

# Cleaning and Testing of Fuel Main Filter and Checking the By-pass Valve

Job No.

09-3

A. OM 636

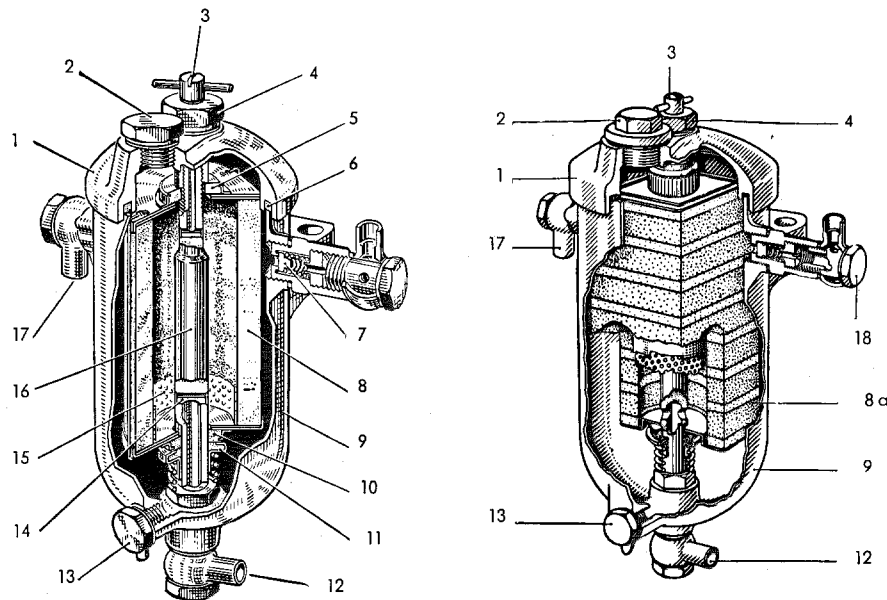


Figure 09-3/1

## Felt Pipe Element

- 1 Cover
- 2 Filler plug
- 3 Bleeder screw
- 4 Adjusting nut
- 5 Sealing ring
- 6 Rubber gasket
- 7 By-pass valve
- 8 Felt pipe element
- 8a Felt plate element
- 9 Housing
- 10 Sealing ring

## Square Felt Plate Element

- 11 Spring retainer
- 12 Outlet and/or feed line to injection pump
- 13 Sludge drain plug
- 14 Outlet passage
- 15 Felt pipe support of perforated sheet metal
- 16 Tightening bolt
- 17 Inlet
- 18 Connector for by-pass line returning to fuel tank

## a) General

The fuel filter has the task of retaining impurities of the fuel which have passed the coarser pre-filter. This is necessary, because the delicate precision parts of the injection pump and the nozzles must be protected against damages and premature wear. The satisfactory performance of an engine depends to a wide extent on the proper filtering of the fuel.

**The engine must never be operated without filter element**, because even the shortest operating periods can be sufficient to make nozzles and injection pump totally unserviceable.

In order to relieve the filter element and to increase its service life only clean fuel should be filled into the tank (also see Job No. 0-5, Fuels and Additives).

The filter element is the characteristic feature of the fuel main filters. The filters were formerly equipped with a square felt plate element and different types temporarily with a paper element. A felt pipe element is installed in all types today (see Figure 09-3/1). In the case of complaints on Diesel knock during operation, the felt tube element can be exchanged against the square felt plate element, part No. 000 477 54 15 (Bosch) or part No. 000 477 10 15 (Knecht) (also see Job No. 0-10).

The fuel to be cleaned enters the filter housing through the inlet (17). The fuel must pass through the filter element (8) (or 8a) to reach the inner space (see Figure 09-3/1). Impurities are retained during this process. Part of the dirt retained by the filter is loosened by the vibrations during operation and settles at the bottom of the filter housing. In order to remove this dirt the sludge drain plug (13) is screwed out from time to time. The fuel contained in the inlet space of the filter will flush out the main part of the settled sludge. The traces of dirt remaining are removed during the next cleaning of the filter element. The filtered fuel flows from the inner space of the filter through the outlet passage (14) inside the tightening bolt downwards to the outlet (12) and to the injection pump. The suction space of the injection pump is continuously kept under overpressure (1 to 1.5 atm.) by the by-pass valve (7) which also prevents unpermissible pressure increases in the feed line. In addition the filter is continuously bled by the by-pass valve during operation. The two sealing rings (5) and (10) seal the inside from the outside of the filter. The spring retainer (11) with spring always applies an adequate pressure to the sealing rings (see Figure 09-3/1).

## b) Cleaning of Fuel Main Filter

**Note:** The temporarily installed paper elements must no longer be installed. Unserviceable felt plate elements must also be replaced by the presently used felt pipe element.

The directions specified below must be observed and the sequence of the operations must be adhered to during the cleaning of the filter.

1. The filter must be emptied before the removal of the filter element. Open first the bleeder screw (3) and then unscrew the sludge drain plug (13) and drain the filter (see Figure 09-3/1).
2. Disconnect the feed line (12) to the injection pump. After that loosen the adjusting nut (4), remove the housing cover (1) and take out the filter element (see Figure 09-3/1).
3. Remove the dirt still contained in the filter housing and flush again.

## 4. Cleaning of Filter Element

### a) Felt Pipe Element

Close the two ends of the felt pipe element with suitable plugs. We recommend for this purpose the use of the Bosch cleaning device EFEP 143 A (see Figure 09-3/2).

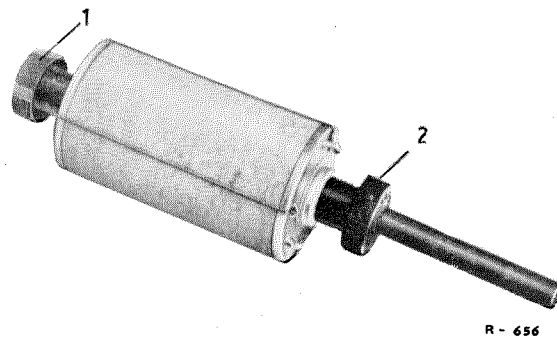


Figure 09-3/2

- 1 Plug
- 2 Plug with hose nipple

Brush the felt pipe with a soft non-metallic brush in diesel fuel or kerosene, wash it, and then rinse again in clean diesel fuel or kerosene. Make sure that the cleaning agent will reach the inside of the filter **only through the felt**. If the device EFEP 143 A is used, the hose nipple must not be submerged. It will be safest to keep the nipple closed while the element is submerged. The cleaning effect through this method will be max. 40 to 50 %.

The device EFEP 143 A is needed **for the final cleansing**, by which the felt pipe elements can be thoroughly cleaned in a simple way (cleaning efficiency almost 100 %, meaning the throughput will be the same as new):

Install device in felt pipe element and pre-clean as described above.

Then submerge the element in clean cleansing liquid and let it suck itself full. Then take out the element and thoroughly blow it out through the nipple with compressed air or with the mouth. Foam bubbles are hereby formed on the outside of the felt pipe. Wash them away. Soak, blow through and rinse; repeat this 4 to 5 times. **It is important that the filter is always blown through from the inside outwards and not in the opposite direction.**

#### b) Felt Plate Element

The element is cleaned by washing the individual felt plates in gasoline or diesel fuel. The filter element must be disassembled for this purpose. **A brush should not be used for the cleansing operation, because the tissue of the plates can be destroyed this way.**

The felt filter elements should not be cleaned too often, because the felt will then become prematurely hard thus reducing the filtering effect.

The felt plates must only be squeezed out well until the pressed-out fuel is free of impurities. Make sure that the thick and thin felt plates are alternately stacked during assembly of the filter. The top and bottom end is formed by one thin metal sheet each (Figure 09-3/1, right). The felt plates swell somewhat during the cleansing operation and must be compressed during assembly, so that the knurled nut

can be screwed on. **On no account, however, leave out any felt plates.**

5. Before the reinstallation of the filter element check proper seating of tightening bolt (16) and serviceable condition of sealing rings (5) and (10) (see Figure 09-3/1).

Very worn sealing rings must be replaced.

A swelled or very compressed and distorted rubber gasket (6) in the housing cover must be replaced. All aluminium sealing rings of the connectors must also be replaced.

6. Connect the feed line of the injection pump to the outlet (12) (see Figure 09-3/1).
7. Install the cleaned filter element and mount the housing cover. Then pump fuel into the filter housing with the hand feed pump and bleed the fuel system (see Job 00-10).

#### c) Testing of By-pass Valve

Measure the opening pressure of the by-pass valve, see Job No. 00-9. If the opening pressure is higher or lower than the specified 1.0 to 1.5 atm. gauge pressure, the by-pass valve should best be replaced. In an emergency the valve can also be disassembled, cleaned and the disc valve leveled if scored.

Disc valves and tension springs cannot be supplied as spare parts.

**Note:** In the vehicles of the Model 180 D and L 319 D and/or O 319 D there was occasionally a ticking or also a tapping noise in the fuel lines to the fuel tank, which was caused by the fuel discharge pulsations of the feed pump.

Due to this reason the disc valve of the by-pass valve was furnished with a 1 mm groove and a choke was installed in the adapter Part No. 636 990 07 63, which serves to connect the fuel feed hose from the fuel feed pump to the fuel filter.

This change was incorporated starting with the following Engine No.:

Model	Engine Number
180 D	636.930-75 06056
O 319 D	636.934-75 00373
L 319 D	636.919-75 01413

If there are complaints about ticking noises in the fuel systems of older vehicles, the following operations can be carried out.

1. If a by-pass valve with a disc valve with groove (see Figure 09-3/3, Pos. 1b) is not available for subsequent installation, the disc valve (1a) installed in the by-pass valve can be furnished with a hole 1.2 to 1.3 mm in diameter. This will have the same effect as the presently valid serially installed disc valve with groove.
2. The adapter A 8 DIN 7523-6 S, which fixes the fuel feed hose from the fuel feed pump to the fuel filter, must be closed with a disc 9 mm in diameter which is attached by hard soldering. A hole 3 mm in diameter is drilled into the center of this disc (see Figure 09-3/4, Pos. 3 and 4).

An effective remedy can only be achieved if both measures are carried out.

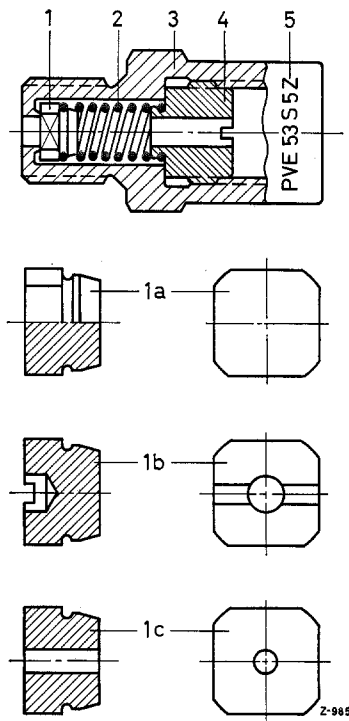


Figure 09-3/3

By-pass Valve OM 636

- 1 Disc valve
- 2 Pressure spring
- 3 Housing
- 4 Pressure spring retaining screw
- 5 Designation of producer
- 1a Disc valve without groove (1st version)
- 1b Disc valve with groove (2nd version)
- 1c Disc valve with hole 1.2 to 1.3 mm in dia. (Repair version)

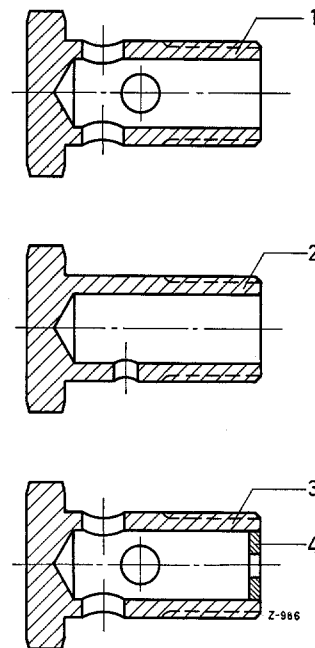


Figure 09-3/4

- 1 Adapter A 8 DIN 7523 - 6 S (1st version)
- 2 Adapter Part No. 636 990 07 63 2nd version, present serial version
- 3 Adapter A 8 DIN 7523 - 6 S modified (repair version)
- 4 Disc with 3 mm hole and 9 mm outer diameter

This modification according to Figure 09-3/3 is not valid for the Unimog and all built-in engines. Furthermore, it cannot be recommended for vehicle engines with poor starting ability.

The by-pass valve must be removed in order to determine beyond doubt whether the disc valve of the by-pass valve is without or with groove or whether the repair version has been installed. If you

look at the disc valve through the small hole, you can either see a plain surface (disc valve without groove) or a groove (disc valve with groove) or a hole (repair version) (see Figure 09-3/3). On new by-pass valves the respective version is indicated by the inscription (see the following table and Figure 09-3/3).

Inscription on the By-pass Valves Model OM 636		Version
of the firm Bosch DB Part No.	of the firm Knecht DB Part No.	
PVE 53 S 5 Z 000 477 03 29	B 302 – 84 M 1 000 477 02 29	disc valve without groove 1st version
PVE 53 P 14 Z 000 477 16 29	B 302/3 – 84 M 1 000 477 17 29	disc valve with groove 2nd version

The specified opening pressure for the two versions is 1 to 1.5 atm.

## B. OM 621

Cleaning and checking of the fuel main filter, as well as checking of the overflow valve are, in principle, identical with the OM 636. The overflow valve which had been hitherto fitted on the fuel main filter in the case of the OM 636 is mounted on the injection pump and features a **ball valve** (see Figure 09-3/5). A cross fitting (9) is mounted on the filter; the bleeder line (14) of the filter, the flexible hose (17) from the leak oil line (25), the flexible hose (8) (return flow line) from the overflow valve on the injection pump and the return flow line to the fuel tank are connected to this fitting. The cross fitting is not connected to the filter; it only serves as a mounting. Therefore, the cross fitting is mounted with a **normal hex. hd. screw** (10). **Caution! Do not use a hollow screw** (see Figure 07-9/1).

In the place of the filler screw on the OM 636, a reducer nipple (11) with a bleeder line (14) is connected to the highest point of the fuel main filter. In the reducer nipple a choke of 1 mm dia. is arranged. With the help of this bleeder line, the fuel level in the filter is essentially increased ensuring that even with low fuel contents in the tank troubles by drawing in air are prevented (see Figure 07-9/1).

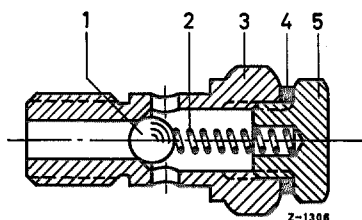


Figure 09-3/5  
Overflow valve OM 621

- 1 Ball
- 2 Pressure spring
- 3 Housing
- 4 Seal ring
- 5 Screw plug