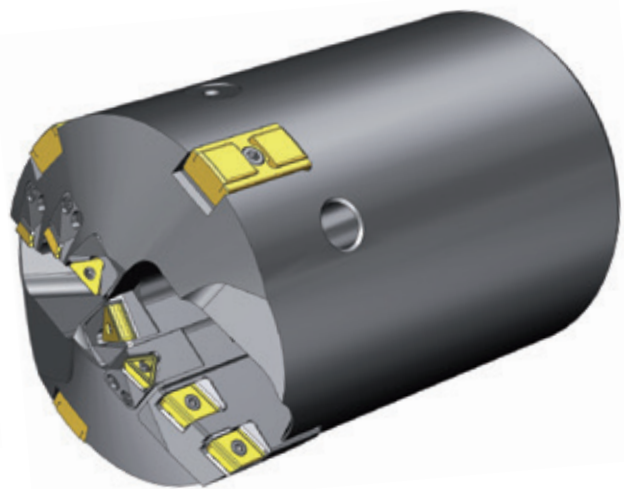
Type 43 A/B/F

Solid drill head with indexable inserts and guide pads
Ø 149.00 to 368.99 mm (larger diameters on request)



Type 43 A

Drilling range Ø 149.00 - 198.99 mm
(from Ø 199,00 on request)

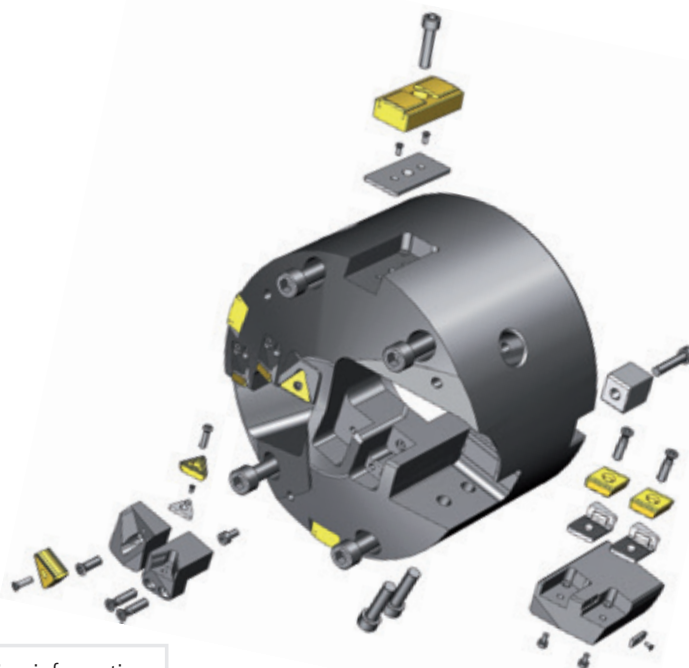


Type 43 B

Drilling range Ø 149.00 - 368.99 mm

Advantages:

- Simplest operation, change of wear parts without readjustment within +/- 0.01 mm
- Wear parts can be exchanged on the machine
- Tool dia. adjustment range up to 10 mm using suitable replacement parts
- New cutting geometry for high cutting performance
- Minimal axis deviation at large drilling depths
- Ø-fine adjustment with stop plate
- Recommended as variant G for use in structural steel, case-hardened steel, ferritic steel, and austenitic steel



Type 43 F

Flange connection

Drilling range Ø 199.00 - 368.99 mm

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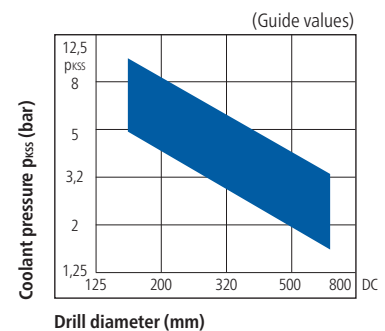
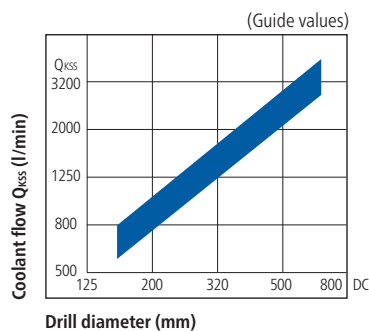
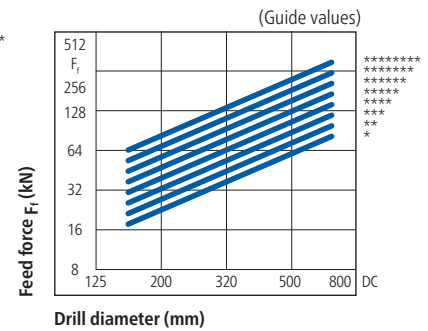
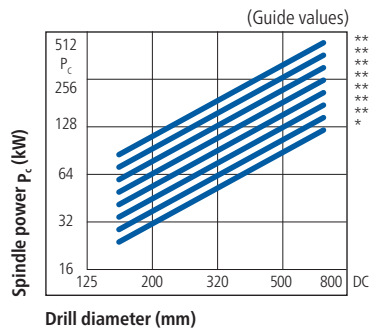
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

*****	f = 0.4 (mm/rev)
*****	f = 0.32 (mm/rev)
*****	f = 0.25 (mm/rev)
****	f = 0.2 (mm/rev)
****	f = 0.16 (mm/rev)
***	f = 0.125 (mm/rev)
**	f = 0.1 (mm/rev)
*	f = 0.08 (mm/rev)

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for deep hole drilling of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)		Carbide grade / chip breaker			
		149.00 - 700.00	Outer insert	Intermediate insert	Centre insert	Guide pads	
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.20 - 0.40	P 25 B - 1	P 25 B - 5	P 40 B - 1	P 20 B	
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.25 - 0.40					
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.20 - 0.35					
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.25 - 0.40					
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.20 - 0.35					
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.20 - 0.35	P 25 B - 1	K 10 BX - 2	K 10 BX - 1	P 20 B	
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.18 - 0.30					
Austenitic steel	60 - 80	0.15 - 0.25					
Heat resisting steel Tool steel	50 - 70	0.18 - 0.30					
Steel castings Rm ≤ 700 N/mm ²	60 - 80	0.20 - 0.35					
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.25 - 0.50	P 25 B - 5	P 25 B - 5	P 40 B - 1	P 20 B	
Cast iron alloyed and unalloyed	70 - 100	0.25 - 0.50					
Aluminium Aluminium alloys	80 - 150	0.15 - 0.50	K 10 BX - 1	K 10 BX - 2	K 10 BX - 1	P 20 B	
Copper Cu-content < 99%	120 - ...	0.10 - 0.25					

Type 13 A/B

Counterboring head with indexable inserts and guide pads

Ø 28.50 to 74.99 mm



Type 13 A

Drilling range Ø 28.71 - 74.99 mm



Type 13 B

Drilling range Ø 28.50 - 74.99 mm

Advantages:

- New chip breakers for high feed rates and high productivity
- No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm
- Tool adjustment range up to 0.5 mm using suitable replacement parts
- Maximum shape accuracy and hole straightness
- Ø-fine adjustment with stop plate



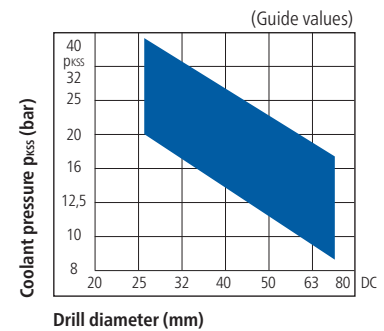
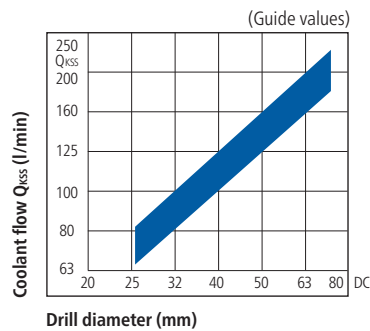
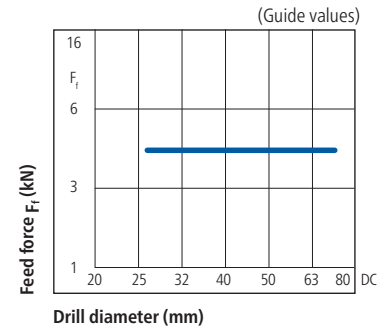
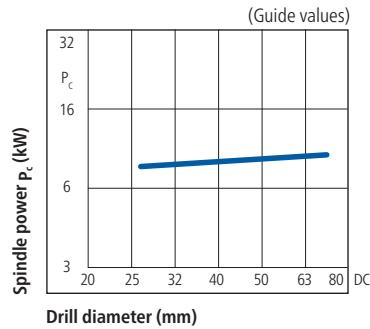
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Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

APMX = 6 mm



Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.

Guide values for counter boring of different materials

Guide values for cutting speed and feed rate are shown in the table.

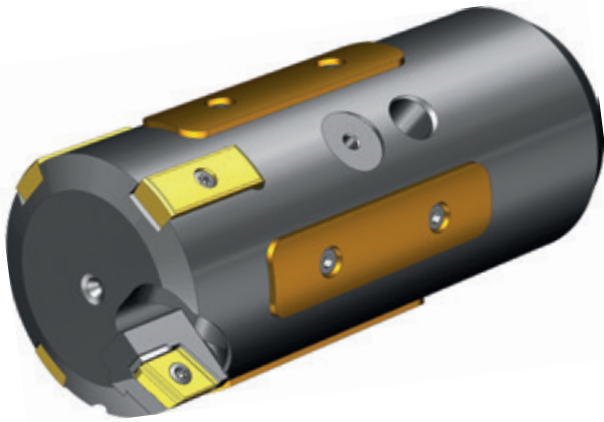
As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)			Carbide grade / chip breaker	
		28.50 - 39.99	40.00 - 51.99	52.00 - 74.99	Outer insert	Guide pads
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.20 - 0.30	0.20 - 0.35	0.20 - 0.45	P 25 B - 1	P 20 B
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.20 - 0.30	0.20 - 0.35	0.20 - 0.40		
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.20 - 0.30	0.20 - 0.35	0.20 - 0.35		
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.20 - 0.30	0.20 - 0.35	0.20 - 0.40		
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.20 - 0.30	0.20 - 0.30	0.20 - 0.30		
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.20 - 0.30	0.20 - 0.35	0.20 - 0.35		
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.15 - 0.25	0.15 - 0.30	0.20 - 0.30	K 10 BX - 2	
Austenitic steel	60 - 80	0.12 - 0.15	0.12 - 0.20	0.12 - 0.20	P 25 B - 5	
Heat resisting steel Tool steel	50 - 70	0.15 - 0.25	0.20 - 0.30	0.20 - 0.30		
Steel castings Rm ≤ 700 N/mm ²	60 - 80	0.15 - 0.25	0.20 - 0.35	0.20 - 0.35		
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.25 - 0.35	0.25 - 0.40	0.25 - 0.45		
Cast iron alloyed and unalloyed	70 - 100	0.20 - 0.35	0.20 - 0.40	0.20 - 0.40		
Aluminium Aluminium alloys	100 - 200	0.05 - 0.10	0.05 - 0.15	0.05 - 0.15		K 10 B - 1
Copper Cu-content < 99%	120 - ...	0.05 - 0.10	0.05 - 0.15	0.05 - 0.15	K 10 - 1	

Type 34 / 54

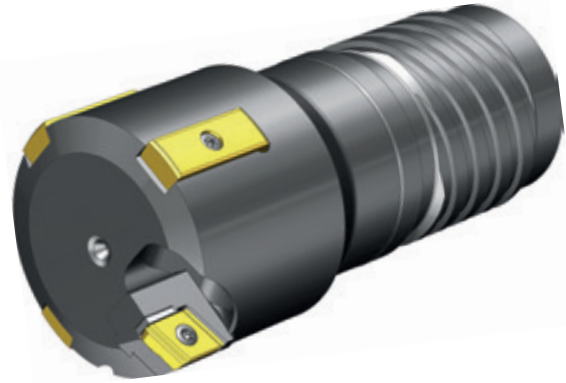
Counterboring head with indexable inserts and guide pads

Ø 44.00 to 353.99 mm



Type 34

Drilling range Ø 44.00 - 353.99 mm

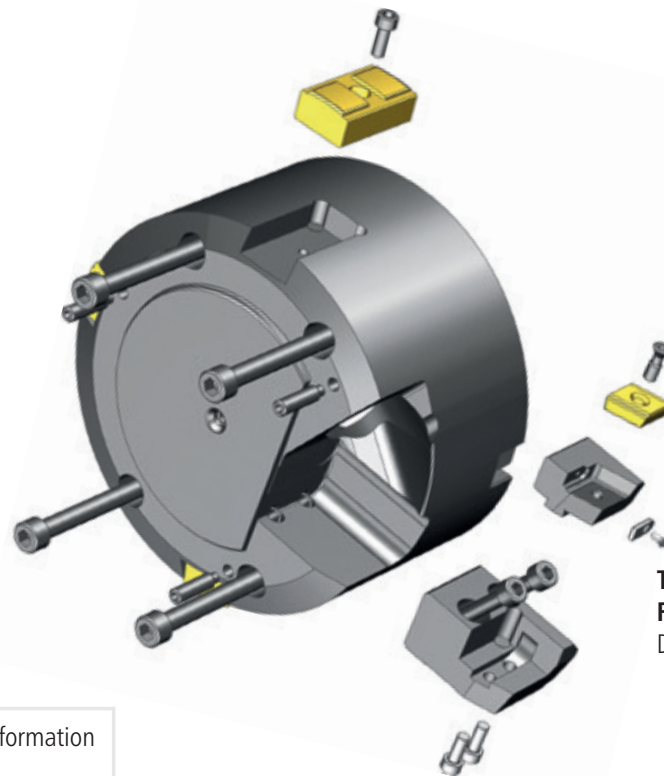


Type 54

Drilling range Ø 47.00 - 353.99 mm

Advantages:

- New chip breakers for high feed rates and high productivity
- No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm
- Tool adjustment range depending on tool diameter up to 12 mm with replacement parts
- Maximum shape accuracy and hole straightness even at large drilling depths
- Internal 1-start connection thread - with additional fibre guide pads for large drilling depths
- Ø-fine adjustment with stop plate



Type 54

Flange connection

Drilling range Ø 210.00 - 353.99 mm

Download and ordering information
available on our website

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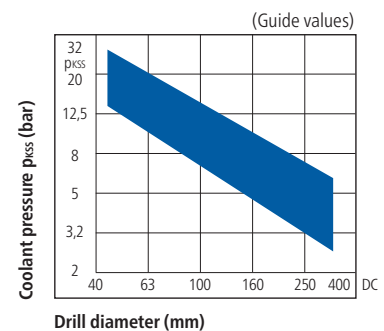
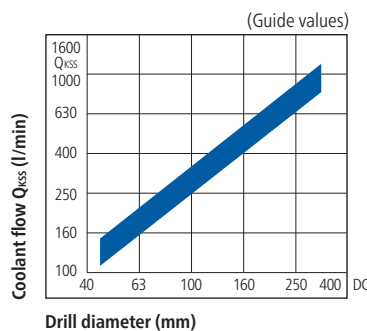
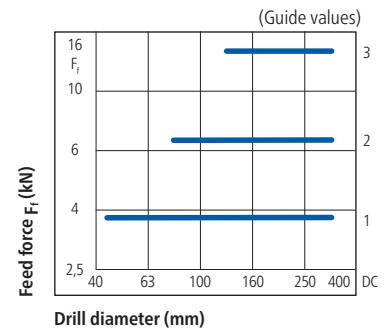
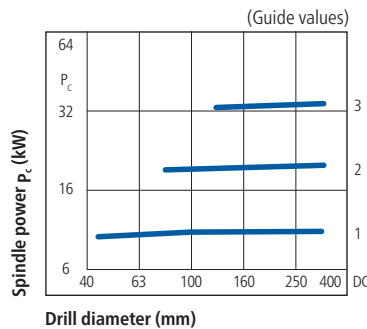
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

- | |
|-----------------|
| 1. APMX = 6 mm |
| 2. APMX = 10 mm |
| 3. APMX = 14 mm |

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for counter boring of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)			Carbide grade / chip breaker		
		44.00 - 80.99	81.00 - 123.99	124.00 - 353.99	Outer insert heavy section	Outer insert light section	Guide pads
Structural steel $R_m \leq 700 \text{ N/mm}^2$	80 - 100	0.15 - 0.20	0.20 - 0.30	0.30 - 0.45	P 25 B - 1	P 25 B - 1	P 20 B
Case hardening steel $R_m \leq 750 \text{ N/mm}^2$	80 - 100	0.15 - 0.20	0.20 - 0.30	0.20 - 0.45			
Case hardening steel $R_m \leq 1100 \text{ N/mm}^2$	70 - 80	0.20 - 0.30	0.20 - 0.35	0.25 - 0.40	P 25 B - 5	P 25 B - 1	
Heat treatable steel $R_m \leq 700 \text{ N/mm}^2$	70 - 90	0.20 - 0.30	0.25 - 0.40	0.30 - 0.50			
Heat treatable steel $R_m \leq 1100 \text{ N/mm}^2$	55 - 75	0.15 - 0.25	0.20 - 0.30	0.25 - 0.40			
Nitriding steel $R_m \leq 1100 \text{ N/mm}^2$	55 - 75	0.15 - 0.25	0.20 - 0.25	0.25 - 0.32			
Ferritic steel $R_m \leq 900 \text{ N/mm}^2$	60 - 80	0.15 - 0.20	0.20 - 0.25	0.20 - 0.30	K 10 BX - 2	K 10 BX - 2	
Austenitic steel	60 - 80	0.12 - 0.18	0.15 - 0.22	0.15 - 0.25			
Heat resisting steel Tool steel	50 - 70	0.15 - 0.25	0.20 - 0.30	0.20 - 0.32	P 25 B - 5	P 25 B - 1	
Steel castings $R_m \leq 700 \text{ N/mm}^2$	60 - 80	0.15 - 0.25	0.20 - 0.30	0.20 - 0.35			
Nodular cast iron $R_m \leq 1000 \text{ N/mm}^2$	65 - 80	0.20 - 0.35	0.25 - 0.40	0.25 - 0.50			
Cast iron alloyed and unalloyed	70 - 100	0.15 - 0.25	0.20 - 0.35	0.20 - 0.40			
Aluminium Aluminium alloys	100 - 200	0.05 - 0.20	0.05 - 0.20	0.05 - 0.20	K 10 B - 1	K 10 B - 1	
Copper Cu-content < 99%	120 - ...	0.06 - 0.15	0.06 - 0.20	0.06 - 0.20	K 10 - 1	K 10 - 1	

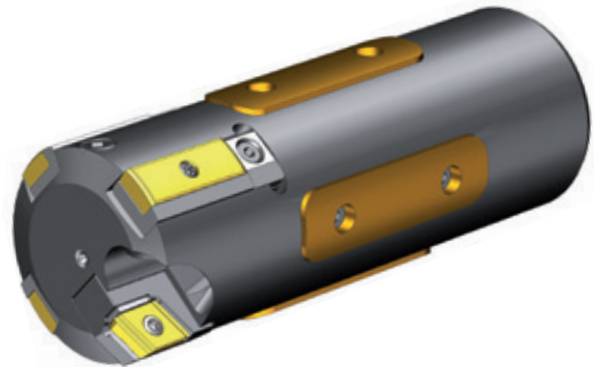
Type 35 A / B / F

Counterboring head with large adjustment range
Ø 61.00 to 498.99 mm (larger diameters on request)



Type 35 A

4-start external connection thread
Drilling range Ø 61.00 - 223.99 mm

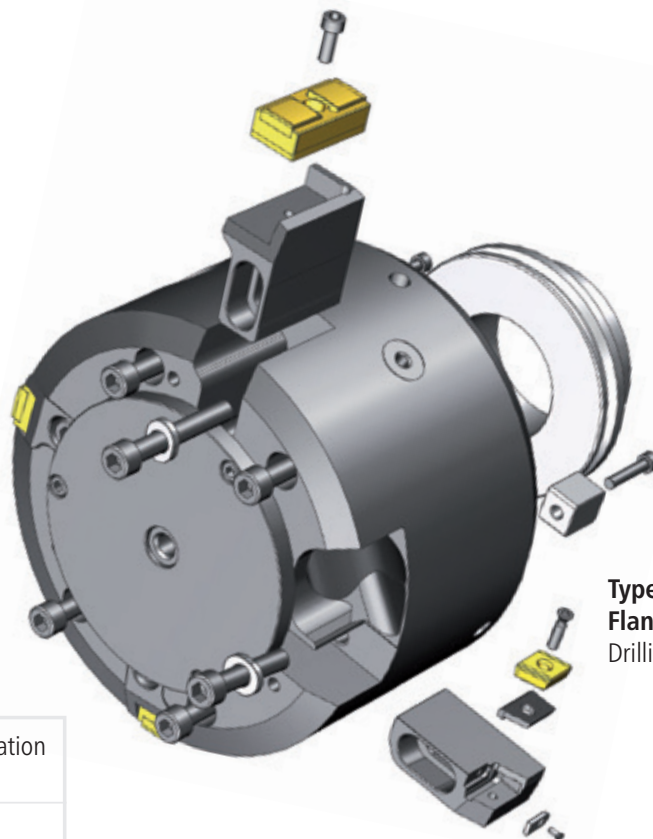


Type 35 B

1-start internal connection thread
Drilling range Ø 61.00 - 498.99 mm

Advantages:

- Tool dia. adjustment range starting at 6 mm, from Ø 149 mm = 25 mm, from Ø 299 mm = 50 mm
- Low requirement for tools over the whole drilling range
- Adjustment system for easy change of diameter
- New patented adjustment system with a central adjusting ring from Ø 149 mm
- Simplest operation, change of wear parts without readjustment within +/- 0.01 mm
- Ø-fine adjustment with stop plate
- Recommended for medium cutting depth as variant N



Type 35 F

Flange connection

Drilling range Ø 224.00 - 498.99 mm

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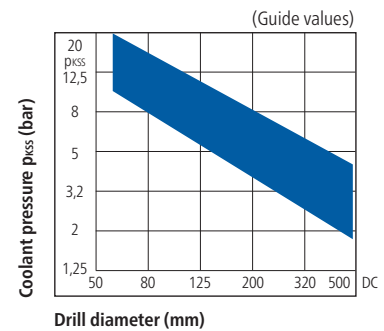
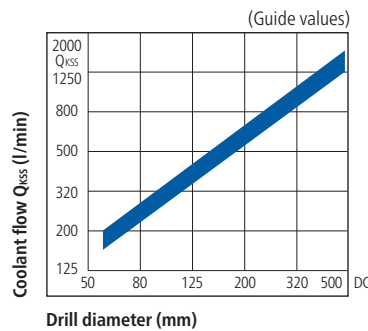
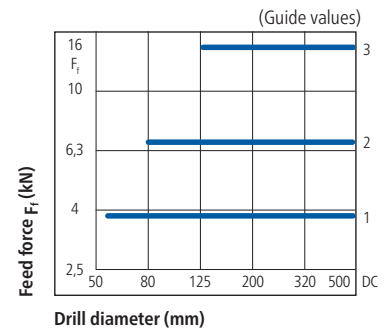
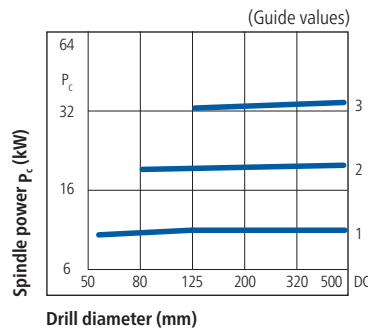
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

- 1. APMX = 6 mm
- 2. APMX = 10 mm
- 3. APMX = 14 mm

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for counter boring of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	V _c (m/min)	f (mm/rev.) for DC (mm)			Carbide grade / chip breaker	
		61.00 - 80.99	81.00 - 123.99	124.00 - 498.99	Outer insert	Guide pads
Structural steel R _m ≤ 700 N/mm ²	80 - 100	0.15 - 0.20	0.20 - 0.30	0.20 - 0.45	P 25 B - 1	P 20 B
Case hardening steel R _m ≤ 750 N/mm ²	80 - 100	0.15 - 0.20	0.20 - 0.30	0.20 - 0.45		
Case hardening steel R _m ≤ 1100 N/mm ²	70 - 80	0.20 - 0.30	0.20 - 0.35	0.25 - 0.40	P 25 B - 5	
Heat treatable steel R _m ≤ 700 N/mm ²	70 - 90	0.20 - 0.30	0.25 - 0.40	0.30 - 0.50		
Heat treatable steel R _m ≤ 1100 N/mm ²	55 - 75	0.15 - 0.25	0.20 - 0.30	0.25 - 0.40		
Nitriding steel R _m ≤ 1100 N/mm ²	55 - 75	0.15 - 0.25	0.20 - 0.25	0.25 - 0.32	K 10 BX - 2	
Ferritic steel R _m ≤ 900 N/mm ²	60 - 80	0.15 - 0.20	0.20 - 0.25	0.20 - 0.30		
Austenitic steel	60 - 80	0.12 - 0.18	0.15 - 0.22	0.15 - 0.25	P 25 B - 5	
Heat resisting steel Tool steel	50 - 70	0.15 - 0.25	0.20 - 0.30	0.20 - 0.32		
Steel castings R _m ≤ 700 N/mm ²	60 - 80	0.15 - 0.25	0.20 - 0.30	0.20 - 0.35		
Nodular cast iron R _m ≤ 1000 N/mm ²	65 - 80	0.20 - 0.35	0.25 - 0.40	0.25 - 0.50		
Cast iron alloyed and unalloyed	70 - 100	0.15 - 0.25	0.20 - 0.35	0.20 - 0.40		
Aluminium Aluminium alloys	100 - 200	0.05 - 0.20	0.05 - 0.20	0.05 - 0.20	K 10 B - 1	
Copper Cu-content < 99%	120 - ...	0.06 - 0.15	0.06 - 0.20	0.06 - 0.20	K 10 - 1	

Type 33 / 36

Counterboring head for hydraulic cylinders

Chip removal in feed direction

Ø 60.00 to 498.99 mm (larger diameters on request)



Type 33 B

1-start internal connection thread

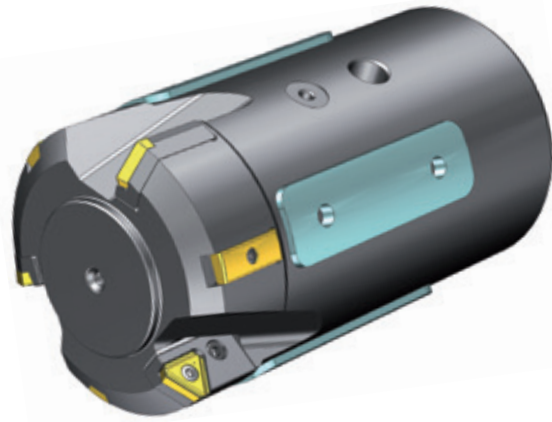
Drilling range Ø 159.00 - 498.99 mm

Type 33 A

4-start external connection thread

Drilling range Ø 159.00 - 223.99 mm

On request



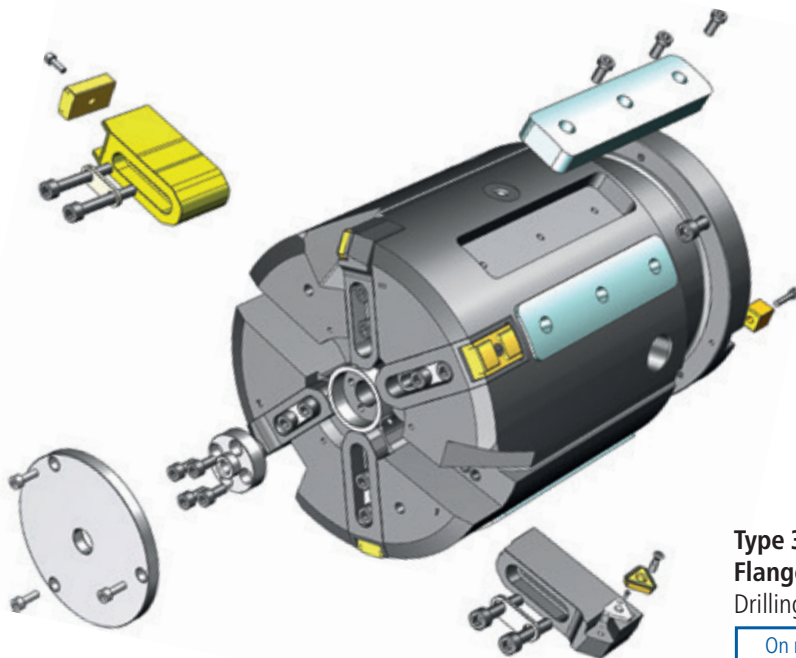
Type 36 / Type 56

Drilling range Ø 60.00 - 250.00 mm

On request

Advantages:

- Type 33: Newly patented adjustment system with central adjusting disc for easy diameter setting.
From Ø 159 mm adjustment range = 25 mm, Ø 299 mm = 50 mm
- Type 36 / Type 56 Ø 60 to 250 mm with radial and axial fixed adjustment
- No adjustment required when changing wear parts, no readjustment within +/- 0.01 mm



Type 33 F Flange connection

Drilling range Ø 224.00 - 498.99 mm

On request

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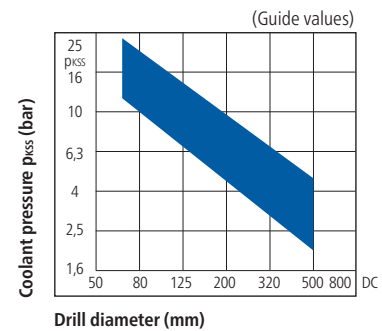
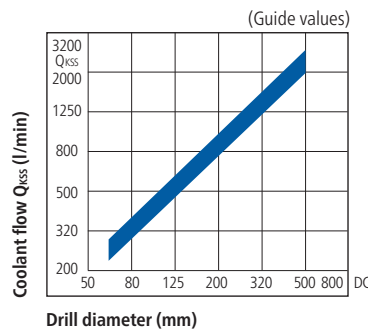
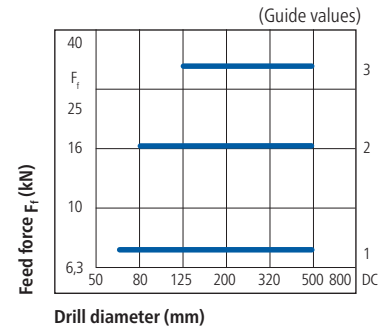
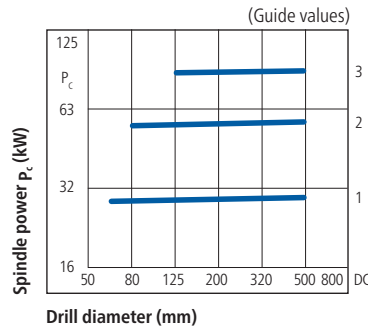
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

- 1. APMX = 6 mm
- 2. APMX = 10 mm
- 3. APMX = 14 mm

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for counter boring of different materials

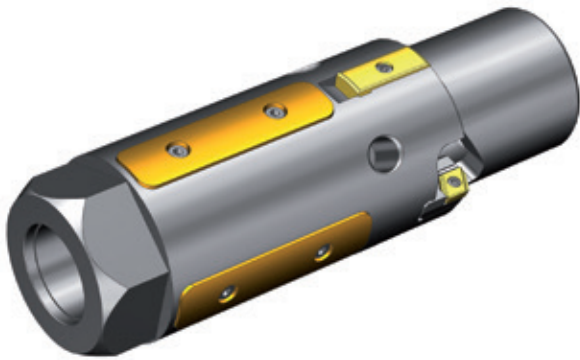
Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)					Carbide grade	
		60.00 - 80.00	80.00 - 120.00	120.00 - 160.00	160.00 - 300.00	300.00 - 500.00	Insert	Guide pads
Structural steel Rm ≤ 750 N/mm ²	80 - 120	0.60 - 1.00	0.80 - 1.20	1.00 - 1.50	1.00 - 1.50	1.00 - 1.50	HC 115 - 5	P 20
Structural steel Rm ≤ 1100 N/mm ²	60 - 70	0.60 - 1.00	0.60 - 1.00	0.80 - 1.20	0.80 - 1.20	0.80 - 1.20		
Austenitic steel Rm ≤ 900 N/mm ²	60 - 80	0.50 - 0.80	0.60 - 1.00	0.80 - 1.20	0.80 - 1.20	0.80 - 1.20	P 25 BX - 1	
Stainless steel castings	50 - 60	0.40 - 0.60	0.50 - 1.00	0.80 - 1.20	0.80 - 1.20		HC 115 - 5	
Aluminium alloys	150 - 250	0.80 - 1.20	1.00 - 1.50	1.00 - 1.80	1.00 - 1.80	1.00 - 2.00		

Type 38 / 58

Pull-boring head with indexable inserts and guide pads
Ø 20.00 to 222.99 mm (larger diameters on request)



Type 38

Drilling range Ø 20.00 - 222.99 mm

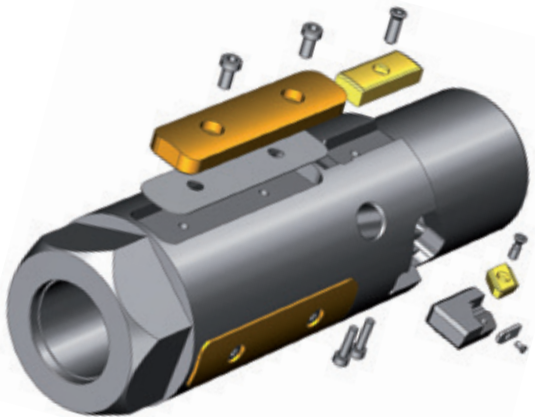


Type 58

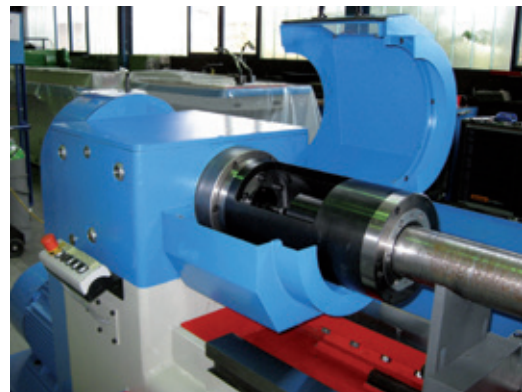
Drilling range Ø 20.00 - 222.99 mm

Advantages:

- Tool adjustment range depending on tool diameter up to 5 mm with replacement parts
- Simplest operation, change of wear parts without readjustment within +/- 0.01 mm
- Minimal axis deviation at large drilling depths
- Bore tolerance in the range of IT7 (IT6) roundness/diameter

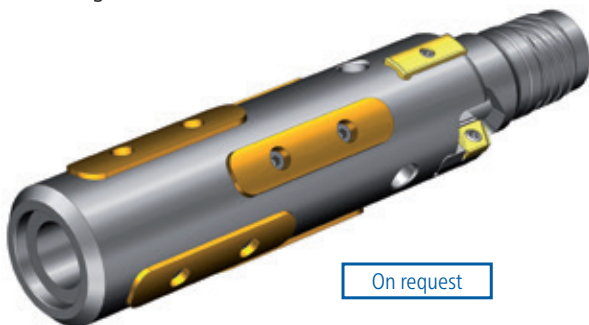


Lantern (on request)

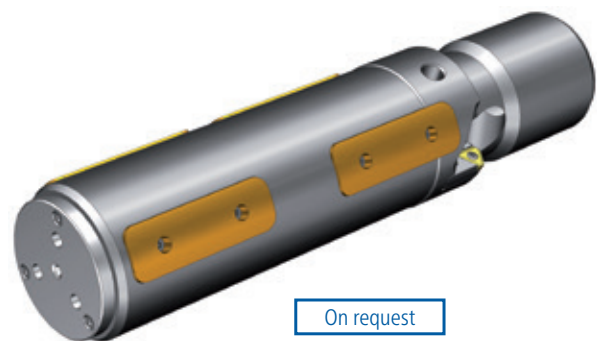


Special pull-boring tool

Machining of twin screw extruders



On request



On request

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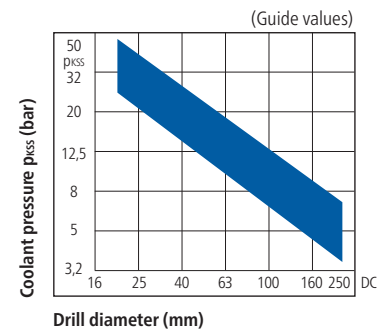
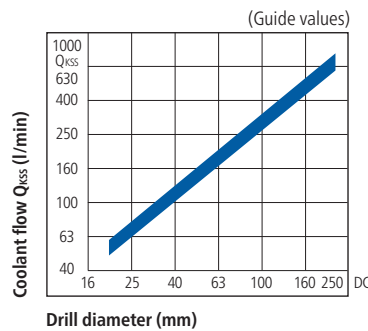
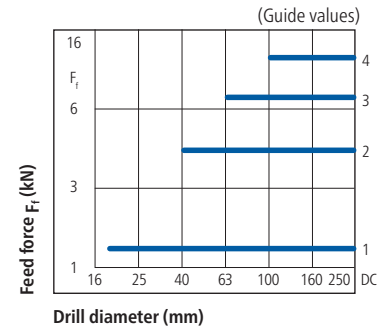
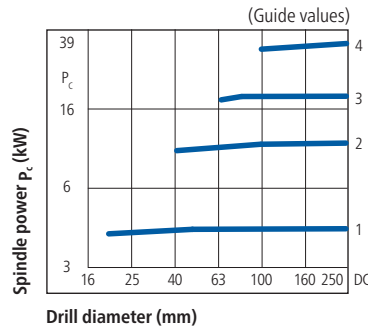
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).

- | |
|-----------------|
| 1. APMX = 3 mm |
| 2. APMX = 6 mm |
| 3. APMX = 10 mm |
| 4. APMX = 14 mm |

Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



Guide values for pullboring of different materials

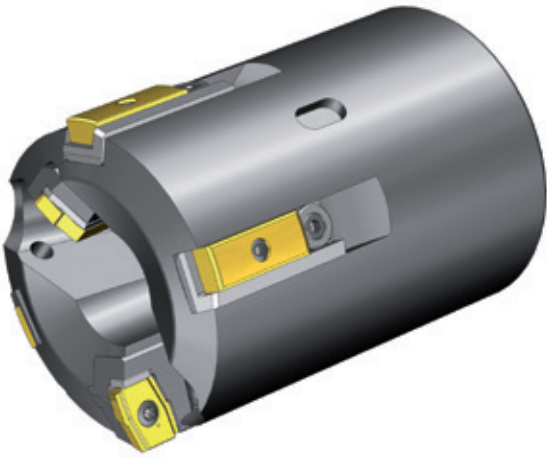
Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)			Carbide grade / chip breaker	
		20.00 - 43.99	44.00 - 90.99	91.00 - 222.99	Outer insert	Guide pads
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.16 - 0.25	0.20 - 0.32	0.20 - 0.40	P 25 B - 1	P 20 B
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.16 - 0.25	0.20 - 0.32	0.20 - 0.40		
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.12 - 0.20	0.15 - 0.25	0.20 - 0.32		
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.16 - 0.25	0.20 - 0.30	0.20 - 0.40		
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.12 - 0.22	0.20 - 0.25	0.20 - 0.30		
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.12 - 0.20	0.20 - 0.25	0.20 - 0.30		
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.12 - 0.22	0.15 - 0.25	0.20 - 0.30	K 10 B - 1	
Austenitic steel	60 - 80	0.12 - 0.16	0.15 - 0.20	0.15 - 0.25	P 25 B - 1	
Heat resisting steel Tool steel	50 - 70	0.12 - 0.20	0.15 - 0.22	0.20 - 0.30		
Steel castings Rm ≤ 700 N/mm ²	60 - 80	0.15 - 0.25	0.20 - 0.30	0.20 - 0.35		
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.12 - 0.25	0.28 - 0.30	0.25 - 0.35		
Cast iron alloyed and unalloyed	70 - 100	0.20 - 0.30	0.20 - 0.40	0.25 - 0.50		
Aluminium Aluminium alloys	100 - 200	0.05 - 0.10	0.05 - 0.10	0.05 - 0.20	K 10 B - 1	
Copper Cu-content < 99%	120 - ...	0.07 - 0.15	0.10 - 0.20	0.10 - 0.20	K 10 - 1	

Type 28 / 48

Trepanning head with indexable inserts and guide pads
Ø 55.00 to 412.99 mm (larger diameters on request)



Type 28

Drilling range Ø 55.00 - 363.99 mm



Type 48

4-start external connection thread
Drilling range Ø 55.00 - 197.99 mm

Advantages:

- No adjustment required when changing wear parts
- Simplest operation, change of wear parts without readjustment within +/- 0.01 mm
- Tool adjustment range depending on tool diameter up to 5 mm with replacement parts
- Ø-fine adjustment with stop plate
- The core may be reused for new workpieces
- For machines with insufficient spindle power



Type 48

Flange connection

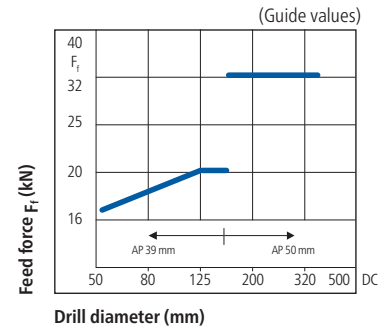
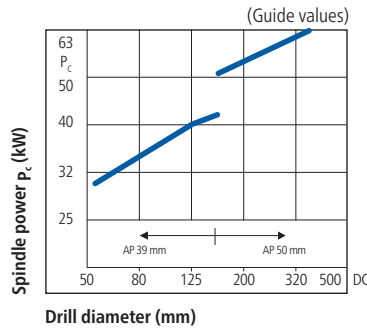
Drilling range Ø 198.00 - 412.99 mm

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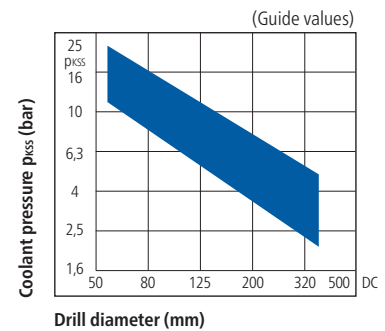
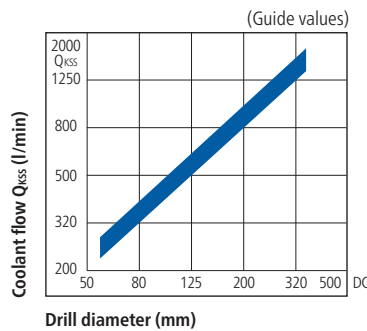
Power requirements:

The guide values are for drilling alloyed steel (800 - 1000 N/mm²) and can vary for other workpiece materials and tool conditions (wear).



Coolant values:

Sufficient coolant must be supplied to the tool for troublefree chip removal.



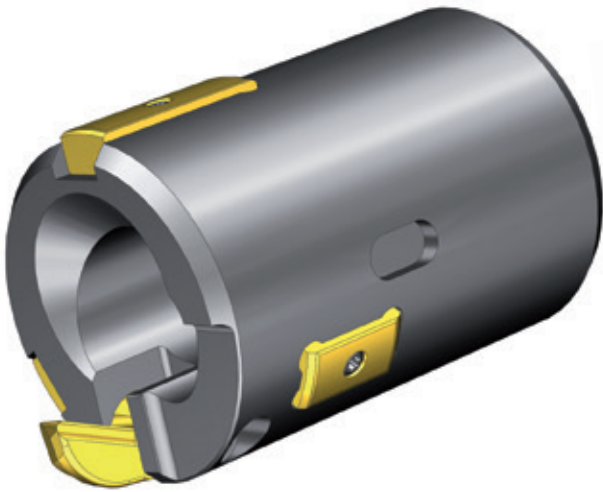
Guide values for pullboring of different materials

Guide values for cutting speed and feed rate are shown in the table.

As there are many factors that can affect the results of deep hole drilling, these values must be corrected if necessary.

Materials / mechanical strength properties	Vc (m/min)	f (mm/rev.) for DC (mm)			Carbide grade / chip breaker			
		55.00 - 98.99	99.00 - 167.99	168.00 - 412.99	Outer insert	Intermediate insert	Core insert	Guide pads
Structural steel Rm ≤ 700 N/mm ²	80 - 100	0.18 - 0.25	0.20 - 0.30	0.20 - 0.40	P 25 B - 2			P 20 B
Case hardening steel Rm ≤ 750 N/mm ²	80 - 100	0.18 - 0.25	0.20 - 0.30	0.25 - 0.40	P 25 B - 1	P 25 B - 1	P 25 B - 1	
Case hardening steel Rm ≤ 1100 N/mm ²	70 - 80	0.16 - 0.22	0.20 - 0.30	0.20 - 0.30				
Heat treatable steel Rm ≤ 700 N/mm ²	70 - 90	0.18 - 0.25	0.20 - 0.35	0.25 - 0.40				
Heat treatable steel Rm ≤ 1100 N/mm ²	55 - 75	0.16 - 0.22	0.20 - 0.30	0.20 - 0.35				
Nitriding steel Rm ≤ 1100 N/mm ²	55 - 75	0.16 - 0.22	0.20 - 0.30	0.25 - 0.35				
Ferritic steel Rm ≤ 900 N/mm ²	60 - 80	0.16 - 0.22	0.18 - 0.25	0.18 - 0.30				
Austenitic steel	60 - 80	0.16 - 0.20	0.16 - 0.25	0.18 - 0.28	P 25 B - 1	P 25 B - 1	P 25 B - 1	
Heat resisting steel Tool steel	50 - 70	0.16 - 0.22	0.18 - 0.25	0.18 - 0.30				
Steel castings Rm ≤ 700 N/mm ²	60 - 80	0.18 - 0.25	0.20 - 0.30	0.20 - 0.30				
Nodular cast iron Rm ≤ 1000 N/mm ²	65 - 80	0.20 - 0.25	0.20 - 0.35	0.25 - 0.40				
Cast iron alloyed and unalloyed	70 - 100	0.20 - 0.25	0.20 - 0.35	0.25 - 0.50	K 10 B - 1	K 10 B - 1	K 10 B - 1	
Aluminium Aluminium alloys	100 - 200	0.05 - 0.10	0.05 - 0.20	0.05 - 0.20	K 10 - 1	K 10 - 1	K 10 - 1	
Copper Cu-content < 99%	120 - ...	0.07 - 0.15	0.10 - 0.20	0.10 - 0.20	K 10 - 1	K 10 - 1	K 10 - 1	

Type 29 / 49
Core cutting head
for cores up to max. \varnothing 60.00 mm



Type 29

On request



Type 49

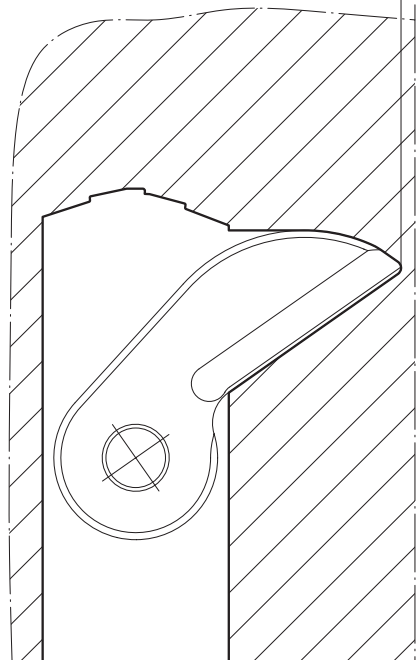
On request

Application:

- Common application with turbine shafts and blind holes for energy technology
- The cores are needed for materials tests and tensile specimens
- Preparation of holes using trepanning tool Type 28/48

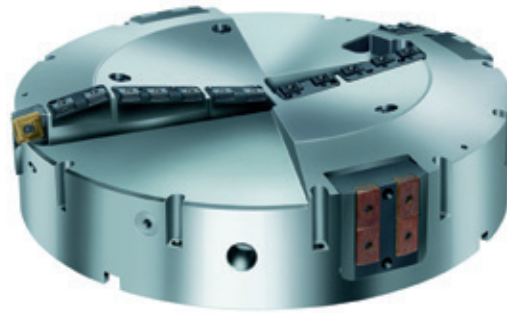


$\sim \varnothing 3$
Break-off Core



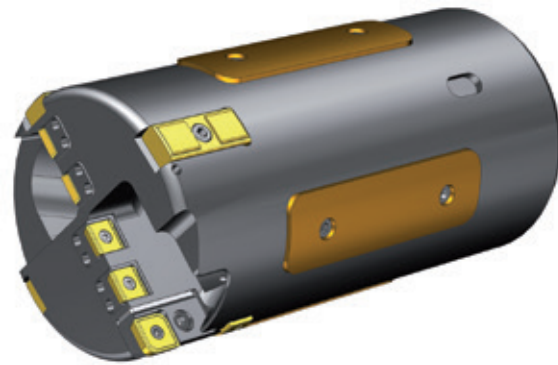
Solid drill head up to \varnothing 700 mm

On request



Flat bottom

On request



Full radius

On request



Cone

On request



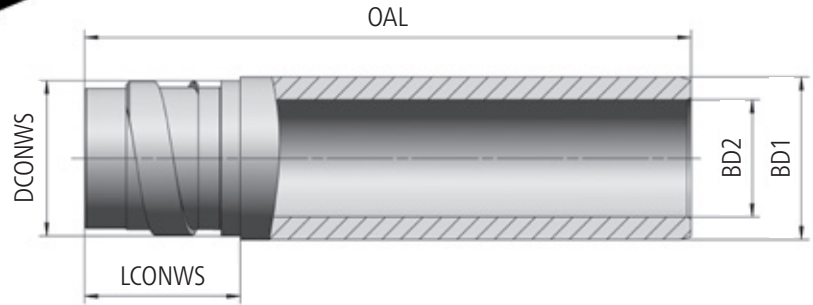
Accessories

Drill tubes Type 25

with 1-start external thread



BD = Body diameter
 DCONWS = Connection diameter workpiece side
 LCONWS = Connection length workpiece side
 OAL = Overall length



Order no.	BD1 _{hs}	BD2	DCONWS	LCONWS	Thread pitch		
25-9310-OAL	12.0	8.0	11.5	23.3	6		
25-9410-OAL	13.0	8.5	11.8				
25-9510-OAL	13.0	8.5	12.4				
25-9610-OAL	14.0	9.0	12.7				
25-9710-OAL	14.0	9.0	13.4				
25-9810-OAL	15.0	10.0	13.7				
25-9910-OAL	15.0	10.0	14.4				
25-0110-OAL	16.5	11.0	15.5			23.0	
25-0210-OAL	18.0	12.0	16.5	26.0	10		
25-0310-OAL	20.0	13.0	19.0				
25-0410-OAL	22.0	14.0	20.0				
25-0510-OAL	24.0	15.5	22.0				
25-0610-OAL	26.0	17.0	24.0				
25-0710-OAL	28.0	18.5	26.0				
25-0810-OAL	30.0	20.0	27.0			41.0	20
25-0910-OAL	33.0	23.0	30.0				
25-1010-OAL	36.0	25.5	33.0				
25-1110-OAL	39.0	28.0	37.0				
25-1210-OAL	43.0	31.0	41.0				
25-1310-OAL	47.0	35.0	44.0				
25-1410-OAL	51.0	39.0	49.0				
25-1510-OAL	56.0	43.0	53.0	71.0	40		
25-1710-OAL	62.0	48.0	59.0				
25-1810-OAL	68.0	53.0	65.0				
25-1910-OAL	75.0	59.0	71.0				
25-2010-OAL	82.0	66.0	79.0				
25-2110-OAL	94.0	78.0	90.0				
25-2210-OAL	106.0	88.0	102.0				
25-2310-OAL	118.0	94.0	114.0				
25-2410-OAL	130.0	104.0	126.0				
25-2510-OAL	142.0	116.0	139.0				

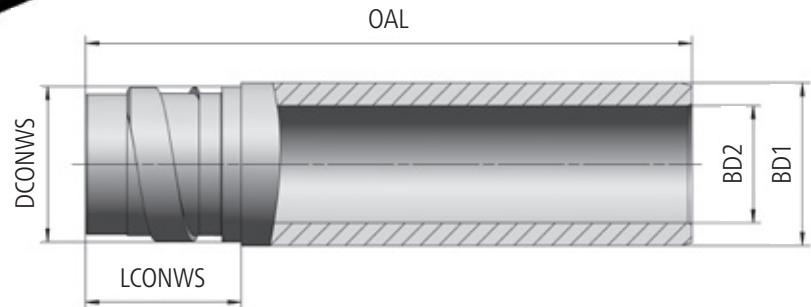
Dimensions in mm

Accessories

Drill tubes Type 25 with 1-start external thread



BD = Body diameter
 DCONWS = Connection diameter workpiece side
 LCONWS = Connection length workpiece side
 OAL = Overall length

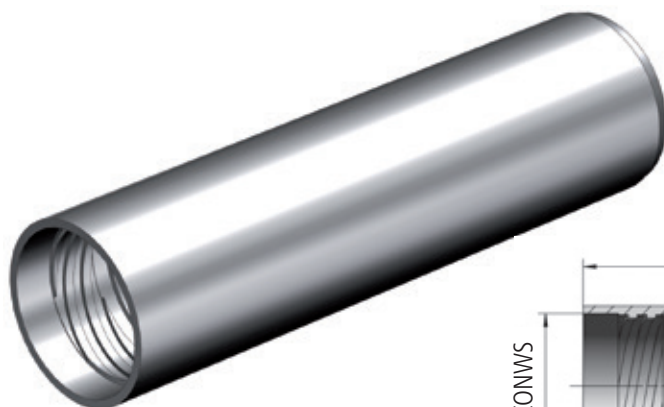


Order no.	BD1 _{h8}	BD2	DCONWS	LCONWS	Thread pitch
25-2610-OAL	154.0	128.0	151.0	86.0	56
25-2710-OAL	166.0	136.0	163.0		
25-2810-OAL	178.0	145.0	175.0		
25-2910-OAL	190.0	154.0	187.0		
25-3010-OAL	202.0	166.0	199.0		
25-3110-OAL	214.0	178.0	211.0		
25-3210-OAL	226.0	190.0	223.0		
25-3310-OAL	238.0	202.0	235.0		
25-3410-OAL	250.0	214.0	247.0	121.0	56
25-3510-OAL	262.0	226.0	259.0		
25-3610-OAL	274.0	238.0	271.0		
25-3710-OAL	286.0	250.0	283.0		
25-3810-OAL	298.0	262.0	295.0		
25-3910-OAL	310.0	274.0	307.0		
25-4010-OAL	322.0	286.0	319.0		
25-4110-OAL	334.0	298.0	331.0		
25-4210-OAL	346.0	310.0	343.0		

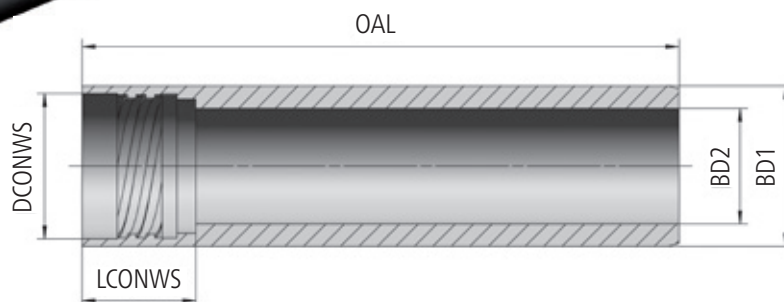
Dimensions in mm

Accessories

Drill tubes Type 45 with 4-start internal thread



BD = Body diameter
 DCONWS = Connection diameter workpiece side
 LCONWS = Connection length workpiece side
 OAL = Overall length



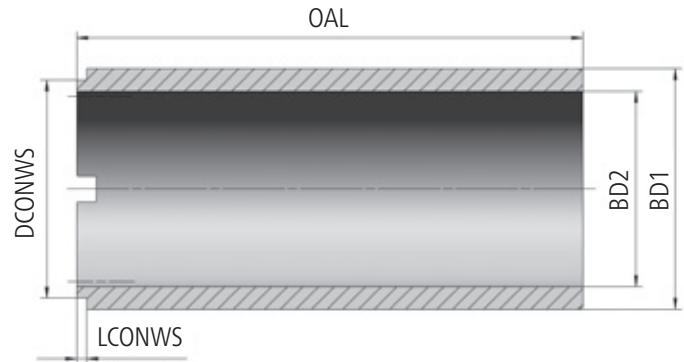
Order no.	BD1 _{h8}	BD2	DCONWS	LCONWS	Thread pitch
45-9710-OAL	14.0	9.0	12.6	21.0	8
45-9810-OAL	15.0	10.0	13.6		
45-9910-OAL	16.0	10.5	14.5	22.0	
45-0110-OAL	17.0	11.5	15.5		
45-0210-OAL	18.0	12.0	16.0	21.5	10
45-0310-OAL	20.0	13.0	18.0		12
45-0410-OAL	22.0	14.0	19.5		
45-0510-OAL	24.0	15.5	21.0	24.5	16
45-0610-OAL	26.0	17.0	23.5		
45-0710-OAL	28.0	18.5	25.5		
45-0810-OAL	30.0	20.0	28.0	30.5	20
45-0910-OAL	33.0	23.0	30.0		
45-1010-OAL	36.0	25.5	33.0		
45-1110-OAL	39.0	28.0	36.0		
45-1210-OAL	43.0	31.0	39.0	34.5	24
45-1310-OAL	47.0	35.0	43.0		
45-1410-OAL	51.0	39.0	47.0		
45-1510-OAL	56.0	43.0	51.0	75.0	32
45-1610-OAL	56.0	43.0	52.0		
45-1710-OAL	62.0	48.0	58.0		
45-1810-OAL	68.0	53.0	63.0		
45-1910-OAL	75.0	59.0	70.0	97.0	44
45-2010-OAL	82.0	66.0	77.0		
45-2110-OAL	94.0	78.0	89.0		
45-2210-OAL	106.0	88.0	101.0	118.0	60
45-2310-OAL	118.0	94.0	113.0		
45-2410-OAL	130.0	104.0	125.0		
45-2510-OAL	142.0	116.0	137.0	139.0	72
45-2610-OAL	154.0	128.0	149.0		
45-2710-OAL	166.0	136.0	161.0		
45-2810-OAL	178.0	145.0	173.0		

Dimensions in mm

Accessories Drill tubes Type 45 with flange connection



BD = Body diameter
 DCONWS = Connection diameter workpiece side
 LCONWS = Connection length workpiece side
 OAL = Overall length



Order no.	BD1 _{h8}	BD2	DCONWS	LCONWS
45-2910-OAL	190.0	154.0	172.0	8.0
45-3010-OAL	202.0	166.0	184.0	
45-3110-OAL	214.0	178.0	196.0	
45-3210-OAL	226.0	190.0	208.0	
45-3310-OAL	238.0	202.0	220.0	
45-3410-OAL	250.0	214.0	232.0	
45-3510-OAL	262.0	226.0	244.0	
45-3610-OAL	274.0	238.0	256.0	
45-3710-OAL	286.0	250.0	268.0	
45-3810-OAL	298.0	262.0	280.0	
45-3910-OAL	310.0	274.0	292.0	
45-4010-OAL	322.0	286.0	304.0	
45-4110-OAL	334.0	298.0	316.0	
45-4210-OAL	346.0	310.0	328.0	
45-4310-OAL	358.0	322.0	340.0	
45-4410-OAL	370.0	334.0	352.0	
45-4510-OAL	382.0	346.0	364.0	
45-4610-OAL	394.0	358.0	376.0	
45-4710-OAL	406.0	370.0	388.0	
45-4810-OAL	418.0	382.0	400.0	
45-4910-OAL	430.0	394.0	412.0	
45-5010-OAL	442.0	406.0	424.0	
45-5110-OAL	454.0	418.0	436.0	
45-5210-OAL	466.0	430.0	448.0	
45-5310-OAL	478.0	442.0	460.0	
45-5410-OAL	490.0	454.0	472.0	

Dimensions in mm

Accessories

Thread wear piece / guide piece

Wear piece (standard)



Type 29-510
1-start external thread

[On request](#)



Type 49-510
4-start internal thread

[On request](#)

Wear pieces are inserted into the drill tube instead of the standard connection thread. They have less wear and tear, especially when tools have to be exchanged frequently. They are also used for repairing damaged threads. Drill tubes can be repaired on-site with the length remaining the same.

Retrac- wear piece



Type 29-518

[On request](#)

Retrac- wear pieces – mechanical or hydraulic – are used when counterboring, skiving and roller burnishing tools are being used. The activations are delivered by the tool supplier.

Guide piece



Type 29-550 / 555
1-start external thread

[On request](#)



Type 49-550 / 555
4-start internal thread

[On request](#)

Guide pieces are inserted between drill head and drill tube. They are used to pass cross holes. They are also suitable for minimizing drill hole deviation.

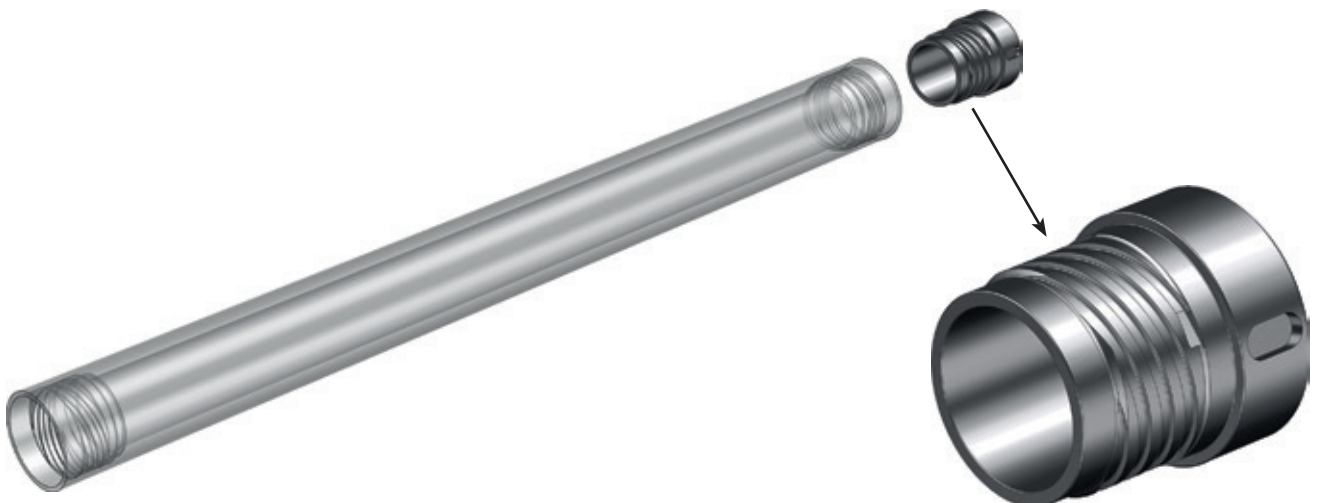
Thread protecting cap for drill tubes with 1-start external thread



Type 29-500

On request

Thread protecting cap for drill tubes with 4-start internal connection thread



Type 49-500

On request

Caps are used on drill tubes with threads on both ends. They prevent drill tube damages when clamping and/or by chips.

Accessories

Thread adapter



Type 29-520
1-start/4-start

On request



Type 29-530
1-start/1-start

On request



Type 49-520
4-start/1-start

On request



Type 49-530
4-start/4-start

On request



Type 49-530
Flange/4-start

On request



Type 49-520
Flange/1-start

On request

Thread adapters are used to connect tools and drill tubes with different connection threads and / or to reduce the number of drill tubes (with large-size reductions please consider the effect of the torque).

Accessories

Oil pressure head (BOZA) for rotating workpieces

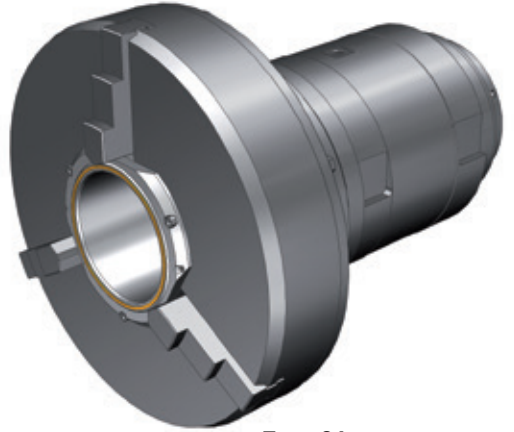
Cone clamping



Type 91

On request

Jaw chuck



Type 91

On request

Face sealing

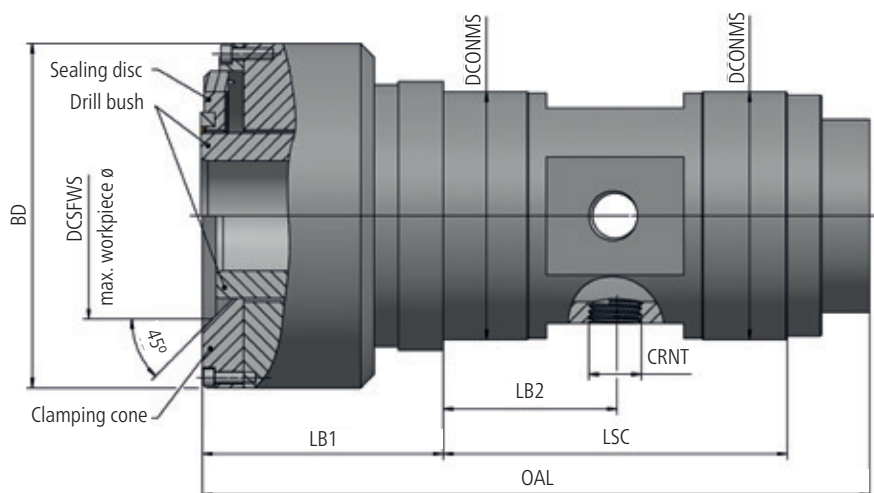


Type 91

On request

Installation dimensions

with clamping cone or sealing disc



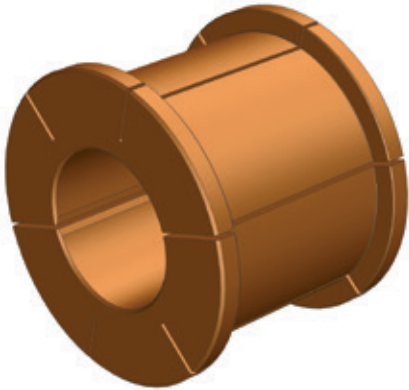
Size	Drilling range	DCONMS	BD	OAL	LB1	LSC	LB2 $\pm 0,2$	CRNT	DCSFWS
50	12.50 - 50.00	140.0	200.0	500.0	175.0	250.0	125.0	R1"	150.0
100	25.00 - 100.00	180.0	250.0	500.0	175.0	250.0	125.0	R1,5"	200.0
200	50.00 - 200.00	300.0	425.0	600.0	200.0	350.0	125.0	R2"	350.0
250	50.00 - 250.00	355.0	475.0	600.0	200.0	300.0	125.0	R2"	425.0
400	100.00 - 400.00	490.0	625.0	675.0	200.0	425.0	175.0	ϕ 80	550.0
500	100.00 - 500.00	600.0	725.0	700.0	200.0	450.0	225.0	ϕ 80	600.0
600	200.00 - 600.00	700.0	850.0	850.0	300.0	475.0	175.0	ϕ 80	600.0

Dimensions in mm

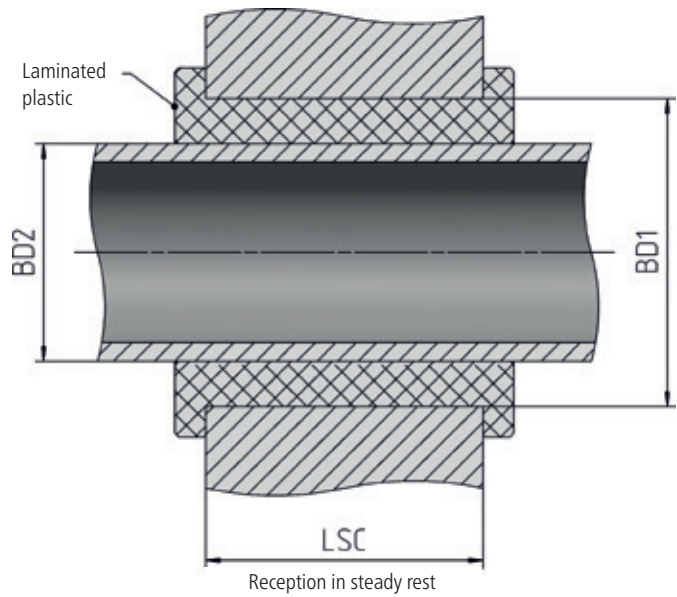
Accessories

Vibration dampers for non-rotating tools

Non-rotating tools



Type 91 - 030



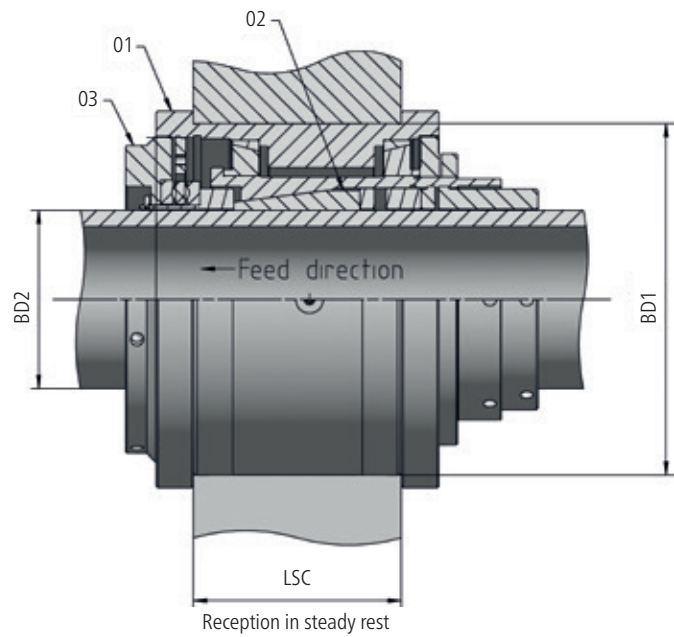
- Vibration dampers are built into a steady rest.
- The steady rest is clamped in its upper part. The vibration dampers for stationary tools consist of **two-piece damping sleeves**. These can also be supplied in a combination of steel and plastic.

BD2 max. (mm)	Size	Damper BD1 (j6) x LSC (mm)	Order no.
130	0	150 x 135	91-030000-000
154	1	180 x 135	91-030100-000
250	2	280 x 165	91-030200-000
310	3	355 x 165	91-030300-000

Rotating tools



Type 91-028



- Vibration dampers are built into a steady rest.
- The damping pressure is adjusted on the pressure ring. The position of the damping cone is limited axially by the adjusting disc.
- The vibration damper works mechanically without any further intervention.

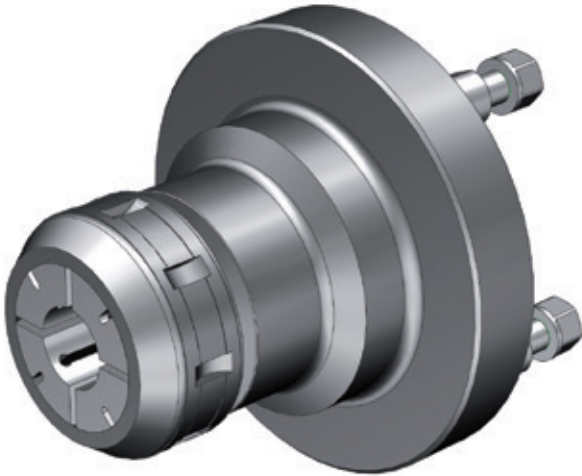
BD2	Size	Damper BD1 (j6) x LSC (mm)	Order no.	max. speed (rpm)
11 - 68	1	180 x 135	91-028100-000	1200
56 - 142	2	280 x 165	91-028200-000	500
118 - 226	3	355 x 165	91-028300-000	250

Accessories

Drill tube clamping

Collet clamping

for drill tubes \varnothing 12.00 - 56.00 mm
standard design for spindle nose DIN 55026-A



Type 91 - 045

Drill tube \varnothing (mm)	Size	Spindle nose flange size	Order no.
12 - 56	3	6	91-045300-060
		8	91-045300-080
		11	91-045300-110

Other spindle nose flanges or special design on request

Spindle nose		Flange	Order no. / Type
Screw on type A2	ISO 702-1 (DIN 55026-A)	ISO 702-1-A2 (DIN 55028-A)	91-052...-...
Bayonet type	ISO 702-3 (DIN 55027)	ISO 702-3 (DIN 55028-C)	91-054...-...
Camlock	ISO 702-2 (DIN 55029)	ISO 702-2 (DIN 55029)	91-055...-...
Special design on request			99-91.....-...

* Please state spindle through hole BD3 when ordering due to risk of chip clogging.

Drill tube driver, split-bush style

for drill tubes Ø 62.00 mm and larger standard design for spindle nose DIN 55026-A



Type 91 - 052

Drill tube / BD1 (mm)	Size	Flangesize	Order no.	OAL	DCON1	DCON2	BD2	BD3
36 - 68 (Special design)	0	6	91-052000-060	170	165	106.375	113	55
		8	91-052000-080	172	210	139.719		
62 - 106	1	8	91-052100-080	210	210	139.719	175	90
		11	91-052100-110	190	280	196.869		
		15	91-052100-150	190	380	285.775		
118 - 166	2	11	91-052200-110	275	280	196.869	230	141
		15	91-052200-150	280	380	285.775		
178 - 238	3	15	91-052300-150	350	380	285.775	302	202
		20	91-052300-200	350	520	412.775		
250 - 382	4	20	91-052400-200	500	520	412.775	446	346

Other spindle nose flanges or special design on request

Spindle nose		Flange	Order no. / Type
Screw on type A2	ISO 702-1 (DIN 55026-A)	ISO 702-1-A2 (DIN 55028-A)	91-052...-...
Bayonet type	ISO 702-3 (DIN 55027)	ISO 702-3 (DIN 55028-C)	91-054...-...
Camlock	ISO 702-2 (DIN 55029)	ISO 702-2 (DIN 55029)	91-055...-...
Special design on request			99-91.....-...

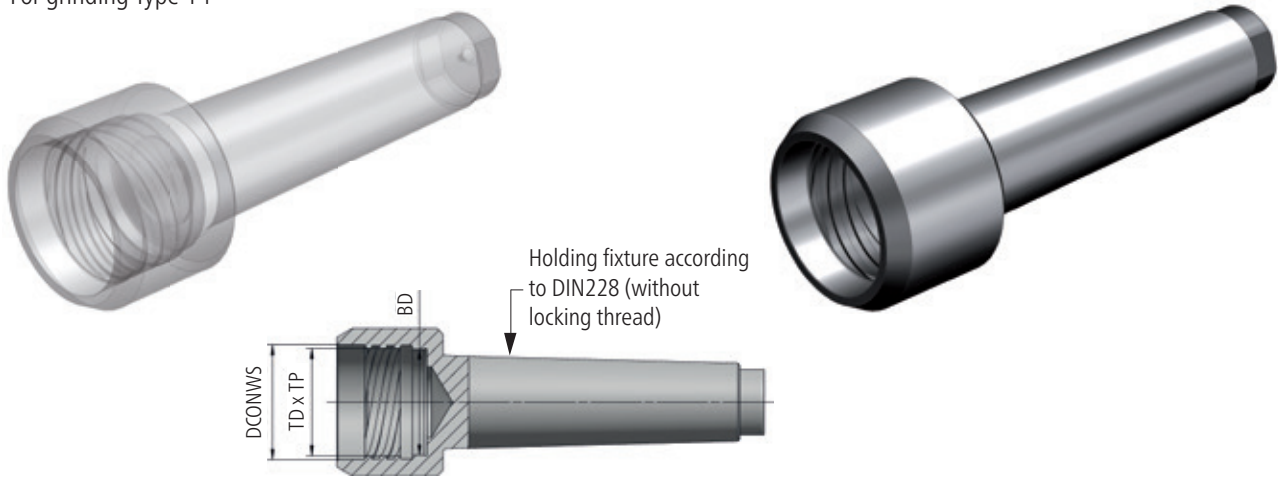
* Please state spindle through hole BD3 when ordering due to risk of chip clogging.

Accessories

Grinding arbor

Grinding arbor with 4-start thread

For grinding Type 14



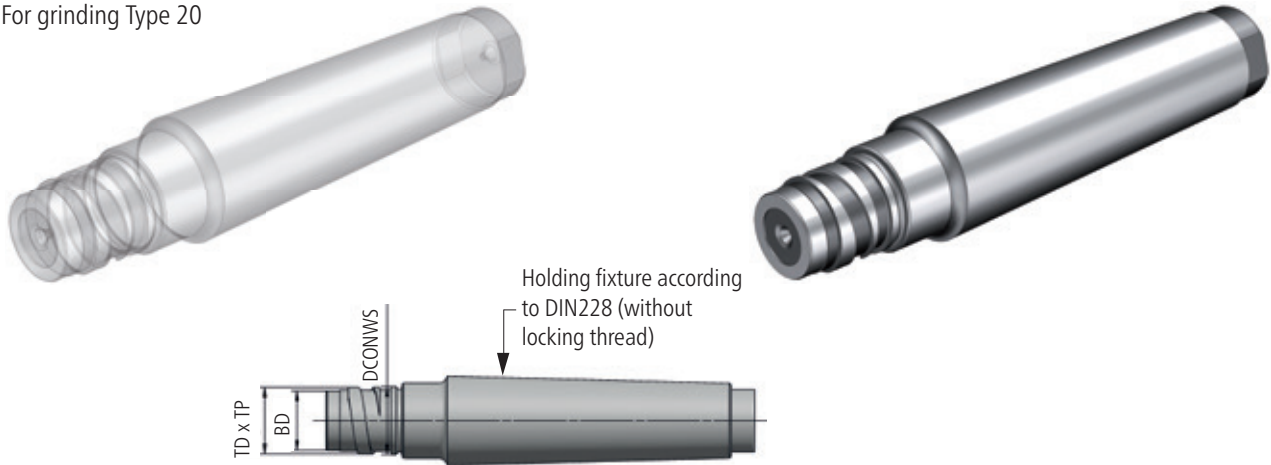
Order no.	Drill tube size	BD1	BD	DCONWS	TD x TP	Holder
49-9710-100	97	14.0	10.8	12.6	12.3 x 8.0	MK 4
49-9810-100	98	15.0	11.8	13.6	13.3 x 8.0	MK 4
49-9910-100	99	16.0	12.5	14.5	14.1 x 8.0	MK 4
49-0110-100	01	17.0	13.5	15.5	15.1 x 8.0	MK 4
49-0210-100	02	18.0	14.0	16.0	15.5 x 10.0	MK 4
49-0310-100	03	20.0	16.0	18.0	17.5 x 12.0	MK 4
49-0410-100	04	22.0	17.5	19.5	19.0 x 12.0	MK 4
49-0510-100	05	24.0	19.0	21.0	20.5 x 12.0	MK 4
49-0610-100	06	26.0	21.0	23.5	23.0 x 16.0	MK 4
49-0710-100	07	28.0	23.0	25.5	25.0 x 16.0	MK 4
49-0810-100	08	30.0	25.5	28.0	27.5 x 16.0	MK 4
49-0910-100	09	33.0	27.0	30.0	29.4 x 20.0	MK 4
49-1010-100	10	36.0	30.0	33.0	32.4 x 20.0	MK 4
49-1110-100	11	39.0	33.0	36.0	35.4 x 20.0	MK 4
49-1210-100	12	43.0	36.0	39.0	38.4 x 20.0	MK 4
49-1310-100	13	47.0	39.5	43.0	42.4 x 24.0	MK 4
49-1410-100	14	51.0	43.5	47.0	46.4 x 24.0	MK 4
49-1510-100	15	56.0	47.5	51.0	50.4 x 24.0	MK 4
49-1610-100	16	56.0	47.0	52.0	51.3 x 32.0	MK 5
49-1710-100	17	62.0	53.0	58.0	57.3 x 32.0	MK 5
49-1810-100	18	68.0	58.0	63.0	62.3 x 32.0	MK 5
49-1910-100	19	75.0	64.0	70.0	69.0 x 44.0	MK 5
49-2010-100	20	82.0	71.0	77.0	76.0 x 44.0	MK 5
49-2110-100	21	94.0	83.0	89.0	88.0 x 44.0	MK 5
49-2210-100	22	106.0	95.0	101.0	100.0 x 60.0	MK 5
49-2310-100	23	118.0	107.0	113.0	112.0 x 60.0	MK 5
49-2410-100	24	130.0	119.0	125.0	124.0 x 60.0	MK 5
49-2510-100	25	142.0	131.0	137.0	136.0 x 72.0	MK 5
49-2610-100	26	154.0	143.0	149.0	148.0 x 72.0	MK 5
49-2710-100	27	166.0	155.0	161.0	160.0 x 72.0	MK 5
49-2810-100	28	178.0	167.0	173.0	172.0 x 80.0	MK 5

Hardened and ground

Dimensions in mm

Grinding arbor with 1-start thread

For grinding Type 20



Order no.	Drill tube size	BD1	BD	DCONWS	TD x TP	Holder
29-9310-100	93	12.0	9.9	11.5	11.3 x 6.0	MK 4
29-9410-100	94	13-1	10.2	11.8	11.6 x 6.0	MK 4
29-9510-100	95	13-2	10.8	12.4	12.2 x 6.0	MK 4
29-9610-100	96	14-1	11.1	12.7	12.5 x 6.0	MK 4
29-9710-100	97	14-2	11.8	13.4	13.2 x 6.0	MK 4
29-9810-100	98	15-1	12.1	13.7	13.5 x 6.0	MK 4
29-9910-100	99	15-2	12.8	14.4	14.2 x 6.0	MK 4
29-0110-100	01	16.5	13.5	15.5	15.3 x 6.0	MK 4
29-0210-100	02	18.0	14.5	16.5	16.3 x 10.0	MK 4
29-0310-100	03	20.0	16.0	19.0	18.5 x 10.0	MK 4
29-0410-100	04	22.0	17.0	20.0	19.5 x 10.0	MK 4
29-0510-100	05	24.0	19.0	22.0	21.5 x 10.0	MK 4
29-0610-100	06	26.0	21.0	24.0	23.5 x 10.0	MK 4
29-0710-100	07	28.0	23.0	26.0	25.5 x 10.0	MK 4
29-0810-100	08	30.0	24.0	27.0	26.5 x 20.0	MK 4
29-0910-100	09	33.0	27.0	30.0	29.5 x 20.0	MK 4
29-1010-100	10	36.0	30.0	33.0	32.5 x 20.0	MK 4
29-1110-100	11	39.0	34.0	37.0	36.5 x 20.0	MK 4
29-1210-100	12	43.0	37.0	41.0	40.5 x 20.0	MK 4
29-1310-100	13	47.0	40.0	44.0	43.5 x 20.0	MK 4
29-1410-100	14	51.0	45.0	49.0	48.5 x 20.0	MK 4
29-1510-100	15	56.0	49.0	53.0	52.5 x 20.0	MK 4
29-1710-100	17	62.0	54.0	59.0	58.5 x 20.0	MK 4
29-1810-100	18	68.0	60.0	65.0	64.5 x 40.0	MK 5
29-1910-100	19	75.0	66.0	71.0	70.5 x 40.0	MK 5
29-2010-100	20	82.0	74.0	79.0	78.5 x 40.0	MK 5
29-2110-100	21	94.0	85.0	90.0	89.5 x 40.0	MK 5
29-2210-100	22	106.0	97.0	102.0	101.5 x 40.0	MK 5
29-2310-100	23	118.0	109.0	114.0	113.5 x 40.0	MK 5
29-2410-100	24	130.0	121.0	126.0	125.5 x 40.0	MK 5
29-2510-100	25	142.0	134.0	139.0	138.5 x 40.0	MK 5
29-2610-100	26	154.0	145.0	151.0	150.5 x 56.0	MK 5
29-2710-100	27	166.0	157.0	163.0	162.5 x 56.0	MK 5
29-2810-100	28	178.0	169.0	175.0	174.5 x 56.0	MK 5
29-2910-100	29	190.0	181.0	187.0	186.5 x 56.0	MK 5
29-3010-100	30	202.0	193.0	199.0	198.5 x 56.0	MK 5
29-3110-100	31	214.0	205.0	211.0	210.5 x 56.0	MK 5
29-3210-100	32	226.0	217.0	223.0	222.5 x 56.0	MK 5
29-3310-100	33	238.0	229.0	235.0	234.5 x 56.0	MK 5

Hardened and ground

Dimensions in mm

Accessories

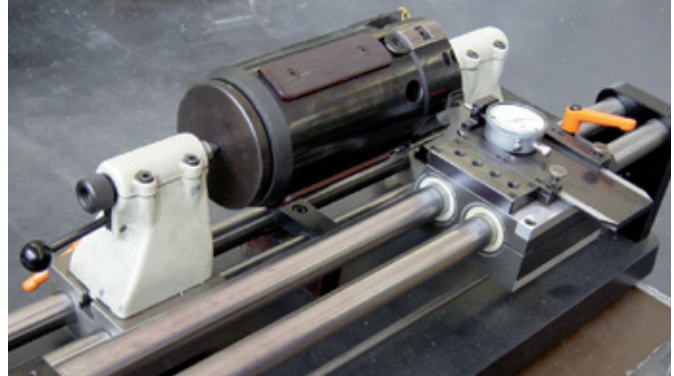
Centre disc

for tools with 1- and 4-start threads

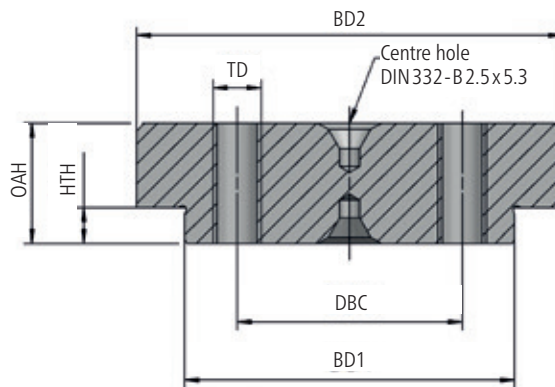
Centre disc cartridge



Example Type 36 – Installation and adjustment of cartridges



The centre disc is used to clamp the tools between centers. With this the fibre guide pads can be reworked or the tool can be measured and adjusted between centers.



1-start thread

Order no.	Drill tube Ø	BD1	BD2	DBC	HTH	OAH	TD	Order no.	Drill tube Ø	BD1	BD2	DBC	HTH	OAH	TD
39-1010-101	36.0	33.0	41.5	20.0	4.5	15.0	M6	39-2810-101	178.0	175.0	190.0	110.0	4.5	20.0	M8
39-1110-101	39.0	37.0	44.0					39-2910-101	190.0	187.0	198.0				
39-1210-101	43.0	41.0	53.0	39-3010-101				202.0	199.0	215.0					
39-1310-101	47.0	44.0	57.0	39-3110-101				214.0	211.0	226.0					
39-1410-101	51.0	49.0	63.0	39-3210-101				226.0	223.0	238.0					
39-1510-101	56.0	53.0	68.0	39-3310-101				238.0	235.0	245.0					
39-1710-101	62.0	59.0	74.0	39-3410-101				250.0	247.0	260.0					
39-1810-101	68.0	65.0	79.0	39-3510-101				262.0	259.0	270.0					
39-1910-101	75.0	71.0	86.0	39-3610-101				274.0	271.0	280.0					
39-2010-101	82.0	79.0	94.0	39-3710-101				286.0	283.0	300.0					
39-2110-101	94.0	90.0	105.0	39-3810-101	298.0	295.0	305.0								
39-2210-101	106.0	102.0	111.0	39-3910-101	310.0	307.0	317.0								
39-2310-101	118.0	114.0	129.0	39-4010-101	322.0	319.0	329.0								
39-2410-101	130.0	126.0	141.0	39-4110-101	334.0	331.0	341.0								
39-2510-101	142.0	139.0	154.0	39-4210-101	346.0	343.0	353.0								
39-2610-101	154.0	151.0	166.0												
39-2710-101	166.0	163.0	178.0												

Dimensions in mm

Dimensions in mm

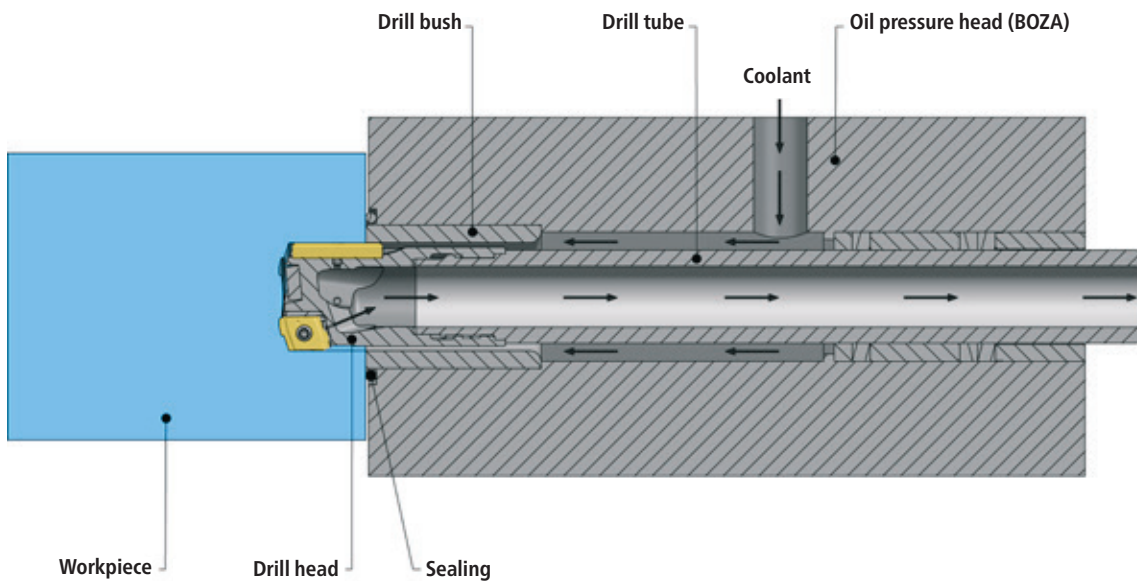
4-start threads

Order no.	Drill tube Ø	BD1	BD2	DBC	HTH	OAH	TD	Order no.	Drill tube Ø	BD1	BD2	DBC	HTH	OAH	TD
59-1610-101	56.0	41.0	48.0	28.0	4.5	15.0	M6	59-2310-101	118.0	87.0	108.0	50.0	4.5	15.0	M8
59-1710-101	62.0	43.0	54.0					59-2410-101	130.0	103.0	120.0				
59-1810-101	68.0	48.0	59.0	59-2510-101				142.0	103.0	132.0					
59-1910-101	75.0	53.0	65.0	59-2610-101				154.0	128.0	144.0					
59-2010-101	82.0	59.0	72.0	59-2710-101				166.0	128.0	156.0					
59-2110-101	94.0	71.0	84.0	59-2810-101				178.0	144.0	168.0					
59-2210-101	106.0	77.0	96.0												

Dimensions in mm

Dimensions in mm

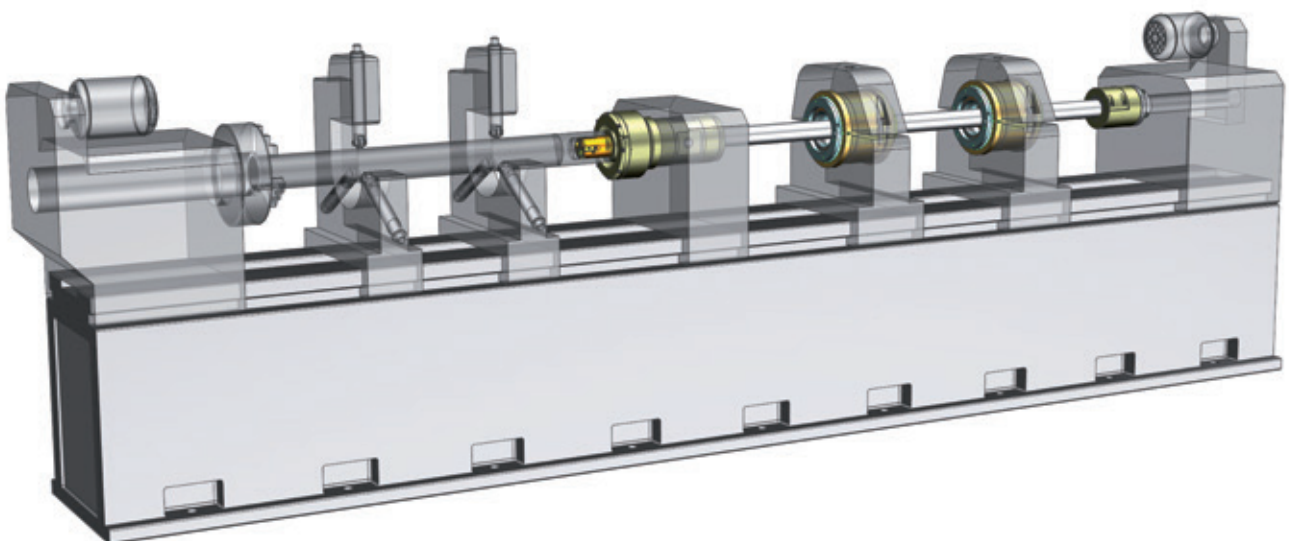
Technical appendix BTA (STS) drilling process



The BTA (STS) drilling process is a deep hole drilling method for special deep hole drilling machines with external coolant supply and inner chip removal (single tube process). To provide the coolant an oil pressure head with sealing to the workpiece is needed.

With this method drilling depths of up to $250 \times D$ are possible. Solid drilling tools $\varnothing 60.00 - 100.00$ mm are used up to a drilling depth of 17,000 mm. Tools for the BTA system are available in a diameter range from 7.76 mm to approx. 1,500 mm.

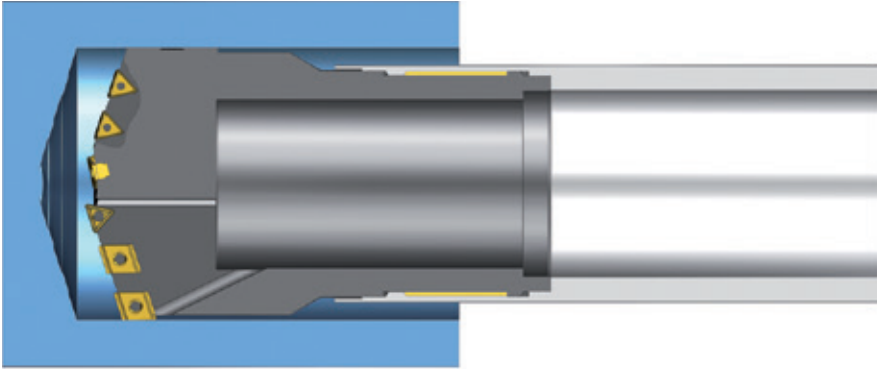
From a diameter of 16.00 mm and upwards, tools with exchangeable inserts and guide pads are used.



Technical appendix

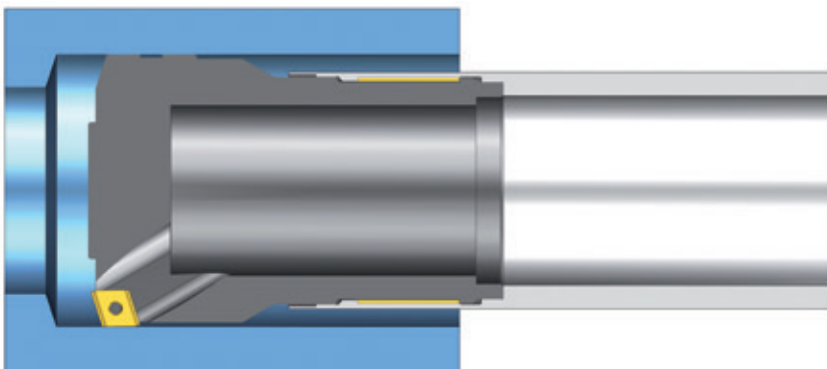
Deep hole drilling methods

Solid drilling



To drill a hole into solid material. Solid drilling is the most commonly used method for drilling operations. Drill hole diameters using the BTA (STS) deep-hole drilling system range from approx. Ø 7.76 to 700.00 mm.

Counter-boring



Counter-boring is used for increasing the diameter of predrilled holes, cast holes (e.g. tubes and pipes) or rolled tubes and bores made by other methods. Generally, the work method counter-boring improves the hole quality.

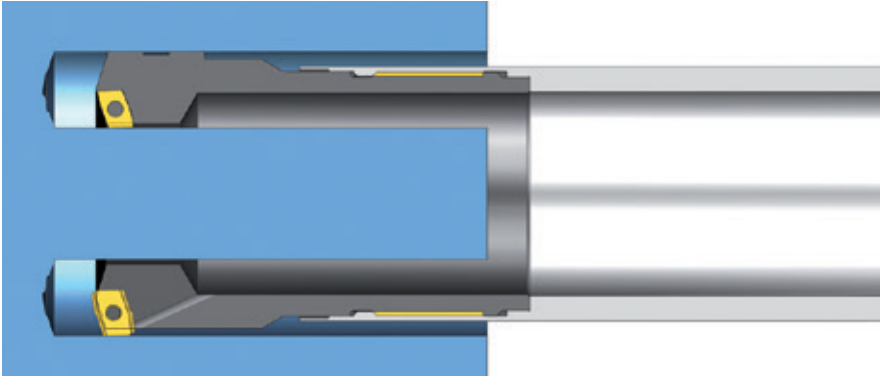
By counter-boring gradually the necessary drive power and feed force can be reduced. This is useful, when the desired drilling diameter cannot be produced in one work step because the spindle power of the machine is insufficient.

Single or multi-edged BTA tools can be used as counterboring tools.

In addition to push-boring heads, pull-boring heads are also used when highest quality is desired.

Using counter-boring tools allow an increased cutting speed, compared to solid drilling or trepanning tools.

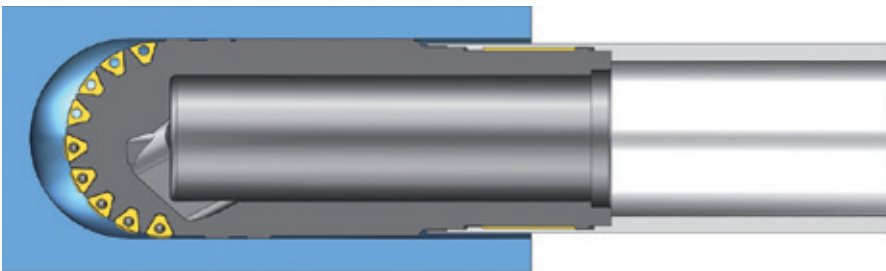
Trepanning



With trepanning only a part of the full cross-section of a bore is cut. There are three reasons for this:

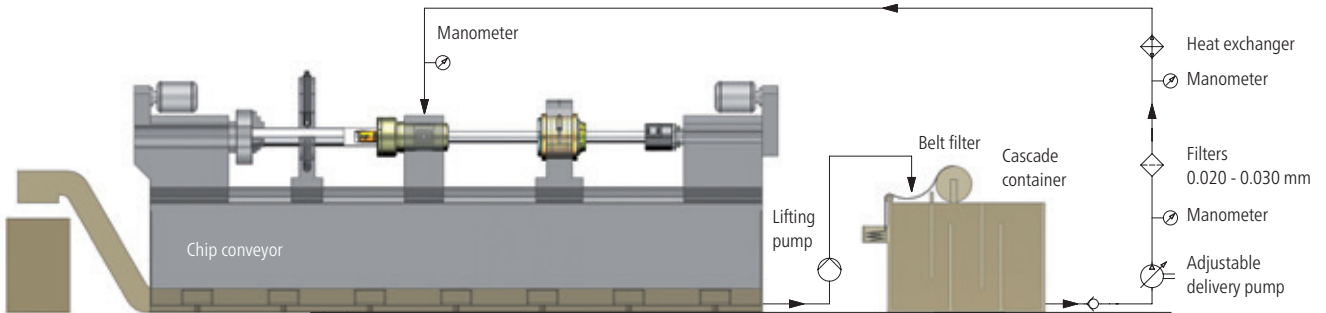
- A material sample should be taken.
- The core represents valuable material that can be processed even further (core is a "workpiece").
- The machine's drive power is not sufficient for a solid bore.

Form counter-boring



Drilling contour sections that are incorporated into the tool.

Schematic diagram of the coolant system



Cooling lubricant system

The purpose of a cooling lubricant in a deep hole drilling system is:

- Cooling of tools.
- Discharge of heat energy generated in the drilling process.
- Reduce friction of elements involved in cutting and guiding.
- Extract the chips.

Tank volume / tank size

- Tanks should be designed to have a volume approximately equivalent to ten times the maximum pump output.
- Baffles arranged in cascade form produce better settling of the suspended particles and air bubbles contained in the filtered coolant.

The tank is heated by

90% of the operating energy for the drill is converted into heat energy.

95% of the pumping energy of all pressure and circulation pumps is converted into heat energy.

The frictional energy in the lines / fans / filters is converted into heat energy.

All this energy is absorbed by the cooling lubricant.

The tank is cooled by

The tank gives off warmth to its environment as soon as the temperature of the cooling lubricant exceeds that of the environment. If the tank is not free-standing, heat transfer is strongly reduced.

The workpiece is normally at ambient temperature and thus has a cooling effect.

Centre-line deviation

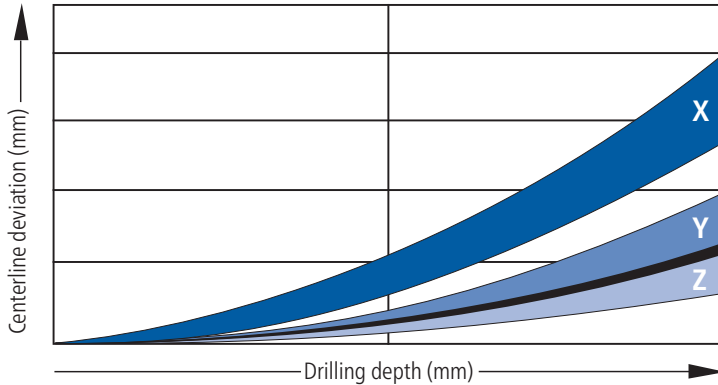
Centre-line deviation means the deviation of the drilling axis from the ideal axis. The centre-line deviation does not follow a straight line; the size of the deviation depends on many factors and cannot be predicted systematically.

Guidelines are according to VDI 3210 Sheet 1 / Part 1 Page 5.

Decisive influencing variables:

- Working method
- Drilling process
- Machine geometry
- Homogeneity of workpiece material
- Workpiece orientation
- Tool adjustment
- Cutting values
- Wear and tear of tools and inserts

Graphic representation: Working method and drilling process



Working method

- X** Only tool rotating
- Y** Tool and workpiece rotating (counter rotation)
- Z** Only workpiece rotating

Drilling process

- X** Solid drilling
- Y** Counter-boring
- Z** Pull-boring

(Please do not combine working method and drilling process.)

Technical appendix

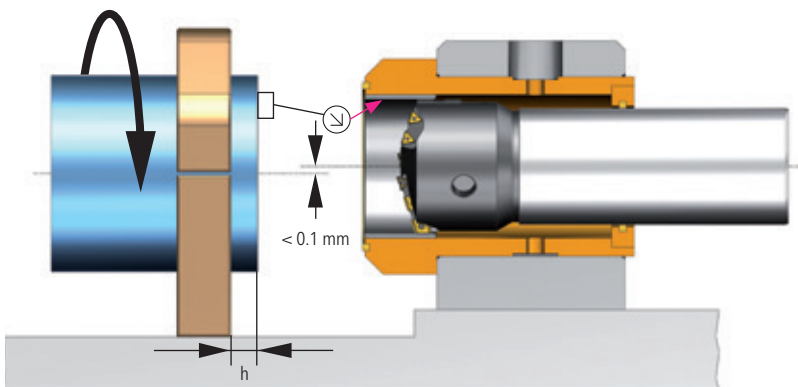
BOZA with oil pressure head



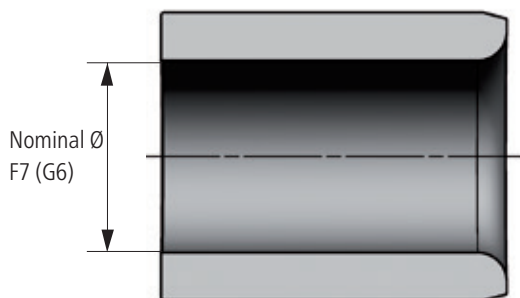
The steady rest of the tool should be as close as possible to BOZA (dimension "h"). This is the only way to achieve that the radial forces that transfer into the work-piece when beginning to drill are properly diverted into the machine bed.

Precise alignment of the axis of rotation between workpiece and drill bush is an absolute requirement in order to prevent damage to the tool and achieve a high bore quality.

Work-piece alignment and stability when beginning to drill (tool-face sealing)



Drill bushes and tolerances



The drill bush guides the tool during the beginning of the boring process.

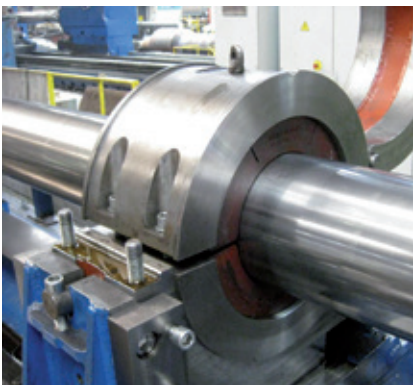
The quality of the bore depends on the drill bush tolerance.

For standard applications we recommend drill bushes with a (nominal \emptyset) tolerance of F7. For bores with highest requirements a tolerance of G6.

Vibration dampers



Rotating and non-rotating tools

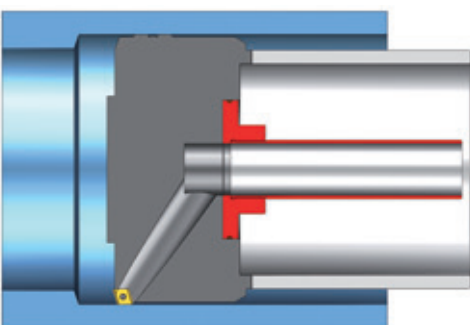


Non-rotating tools

The job of the vibration damper is both to support the drill tube and also to reduce the longitudinal and torsional vibrations occurring during the drilling process. By reducing the vibration amplitude the quality of the hole surface is improved and cutting wear is reduced.

The botek vibration damper works purely mechanically and can be used for both rotating and non-rotating applications. A pre-loaded spring presses the damping cone with constant force against the counter-bearing and balances any slight diameter differences the continuous drill tube might have. The damper is also used for **enclosed machines** or machines which are not accessible during drilling. If the vibration damper is not set correctly, it must be readjusted during the drilling process. Also applied for **pull-boring**. Since with pull-boring the tensile forces are low and the feed rate is small, the vibrations are reduced very well by the pressurized counter-bearing. The spring assembly can be fully loaded for this application.

Chip tube



With long drill tubes in particular and large drill tube diameters it is advantageous to use a chip tube.

The flow velocity of the cooling lubricant is often not sufficient to divert chips safely from the process. Usually these chips build up in the drill tube just behind the drill head. By using a chip tube the flow velocity is increased enough so that chips can be flushed out safely. The chip tube cannot be used in trepanning operations. Please contact us for further information in this regard.

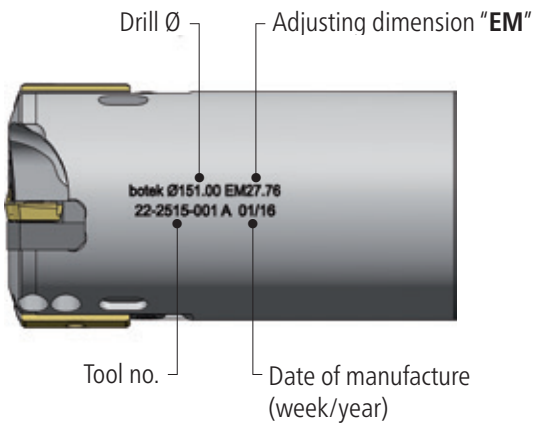
botek counter-boring tools diameter 162 mm and upwards are generally equipped with a chip tube connection.

Technical appendix

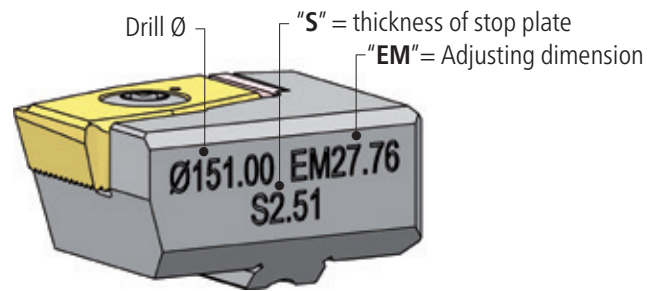
Adjusting tools

When they leave the factory, tools are preset to the diameter stated in the order, and all **important** data (drill diameter, setting gauge and thickness of the stop plate) are engraved on the body or on the cartridge.

Example: Labelling - drill head



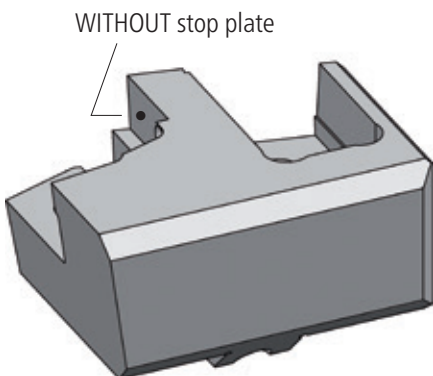
Example: Labelling - cartridge peripheral insert



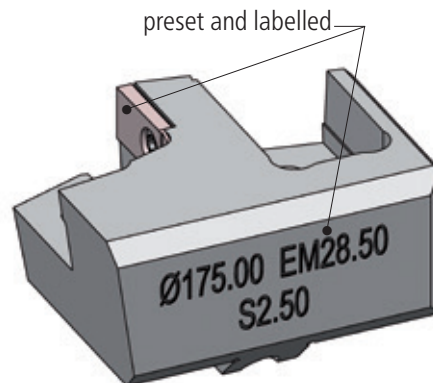
Cartridges - replacement orders

When ordering replacement cartridges, always quote the information engraved on the body. Preset cartridges will then be supplied (please quote adjusting dimension "EM" and drill-Ø).

Example: If cartridges are ordered **without** stating the setting gauge, they will be supplied **without** fittings.

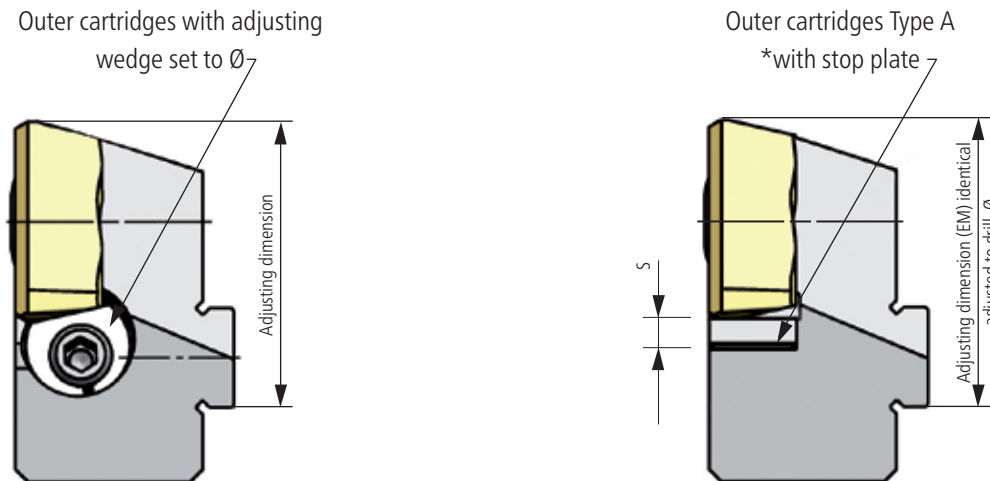


Example: If cartridges are ordered **stating** the "EM" size, they will be supplied **preset** and **labelled**.

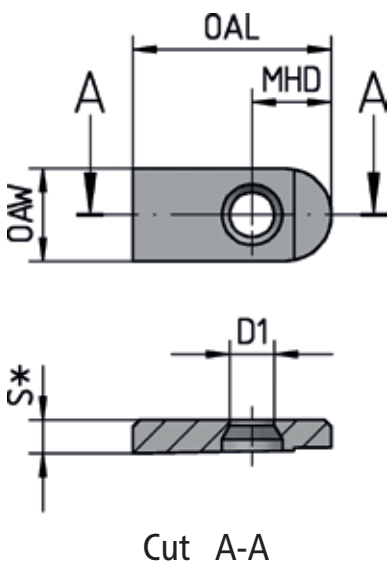


Ordering information for type A cartridges

The following must be ensured when changing the outer cartridge from the version with adjusting wedge to the Type A design with stop plate (this also applies to exchange/replacement of Type A cartridges).



- When changing from cartridge with adjusting wedge to type A cartridges with stop plate, please quote order number and in addition the adjusting dimension ("EM") (take size from cartridge with adjusting wedge). The thickness of the stop plate (size "S") can thereby be determined and suitably supplied.
- When a drill head with type A outer cartridge is supplied, the adjusting dimension ("EM") for the drill head diameter supplied is engraved on the drill head and on the cartridge.
- When ordering a type A cartridge, quote adjusting dimensions ("EM") and drill Ø.
- Stop plates are available in thickness steps (dimension "S") of 0.01 mm. The respective thickness is engraved on the stop plate. For available S dimensions see VU-01-0056-B.
- It is advisable to store a certain assortment of these stop plates so that any diameter adjustments required can be made without delay.



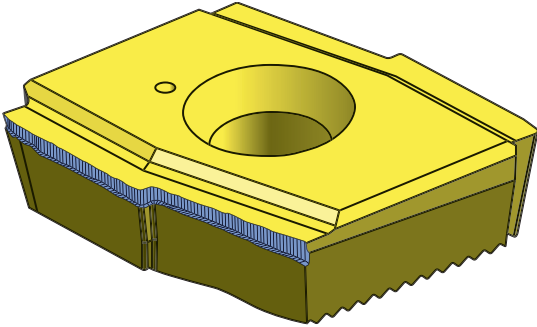
* Stop plates are available in thickness steps (dimension "S") of 0.01 mm. For range, see table. The respective thickness is engraved on the part. When reordering, quote the order number and in addition the dimension "S".

Order no.	S	OAW	OAL	MHD	D1	Screw	
						Order No.	Dimensions
01-2050-610-S...	1.30 - 2.00	5.0	11.0	4.8	2.8	01-0200-860	M2.5 x 4.3
01-2400-610-S...	1.80 - 2.50	6.0	13.5	6.0	2.7	21-0200-860	M2.5 x 4.7
01-3750-610-S...	2.20 - 3.00	7.0	15.0	6.0	3.4	21-0600-860	M3.0 x 6.7

Dimensions in mm

Types of wear

Flank wear

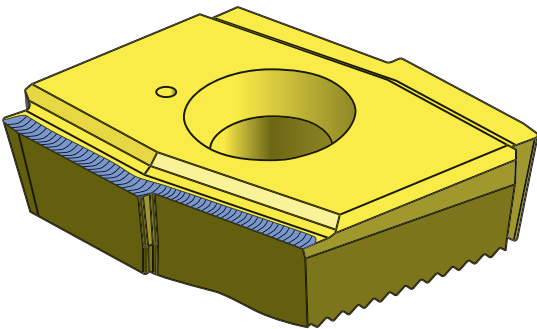


Abrasion of the cutting material almost parallel to the direction of cut because of the sliding abrasion at the cutting surface. Flank wear is normal wear that increases constantly over the operating lifetime.

To extend lifetime:

- use cutting material more resistant to wear
- lower cutting speed

Crater wear

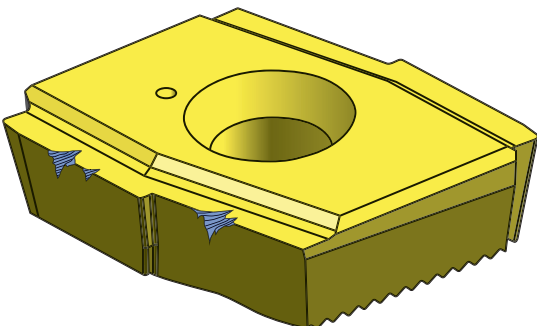


Erosion of the cutting material in the form of depressions behind the cutting edge caused by sliding wear from the chips exiting. Crater wear is normal wear that increases constantly over the operating lifetime.

To extend lifetime:

- suitable chip pilot stage
- greater cutting material strength
- alternative coating

Notch wear

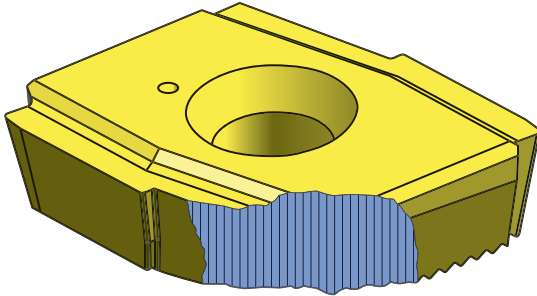


Erosion of the cutting material in the form of notches. Frequently occurs with counter-boring and is caused by a hard surface layer.

To extend lifetime:

- greater cutting material strength
- alternative coating
- regular exchange of indexable inserts

Breakage



Forced breakage of the cutting material in the cutting plane caused by chip congestion, chip breakers too short, drill bush play and vibrations.

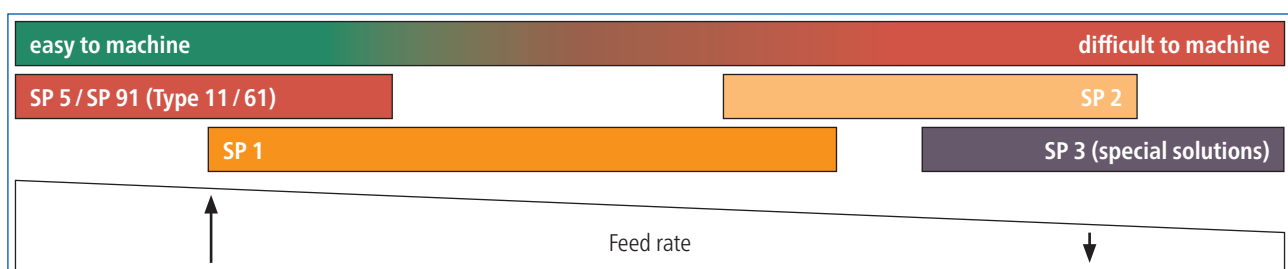
Remedial action:

- Chip congestion: Shorter chip breakers
Adjust suitable quantity of cooling lubricant
- Chip breaker too short: Use longer chip breaker
- Drill bush play: Drill bush nominal dimension F7
- Vibrations: Unsupported drill tube length too long
Setting of vibration damper
Carbide selection

Chip breaker

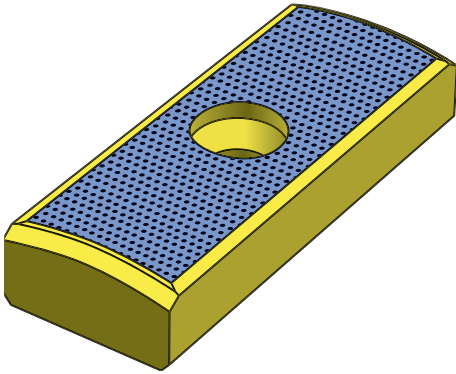
1. The chip breaker has a decisive part to play with the chip formation.
2. To obtain trouble-free chip flow along with optimum tool life, it is essential to aim for the most ideal chip formation possible.
3. The chips should be broken just short enough to ensure that there is no chip congestion in the flute of the drill.
4. Excessively short, crushed chips place strain on the cutting edges and lead to premature wear and will destroy the cutting edge.
5. For processing commonly used materials, indexable inserts are available from stock with chip breakers in accordance with model SP 1, SP 5 or model SP 2.

Materials to be processed



Technical appendix

Cobalt leaching

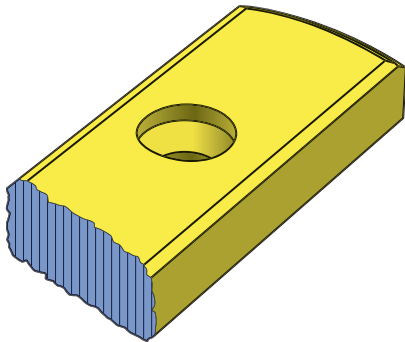


Material fatigue due to unsuitable lubricant.

Remedial action:

- Use deep hole drilling oil
- Use emulsion with high EP additive content

Breakage

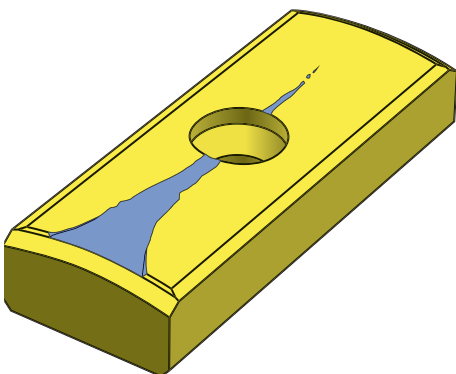


Overload breakage of the guide pad caused by chip congestion or rifling.

Remedial action:

- Chip congestion Optimize process
- Rifling Optimize process

Material abrasion



Surface abrasion of hard metal. This appearance is a normal wear, which increases continuously with the duration of use.

Remedial action:

- Observe max. tool life
- Remove dirt particles from cooling lubricant (scale acts like emery)
- Increase lubricating effect of cooling lubricant (EP additives)

Changing the drill head diameter

By replacing the accessories the diameter can be changed.

Depending on the type of tool stop plate, guide pads, shims and the cartridge of the peripheral insert must be replaced.

- Stop plate - Increments of 0.01 mm
- Cartridges - Please choose according to information given in our catalogues
- Guide pads - Are produced on diameter, alternatively shims can be supplied in thickness of 0.025; 0.05; 0.1 and 0.25 mm. Other dimensions must be sourced in locally.

When re-ordering accessories please always state technical details.

Drill heads without cartridge (e.g. Type 60) → dimension "S" and drill Ø

Drill heads with cartridge (e.g. Type 43) → adjusting dimension "EM" and drill Ø

Examination

Please check the correct setting after every diameter change by using the botek head setting gauge.



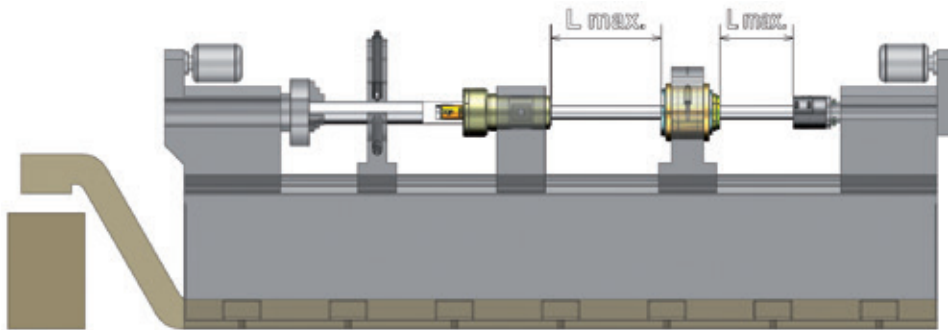
botek setting gauge, measurement range 100 - 600 mm

Cutting tool data according to ISO 13399

Short name	Preferred Name
APMX	Depth of cut maximum
BD	Body diameter
DC	Cutting diameter
DCON	Connection diameter
DCONWS	Connection diameter workpiece side
LCF	Length chip flute
LCON	Connection length
LCONWS	Connection length workpiece side
LS	Shank length
LSC	Clamping length
LU	Usable length (max. recommended)
OAL	Overall length
PL	Point length

Application notes

1. **Before using the drills make sure the machine has the necessary equipment for proper deep hole drilling. The machine should have suitable safety guarding for protection from cutting chips and coolant for operator.**
Check with machine builder!
2. **Improper use or handling of deep hole drilling tools can cause serious injuries**, e.g. skin cuts from the cutting edge.
3. **Tool support: Unsupported drill length** should never exceed the dimensions as shown on table.
If the unsupported drill length is exceeded the drill might cause injury.



Drill tube-Ø	L max.
mm	mm
11	880
12	960
13	1040
14	1120
16	1360
18 - 20	1530
22 - 24	1760
26 - 28	1950
30 - 33	2100
36 - 39	2340
43 - 47	2580
51 - 56	2703
62 - 75	3100
82 - 94	3690
106 - 130	3922
142 - 178	4544
190 - 226	5130
238 - 274	5474
286 - 334	6006

The values given in the table (L max.) are guide values for a maximum possible unsupported drill tube length in order to avoid risk of injury. However, the actual maximum possible unsupported drill tube length for a safe and reliable function of the drilling process can vary depending on the drilling application and the drilling process conditions. We generally recommend the use of a vibration damper for unsupported drill tube lengths from 50% of the guide values (L max.) specified here. If several vibration dampers are used, the first vibration damper should be positioned as close as possible behind the pressure head (BOZA).

4. Grinding of carbide produces dust (cobalt etc.) that may be potentially hazardous.
Use adequate ventilation and safety glasses during grinding.
5. **Consequences of not following** our application notes 1-4.
Using botek gundrills other than directed may cause personal injury.
Tool breakage and unsupported gundrills can be extremely dangerous.

**Please note that all application notes and values contained herein are intended as guidelines only.
We do not accept any liability for damages caused by improper handling of botek deep hole
drilling tools, operating errors, unsuitable machinery or misuse while using our tools!**

Do you have any further questions? Please call us on **T +49 7123 3808-0**. We will be pleased to offer you advice.

ISO 13399

Length specifications and tool data according to ISO 13399.

botek®

DEEP HOLE DRILLING SYSTEMS
SOLID CARBIDE TOOLS

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