

**botek**<sup>®</sup>

DEEP HOLE DRILLING SYSTEMS  
SOLID CARBIDE TOOLS

# Solid carbide twist drills

Type 158

botek



## The botek company

Manufacturing deep and precise holes is a technical challenge when processing metal. Accordingly specialising in deep hole drilling technology was the founding idea in 1974 of botek Präzisionsbohrtechnik GmbH in Riederich.

botek grew to be an international supplier of deep hole drilling tools. Over 500 employees in the main company develop and manufacture single and two fluted drills, deep hole drilling tools BTA and Ejector systems as well as special tools.

A complete product program, regarding all deep hole drilling aspects and a team of highly qualified and dedicated cutting specialists make botek a competent partner for the automobile industry and their suppliers, shipbuilding industry, hydraulic industry as well as motor, gear and machine building companies.



- Our General Standard Terms and Conditions, which we assume as known, apply.
- We reserve the right to make modifications in the interests of technical improvement. Such modifications cannot, in principle, be accepted as justifiable reasons for complaint.
- Subject to change. The manufacturer accepts no responsibility for misprints and other errors.

© botek Präzisionsbohrtechnik GmbH



## **Contents**

- p. 2 The botek company
- p. 3 Contents
- p. 4 **botek advantages**  
NEW: Carbide twist drills with internal coolant supply
- p. 5, 6 **Application requirements**  
for carbide twist drills
- p. 7 **Pilot drills / carbide twist drill**  
Service
- p. 8 **Technical information / guide values drilling quality for**  
Carbide twist drill in solid carbide – version type 158
- p. 9 **Technical information**  
Application notes
- p. 10 **Technical information**  
Drilling example
- p. 11 **Inquiry/ Order**  
Carbide twist drills

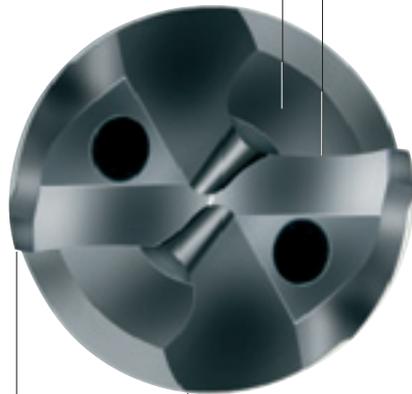
## botek advantages

### NEW: Carbide twist drills with internal coolant supply

1. Twist drills from the deep hole drilling tool specialist.
2. Top product quality, since **development and manufacturing** take place at botek.
3. Extremely good productivity achieved by high feed rates.
4. Outstanding tool life and good breaking resistance due to the extreme toughness of the carbide.
5. Trouble free chip removal due to special flute surface finish.
6. 4 margins for high hole accuracy and centreline deviation.
7. Suitable for emulsion, neat cutting oil or MQL.
8. Coating and regrinding service available at botek.

Large flute for optimum chip removal!

Excellent chip breaking due to new flute geometry!



Stable cutting edges for maximum tool life!

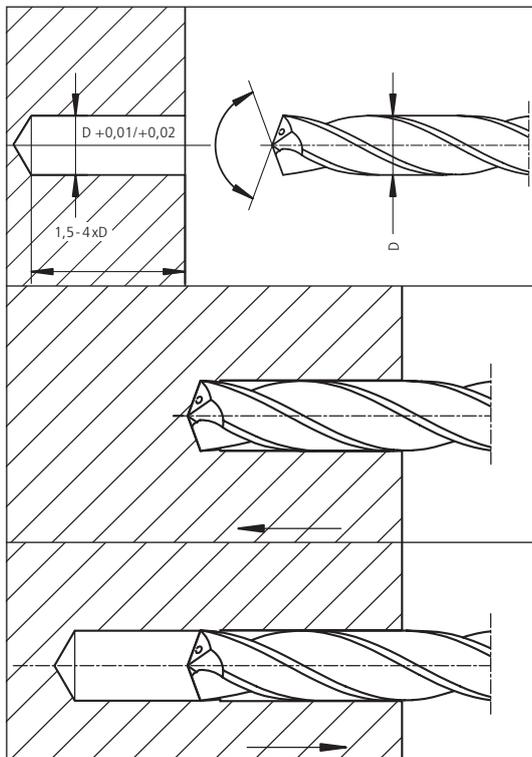
4 margins provide very good accuracy and drilling stability!



### Conditions for successful deep hole drilling:

1. An efficient coolant and filtration system with a filtration of 20  $\mu\text{m}$  to 30  $\mu\text{m}$  (the smaller the diameter, the better the coolant and filtration should be).
2. Suitable coolant, i. e. deep hole drilling oil or emulsion (min. 6 % concentration, with additives) has to be provided in sufficient quantity and pressure. Minimum quantity lubrication (MQL) is also possible.
3. Guidance with a pilot hole in the workpiece.

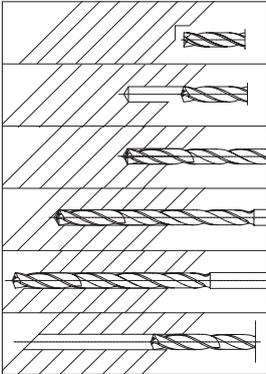
### Machining sequence:



1. Drill pilot hole (for size see table "Dimensions for the guide hole").  
→ We recommend to use botek pilot drills Type 153
2. The twist drill is fed into pilot hole while non rotating or rotated slowly at < 200 RPM.
3. Switch on the coolant.
4. Switch on RPM and feed.
5. After reaching the drilling depth switch off the RPM.
6. Switch off the coolant pump.
7. Fast retract with the spindle stopped or slowly rotated < 50 RPM. Please see our safety instructions (page 9).

# Application requirements for carbide twist drills

## Angular drilling



1. Spot facing.
2. Drill pilot hole (for size see table "Dimensions for the guide hole").  
→ We recommend to use botek pilot drills Type 158
3. The twist drill is fed into pilot hole while non rotating or rotated slowly at < 200 RPM.
4. Switch on the coolant.
5. Switch on RPM and feed.
6. After reaching the drilling depth switch off the RPM.
7. Switch off the coolant.
8. Fast retract with the spindle stopped or slowly rotated < 50 RPM.

The mentioned values are guide values. The maximum possible values depend on the diameter and length ratio of the tool.

The carbide twist drill is a self centering drilling tool. However, a guidance by means of a pilot hole is necessary. Drill lengths exceeding 15 x Dia., high feed rates while drilling and the resulting deflection forces might cause tool breakage.

Quality and accuracy of the pilot hole affect tool life and centreline deviation.

	Drill diameter (mm)	Dimensions for the guide hole	
		L (mm)	D (mm)
			for <b>very precise</b> hole quality
	3.000 – 14.000 mm	app. 1.5 x D	D + 0.01 to 0.02 mm

### Overview – pilot drills

Type		
<b>Type 153-02</b> not coolant fed/ point angle 140°, 3 x D (flute length)	Standard	
<b>Type 153-03</b> coolant fed/ point angle 140°, 5 x D (flute length)		
<b>Type 158-07</b> not coolant fed/ point angle 160°, 3 x D (flute length)	Optimised	
<b>Type 158-08</b> coolant fed/ point angle 160°, 5 x D (flute length)		

For angular drilling situations we recommend tapered pilot drills (coolant fed), type 159-01

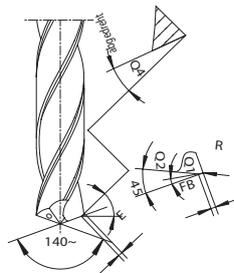
### Overview – carbide twist drills

Type	Tool diameter	
<b>Typ 158-00</b> Solid carbide twist drill / solid drilling tool/ 4 margins (high-performance twist drill), coolant fed	Tool diameter <b>3,000 – 14,000 mm</b>	
<b>Typ 158-01</b> Solid carbide twist drill/ solid drilling tool/ 2 margins with internal cooling (available on request)	Tool diameter <b>3,000 – 14,000 mm</b>	

All tools also available without internal cooling

#### Standard nose grind

The drill point geometry and the resulting low axial forces allow very high feed rates. Stable cutting edges in combination with the special botek coating guarantee highest tool life.



#### Clamping shanks for type 158-00

- Standard: DIN 6535 HAK. Others available on request (e.g. DIN 6535 HBK, DIN 6535 HEK).
- All shanks have optimized shank tolerances for hydraulic chucks.

#### Service

##### → Coating

Carbide twist drills can be supplied with several botek coatings. The type of coating depends on the material, coolant and drilling application and is tailored to requirements.

##### → Regrinding

botek provides an individual regrinding service and would be pleased to perform this task for you.

##### → Process design

##### → Customer testing in our trial department

Please contact us.

More information available at [www.botek.de](http://www.botek.de)

## Technical information

### Carbide twist drill in solid carbide – version type 158

#### Guide values for processing various materials with carbide twist drills (coolant fed)

Material groups	Aluminium Si-content < 5%	VA steel	Alloyed steel	Annealed steel ~35 HRC (C ≥ 0.3%)	Annealed steel 35~45 HRC	Hardened steel 45~50 HRC	GG	GGG	C ≤ 0.2%
Cutting speed m/min	120 - 150	50 - 80	70 - 90	50 - 70	40 - 60	30 - 40	63 - 125	60 - 80	63 - 125
Drill diameter (mm)	Feed rate (mm/rev.)								
	from - to	from - to	from - to	from - to	from - to	from - to	from - to	from - to	from - to
3.0	0.06 - 0.09	0.06 - 0.12	–	–	–	–	0.06 - 0.12	0.06 - 0.12	0.06 - 0.12
4.0	0.10 - 0.14	0.08 - 0.16	0.10 - 0.15	0.10 - 0.15	0.10 - 0.15	0.08 - 0.13	0.08 - 0.16	0.08 - 0.16	0.08 - 0.16
5.0	0.15 - 0.18	0.10 - 0.20	0.10 - 0.20	0.12 - 0.18	0.12 - 0.18	0.10 - 0.15	0.10 - 0.20	0.10 - 0.20	0.10 - 0.20
6.0	0.20 - 0.25	0.12 - 0.24	0.14 - 0.20	0.14 - 0.20	0.14 - 0.20	0.12 - 0.18	0.12 - 0.24	0.12 - 0.24	0.12 - 0.24
8.0	0.25 - 0.29	0.16 - 0.28	0.16 - 0.24	0.16 - 0.24	0.16 - 0.24	0.14 - 0.22	0.16 - 0.28	0.16 - 0.28	0.16 - 0.28
10.0	0.23 - 0.30	0.20 - 0.35	0.18 - 0.27	0.18 - 0.27	0.18 - 0.27	0.15 - 0.25	0.20 - 0.35	0.20 - 0.35	0.20 - 0.35
12.0	0.32 - 0.40	0.24 - 0.42	–	–	–	–	0.24 - 0.42	0.24 - 0.42	0.24 - 0.42

#### Please note:

- The recommended values given in the table above only apply when using hydraulic chucks and providing good chip removal.
- Feed rates set to achieve short chips.
- Reduced feed rates for interrupted cuts (hole exit, angled exit, etc.).

#### Drilling quality

To achieve optimum drilling results when using solid carbide twist drills, various criteria must be applied. In addition to tool design, key factors are machine design and construction, process techniques, pressurized and filtered deep hole drilling coolant. Selection of proper cutting parameters is also a significant factor.

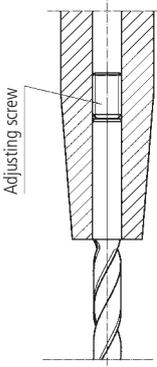
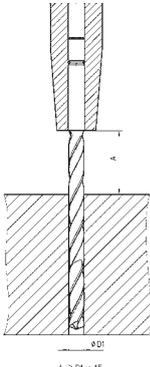
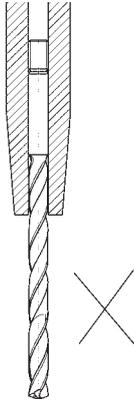
The key factors botek considers when designing gundrills:

- Material type
- Diameter, tolerance and surface finish
- Suitable carbide grade
- Nose grind geometry

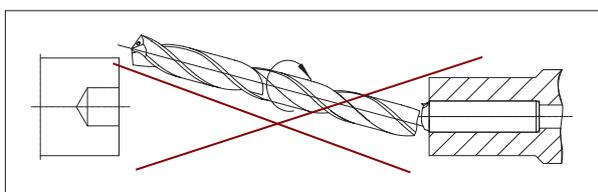
In addition to our refined manufacturing and technology for consistent product quality, our application and technical experience help you realize optimal solutions.

### Safety instructions:

1. **Before using** the drills make sure the machine has the necessary equipment to do 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. **Operating instructions**

Tool holder	Tool length	Tool installation	Installation tolerance
 <p>Adjusting screw</p>	 <p>A: <math>\geq D1 \times 15</math></p>		 <p>Concentricity <math>\leq 0.03</math> mm</p>
<p>The tool is securely clamped in a chuck.</p>		<p>Clamp on cylindrical part of tool only.</p>	

4. The twist drill is fed into drill bush or pilot hole while non rotating or rotated slowly at  $< 50$  RPM.  
 Then the coolant and the machine spindle should get started.
5. **Consequences of failure** to comply with our usage instructions 1 – 4



If our deep drilling tools are incorrectly used and our usage recommendations are not followed correctly, people may be injured and/or property may be damaged.

There is a risk of fatal injury if the tool breaks and flies through the air in an uncontrolled way!

**Please note that all of the usage instructions and values are recommendations only. We are not liable for damage resulting from incorrect handling of our deep drilling tools, operating mistakes, substandard mechanical requirements or improper use of our tools!**

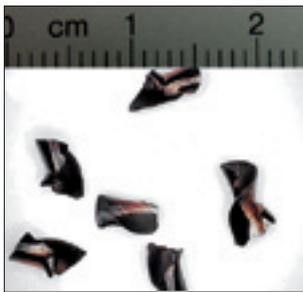
Do you have any questions? Please call us on T +49-(0)-7123-3808-0. We would be pleased to advise you.

# Technical information

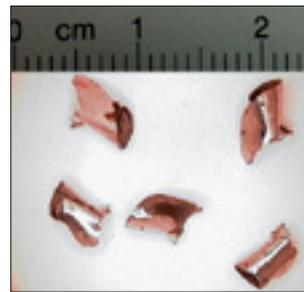
## Drilling example

Machining example:	
Workpiece	Crankshaft
Drilling dia.	7.0 mm
Drilling depth	25 - 139 mm
Coolant pressure	40 bar
Coolant	Emulsion
Tool	Carbide twist drill, Ø 7.0 x 205 mm overall length, 160 mm flute length, shank-Ø 8.0 mm
Cutting data	<b>Vc = 110 m/min n = 5000 rpm</b> <b>f = 0.16 mm/rev. vf = 800 mm/min</b>
Drilling situation	Solid drilling, hole exit under an angle into existing hole (Ø 10.1 mm)
Pilot hole	Ø 7.02 mm, 10 mm deep, type 153-02 (not coolant fed) Cutting data: n = 2000 rpm, Vc = 45 m/min, vf = 400 mm/min, f = 0.2 mm/rev.
Result after 50 holes	- No visible wear - Extremely good surface finish throughout - Good chip formation - Quiet and smooth drilling all the way through

### Chip forms



**Minimum quantity lubrication/MQL**  
**Ø 6.0 mm**  
**50 CrMo4SV**  
**Feed: 700 mm/min**  
**Vc = 80 m/min**



**Emulsion**  
**Ø 7.0 mm**  
**Crankshaft**  
**Feed: 800 mm/min**  
**Vc = 110 m/min**



# botek<sup>®</sup>

DEEP HOLE DRILLING SYSTEMS  
CARBIDE TOOLS

botek  
Präzisionsbohrtechnik GmbH

Längenfeldstraße 4  
D-72585 Riederich

**T** +49-(0)-7123-3808-0  
**F** +49-(0)-7123-3808-138

**E-mail** [Info@botek.de](mailto:Info@botek.de)  
**www**.[botek.de](http://botek.de)

