

## Checking, Cleaning and Fabricating of Pressure Lines or Injection Lines

Job No.

07-16

The satisfactory performance of the injection nozzles depends to a wide extent on the internal cleanness of the pressure pipes. For this reason the following description on cleaning, fabricating and storing of injection pressure lines must be adhered to.

### Testing Lines

Old injection lines must be tested for leaks before installation. For this purpose pressure-test each line with the nozzle tester at a pressure of approx. 200 atm.

The pipe, especially at the sealing cones, should not be compressed. If necessary, the line must be re-bored with a 2 mm drill for a length of approx. 20 mm at the sealing cone end. Scored lines must always be replaced.

### Fabricating Injection Lines

Length, inner diameter and wall thickness of the pressure pipe lines between the injection pump and the nozzles influence the discharge rate, the engine output and the combustion noise. Therefore, only spare pipes must be used which are exactly similar in every respect to the pipes originally installed. The lines must be clamped together and/or fixed to the engine with the provided mounting clips, so that they cannot vibrate, thus preventing breaking of the pipes.

Pipes with scaled and rough internal surfaces must not be used. They can never be properly cleaned like pipes with smooth interior free of scale. Furthermore, pressure pipes with a smooth and finely grained surface can be bent and upset better, have less tendency to crack, leak, etc. than rough and coarsely grained pipes. But the greatest disadvantage is that scale spalls off from scaled pipes during the upsetting of the sealing cones, during bending and even later during operation.

Scale particles are very hard and have sharp edges. They are carried in the fuel to the nozzle holder and into the nozzle, damage needle seat and/or needle stem, and cause jamming of the nozzle needle. By this the nozzles often become unserviceable immediately. – Similar damages will be caused by all impurities; the lines must therefore be thoroughly cleaned and blown through with compressed air before installation.

### Dimensions of the Pressure Pipes:

Model	OM 636	OM 621 *
Length, not upset	750 mm	324 mm
Length, ready for installation	738–739 mm	312–313 mm
Outer dia.	6 mm	6 mm
Inner dia.	2 mm	2 mm
<p>* OM 621 engines subject to complaints on partial load knock, the injection lines of 1.5 mm inner dia. are especially suitable for improving the partial load and starting noises. The injection lines of 1.5 mm inner dia. can be supplied under the following part No.:</p>		
Injection line for cylinder	Part No.	
1	621 070 08 33	
2	621 070 09 33	
3	621 070 10 33	
4	621 070 11 33	

We recommend the following procedure for the fabrication of the lines:

1. Cut pipe to a length of 750 mm for Model OM 636 and 324 mm for Model OM 621, because approx. 6 mm should be added for the upsetting of each sealing cone. Remove burrs and blow out chips.
2. Submerge the lines in kerosene for approx. 24 hours, after that blow through with compressed air.
3. Pull al steel wire or thin steel cables approx. 20 to 25 times through the pipe, so that possible scale is loosened. The wire should be 1.5 to 1.7 mm thick and approx. 1 m longer than the line. Thoroughly blow out the pipes with compressed air. (We also recommend this cleaning for lines which were stored unplugged and had not been preserved.)
4. Then upset the two sealing cones with the Bosch Tool EF 8095. Before the upsetting of the second sealing cone slip the rings and cap nuts on the pipe. After the upsetting of the sealing cones bore the ends of the line to the specified width of 2.0 mm in dia. and approx. 20 mm deep. After that anneal the injection lines in the gas shielding furnace at 900° C for 10 seconds up to approx. 25 to 30 mm behind the sealing cones and cool slowly under gas shield.
5. Bend the pipe according to the old line. Use no sharp-edged tools for this operation.
6. After the upsetting of the sealing cones and after the bending flush the line with an injection pump mounted on the injection pump test stand for approx. 2 to 3 minutes under the highest possible discharge rate. If there is no pump test stand available, the injection line can also be cleaned and flushed with a nozzle tester. Subsequent to the flushing connect the end of the line with a nozzle holder and with a used nozzle no longer serviceable for engines, which is adjusted to an opening pressure of approx. 150 atm. Pressure-test the line with increased speed (pump in full load position) and/or fast pump strokes and check for leaks. After that thoroughly blow out the line again with compressed air containing no water.
7. If the pressure pipes are stored before assembly, they must be preserved with an anti-corrosion oil and the two ends must be closed with plugs or rubber caps. Storing in a dry room can be recommended.

**Note:** The injection line fabricated without rust protection must be replaced by an original injection line as soon as possible.