



UNIVERSAL INJECTOR SHAFT CLEANING KIT

Manual

9038100



PICHLER
tools since 1978.

SAFETY NOTICE

To understand the functioning of the tools, it is necessary to read the manual first!

- > Read these instructions before assembling, during installation and throughout use and in the proper sequence
- > Always refer to the OEM manufacturer's instructions and service manuals for the latest data and to maintain the correct sequence
- > These work instructions and the recommended tools are meant to serve as aides only and are by no means a guarantee for certain results.
- > This tool kit is a special collection and it has been tested and used successfully on several occasions. It is of the utmost importance to maintain the correct procedure as per the instructions
- > The use of the tools should only be carried out by qualified personnel!



ATTENTION

Special caution



CORRECT



LIGHT BULB

Hint or recommendation



WRONG



SAFETY GOGGLES

Wearing safety goggles
necessary

INHALT

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UNIVERSAL INJECTOR SHAFT CLEANING KIT

Part. Nr.: 9038100



MODULE 1 - BRUSHING

Part.-Nr. 9038010

Nr.	PART.-NR.	Description
1	9039032	Wire Brush Ø 18 mm
2	9039031	Wire Brush Ø 19 mm
3	9039029	Wire Brush Ø 21 mm
4	9039028	Wire Brush Ø 24 mm
5	9039027	Wire Brush Ø 26 mm
6	9039011	Brass Wire Brush for Injector Seat 17 mm
7	9039012	Steel Wire Endbrush Ø 17 mm
8	9039036	Toolholder for Wire Brush
9	9039008	Setting Tool with 6 Sealing Plugs with Collars Ø 8+10 mm
10	9039034	Flexible Bit Holder ¼"
11	9049027	Pipe Brush Ø 7,5 mm
12	9039016	Guide For End Brush

MODULE 1 - BRUSHIN

Part.-Nr. 9038011

Nr.	PART.-NR.	Description
1	90390041	Injector Seat Cross Buffs Ø 19 mm, Fine
2	9039004	Injector Seat Cross Buffs Ø 25 mm, Fine
3	90390021	Injector Seat Cross Buffs Ø 19 mm, Coarse
4	9039002	Injector Seat Cross Buffs Ø 25 mm, Coarse
5	9039032	Wire Brush Ø 18 mm
6	9039031	Wire Brush Ø 19 mm
7	9039029	Wire Brush Ø 21 mm
8	9039028	Wire Brush Ø 24 mm
9	9039027	Wire Brush Ø 26 mm
10	9039003	Toolholder for Cross Buff
11	9049027	Pipe brush Ø 7,5 mm



MODULE 2 - MILLING

Part.-Nr. 9038020

Nr.	PART.-NR.	Description
1	90390335	Injector Seat Milling Cutter 180° Ø 15 mm
2	90390340	Injector Seat Milling Cutter 180° Ø 17 mm
3	90390321	Injector Seat Milling Cutter 120° Ø 17 : 18,8 mm
4	9039049	Centring Cone Ø 16,7 - 22,0 mm
5	90390493	Centring Cone Ø 17,8 - 20,6 mm
6	90390495	Centring Cone Ø 18,8 - 24,5 mm
7	9039046	Basic Device for Injector Seat Milling Cutter
8	90390485	Depth Gauge
9	60200035	Cutting Grease 300 g
10	151.2103	Allen Key Ball End 3 mm long



MODULE 3 - EXTRACTING THE SEALING RING

Part.-Nr. 9038030

Nr.	PART.-NR.	Description
1	6039070	Universal Sealing Ring Extractor
2	60390750	Slide Hammer 1.35 kg

1. PREPARATION

Remove fuel lines, electrical connectors and other components which will hinder the work. Remove soot and slagging etc.



Remove the injector from the cylinder head with a suitable tool.



Tools to do this can be found in recommended accessories (page 20).



Cylinder head cross section with soiled injector shaft

2. MODULE 1 - BRUSHING

2.1 Cleaning the bore to the combustion chamber



Clean, with the pipe brush $\varnothing 7,5 \text{ mm}$ the bore to the combustion chamber 5 .



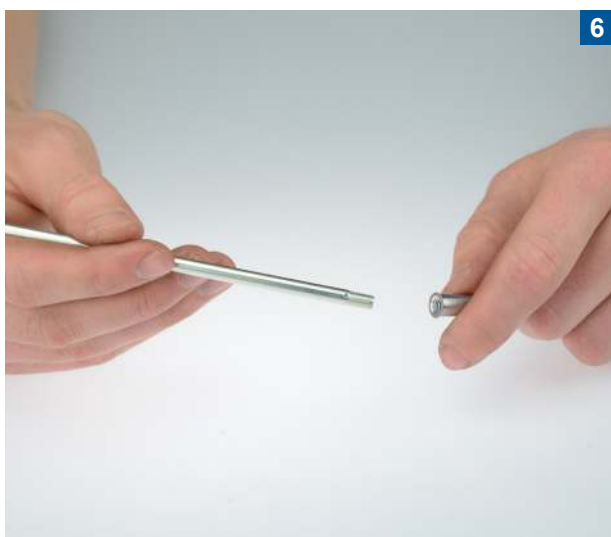
Cylinder head cross section

2.2 Closing the bore to the combustion chamber

Place using the setting tool **6** the appropriate plug (8 or 10 mm collar diameter) in the previously cleaned bore.



If the plug cannot be inserted easily, then reclean the bore with the pipe brush $\varnothing 7,5 \text{ mm}$.



Cylinder head cross section

2.3 Cleaning the walls of the injector shaft

Measure the diameter of the removed injector **8** and select the appropriate wire brush (see table 1). With stepped injectors, with large diameter differences, the wire brush has to be changed according to the diameter that has to be cleaned.



8

Ø	Part.-Nr.
18 mm	9039032
19 mm	9039031
21 mm	9039029
24 mm	9039028
26 mm	9039027

Table 1: Selecting the appropriate wire brush



The wire brush used should always be the same or next larger diameter.

Clamp the selected wire brush in the brush holder with two spanners 14 & 13.



9



10

Insert the brush holder into the flexible shaft, clamp the shaft in an electrical drill and place the brush in the injector shaft.



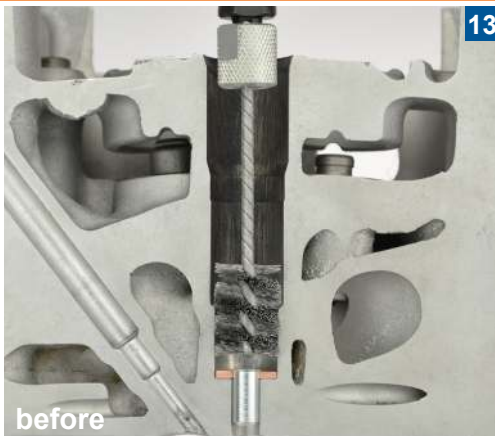
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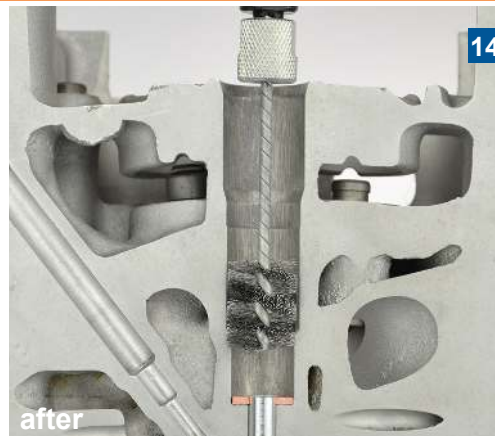
12



Clean the surface of the injector shaft at medium speed.



Cylinder head cross section



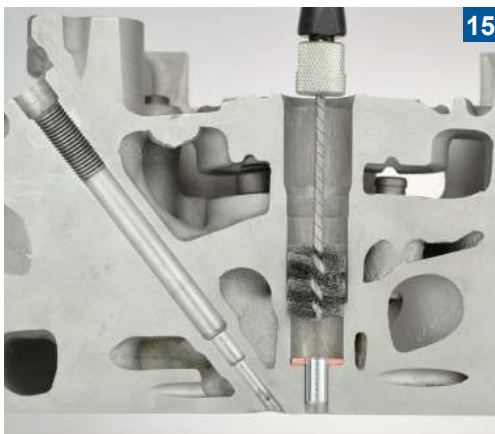
Cylinder head cross section



Remove the loosened depo-sits with a vacuum cleaner or compressed air.



In order not to remove the plug inadvertently this should be pinned down with the insertion tool.



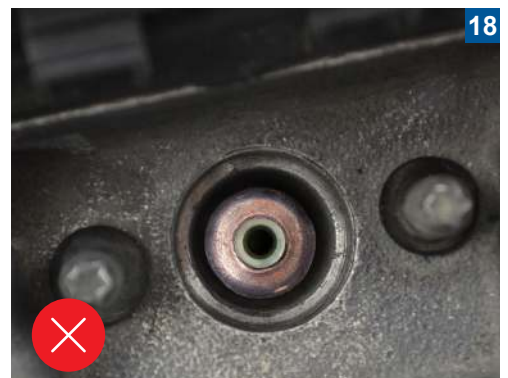
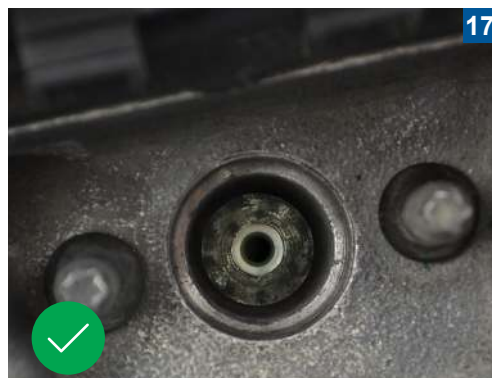
If the copper seal is already removed with the injector from the shaft, then continue with **step 2.4.**



Is the copper seal still in injector shaft **18** it can be removed with module 3. (see page 18)



But first must the previously set plug be removed.



2.4 Cleaning the sealing surface of the injector shaft

In case of gross contamination is the injector shaft sealing surface first cleaned with the Steel End Brush and finished with the Silicon Carbide Brush.

Insert the end brush into the flexible shaft. Slide the guide over the flexible shaft and end brush.



Clamp the shaft in an electrical drill. Insert, by aided by the guide, the end brush in the injector shaft. When cleaning, do not use excessive force or speed, as this could damage the sealing surface for the injector.

Remove gross contamination with the Steel End Brush, in case of only light contamination will the more gentle Silicon Carbide End Brush suffice. Repeat the cleaning process until the sealing seat is shiny clean. Repeat the process until the sealing seat shines. ²⁴ The sealing seat can be examined on cleanliness with the flexible lamp from module 3.



Cylinder head cross section

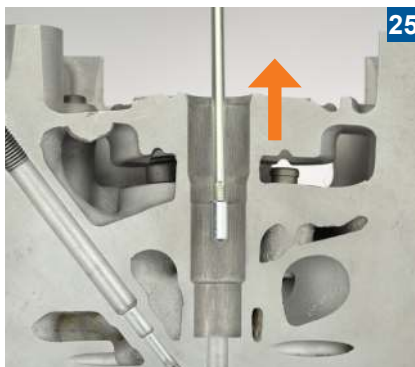


Cylinder head cross section



Clean as previously described the shaft with a vacuum cleaner or compressed air. (see fig. ¹⁵ & ¹⁶) Remove the plugs with the insertion tool and clean again the sealing seat shortly with the end brush.

Again clean the shaft with a vacuum cleaner or compressed air.



Cylinder head cross section



Cylinder head cross section

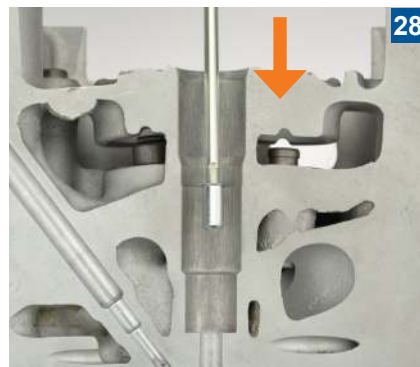
3. MODULE 1.1 - BRUSHING PLUS



ATTENTION: Before module 1.1. is used, all steps of module 1 - Brushing should have been carried out.

3.1 Closing the bore to the combustion chamber

Place using the setting tool **27** the appropriate plug (8 or 10 mm collar diameter) in the previously cleaned bore.



Cylinder head cross section

3.2 Careful cleaning of the shaft wall and sealing seat

Select the right Cross Buff depending on the injector diameter. Clean off heavy grime first with the coarse Cross Buff, later change to the fine.



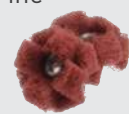
Brush	Ø	Art.-Nr.
Coarse 	19 mm	90390021
	25 mm	9039002
Fine 	19 mm	90390041
	25 mm	9039004

Table 2: Selecting the proper Cross Buff

Screw the selected Cross Buff on the Cross Buff holder and insert it into the flexible shaft.





Clamp the flexible shaft into the drill and clean the wall and the sealing seat with medium speed to a high gloss. Work only clockwise! Clean repeatedly the shaft with a vacuum cleaner or compressed air. (see fig. 15 & 16)



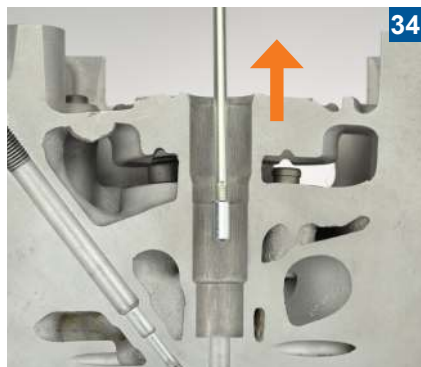
Cylinder head cross section



Cylinder head cross section



Remove the plugs with the in-section tool and repeat cleaning the sealing seat shortly with the Cross Buff. Clean the shaft with a vacuum cleaner or compressed air. (see fig. 15 & 16)



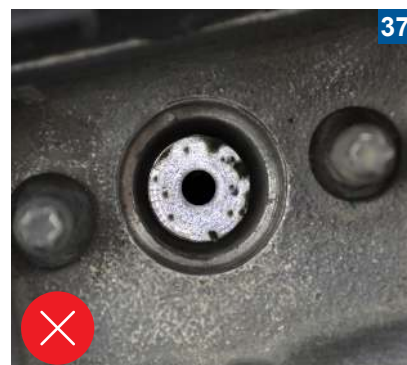
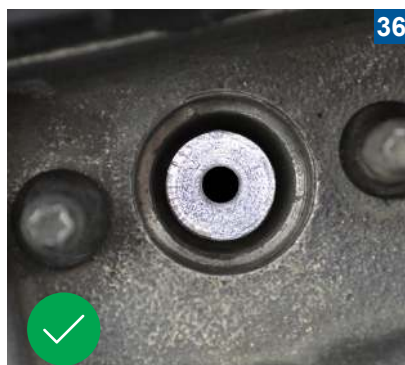
Cylinder head cross section



Cylinder head cross section



Wasn't it possible to remove all impurities from the sealing seat or damage is visible (Pits or burned exhaust residues, etc.) and this may prevent sealing of the injector, it is possible to revise the sealing seat precise and controlled with the tools of module 2.



4. MODULE 2 - MILLING

4.1 Preparing the injector seat milling cutter

Select the appropriate, depending on the injector shaft opening, centring cone and slide it together with the depth stop on the basic device.

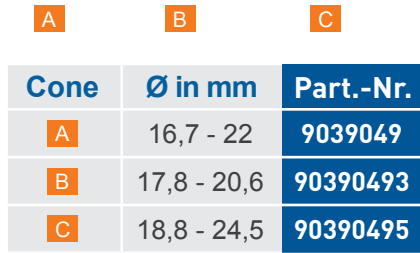


Table 3: Selecting the proper cone brush

Select the appropriate injector seat milling cutter by comparing it with the bottom side of the injector.

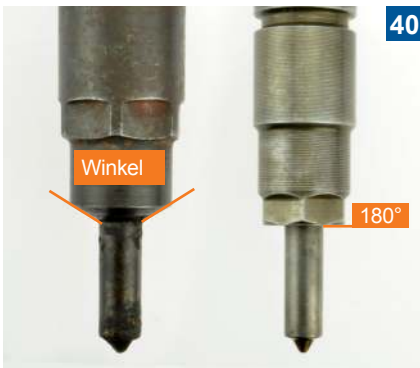


Table 4: Selecting the proper milling cutter

Slide it flush on to the basic device and make sure, that it's clamped on the flat spot of the basic device.



To bond the chips and for a better cutting result, immerse the milling cutter slightly rotating clockwise into the cutting grease.



4.2 Placing the milling cutter in the injector shaft

Insert the milling cutter in the injector shaft and lightly knock the centring cone in with the depth stop.



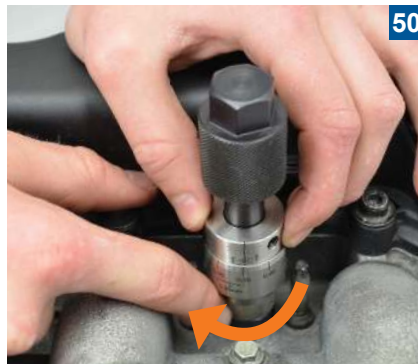
Make sure that the copper sealing ring and the sealing plug previously have been removed.



If the depth stop sits too close to the cylinder head, a second centring cone can be slid on the basic device as a spacer. e.g. with the PSA DV4 engine.



Retain the upper scale ring and turn the lower ring on the depth stop so long in a clockwise direction, until the stop **50**
Now turn the adjusting ring as long counter clockwise until its zero position lines up with the mark on the upper scale ring. **51**



Push the injector seat milling cutter all the way in, press the depth stop on the centring cone and at the same time clamp the upper scale ring. Then clamp the lower setting ring.



4.3 Cleaning the seal seat in the injector shaft with the milling tool



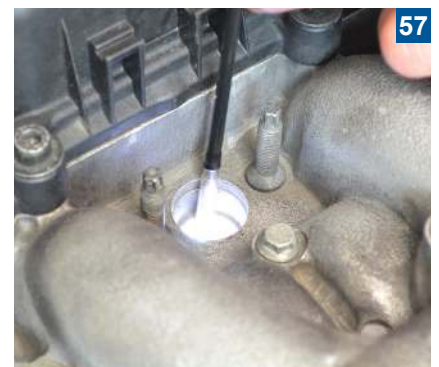
By gently pressing the basic device and rotating it clockwise, clean the injector seal seat surface.

Remove the injector shaft milling cutter and check if the seal seat is clean.

Suitable accessories for this can be found on page 20 or in module 3 (flexible lamp).



Cylinder head cross section



If necessary, release the lower ring, and add 0.05 mm. Repeat step 54 to 59 as long as necessary until all deposits are removed



Clean and regrease the milling cutter several times.



Could all impurities be eliminated, then continue with **step 4.5.**

Shows the sealing seat damages such as pits, burned in exhaust deposits, etc., then continue with **step 4.4.**



4.4 Revising the sealing seat in injector shaft

Could not all impurities be eliminated or shows the sealing seat damages such as pits or burned in exhaust deposits, then this can be rectified with the injector seat milling cutter. For that purpose material is removed by milling until all damages are removed. See steps 54 to 59.

Depending on how much material had to be removed, an oversize sealing ring can or must be used.

Follow the manufacturer's instructions!



By means of the used the depth gauge can exactly be adjusted how much material is to be removed or determined how much has been removed.

Original sealing ring: 1.20 mm

Oversize sealing ring: 1.55 mm this gives; add 0.35 mm.



4.5 Finishing

Clean again the sealing seat with the fine Cross Buff.



Before installing the new injector, the engine can be cranked over once shortly.

Thus, the last residual debris will be removed by the compression from the injector shaft.



Cylinder head cross section



5. MODULE 33 -- REMOVING THE SEALING RING

5.1 Preparing the sealing ring extractor

The knurled actuator of the sealing ring extractor must be freely movable and should have 3 - 4 mm play from the knurled pipe.



66



After being used several times it can happen that the four claw elements get overstretched and do not fit in the sealing ring any-more. This can be corrected by squeezing them together with a pair of long-nosed pliers.



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Use a new sealing ring and place it on the extraction claw in order to adjust the grip depth.



69



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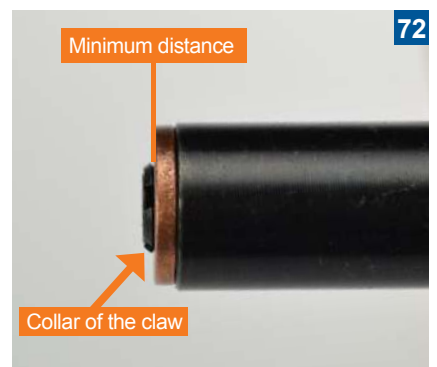
The claw is optimally adjusted when the collar protrudes minimally over the sealing ring.



If the claw protrudes too much, it will jam in the bore for the nozzle.
If the claw protrudes too little, it will not grip the sealing ring properly.



71



72

5.2 Removing the sealing ring

Screw the slide hammer on the sealing ring extractor and place the combination in the injector shaft.



Tap gently with the slide hammer the extractor claw of the sealing ring ext-ractor into the bore of the sealing ring.



Cylinder head cross section

By turning the knurled actuator clockwise spread open the claw of the sealing ring extractor and grab this way the sealing ring.



Cylinder head cross section

By tapping gently with the slide hammer remove the sealing ring from the injector shaft.



RECOMMENDED ACCESSORIES

UNIVERSAL INJECTOR REMOVAL SET II

60384435



INJECTOR ADAPTER SET 15 PC

60384660



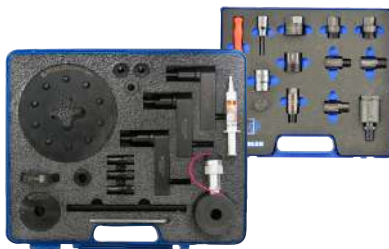
SLIDE HAMMER MOD. 8,5 KG

6148800



UNIVERSAL HYDRAULIC INJECTOR REMOVAL TOOL

60385445



INJECTOR REMOVAL TOOL KIT MOD. M9R

60385095



EXTRACTOR CLAW

6039072



COUNTERSINK SCREW

6039071



VIDEOSCOPE „EXCLUSIVE“

9078050



FLEXIBLE MAGNETIC PICK-UP

52601020



UNIVERSAL INJECTOR SEALING RING ASSORTMENT 450 PCS.

60390505



UNIVERSAL INJECTOR SEALING RING ASSORTMENT 551 PCS.

60390605



INJECTOR REMOVAL SET SOFIM

60385345



GLOWPLUG HOLE BRUSHES SET 14 PCS.

90490300



INJECTOR NEEDLE PULLER

6038472E



HYDRAULIC SET 3 PCS. 700 BAR

80255500

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