

Assembling the crank mechanism

Special tools: [951 2767](#) , [999 1801](#) , [999 5676](#) , [999 5746](#)

Note! The illustrations in this service information are used for different model years and / or models. Therefore there may be some variation. However, the essential information in the illustrations is always correct.

Tightening torques

For tightening torques not in the text, see [Tightening torque](#) .

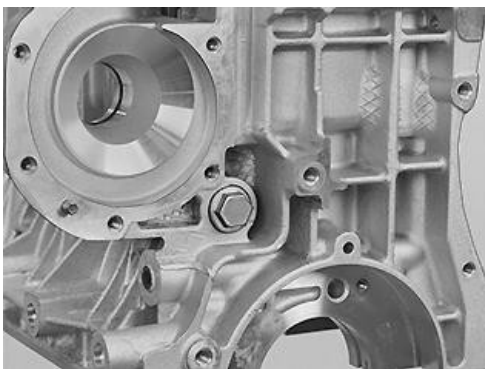
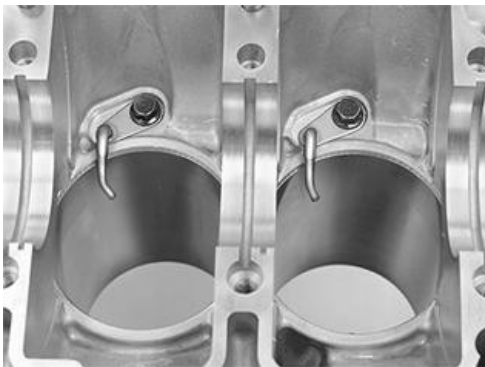
Cleaning

Ensure that the all components are **completely** clean.

Blow clean the oil ducts in the block, intermediate section and sump.

Installing the piston cooling valve and nozzles

Install the piston cooling nozzles. Tighten to **17 Nm**.



Install the piston cooling valve. Use a seal washer. Tighten to **38 Nm**.

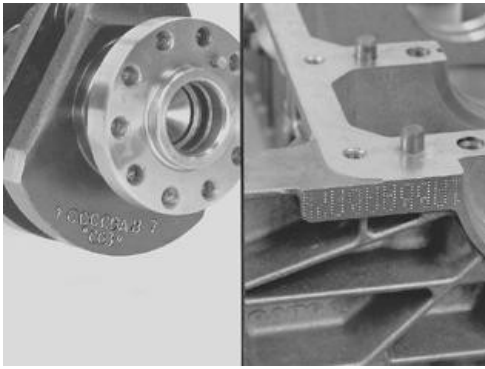
Classification of main bearings

Wipe clean the bearing recesses in the block and the intermediate section.

Check that the components are clean and undamaged.

Check the classification of the block and crankshaft.

The classification marking is at the rear edge of the block and the crankshaft. The



classification is read from digits 1 to 7. The first letter after digit 1 is the classification of main bearing 1. The bearing positions are numbered starting at the front of the engine.

Selecting bearings

Cylinder block classification / Class of crankshaft	A small diameter		B medium diameter		C large diameter	
	block	intermediate section	block	intermediate section	block	intermediate section
A small	yellow medium	yellow medium	yellow medium	blue thick	blue thick	blue thick
B medium	red thin	yellow medium	yellow medium	yellow medium	yellow medium	blue thick
C large	red thin	red thin	red thin	yellow medium	yellow medium	yellow medium

Install the main bearings in the cylinder block and the intermediate section. See the table. The axial bearing is positioned at bearing recess 6.

Caution! When reusing old bearing covers, ensure that they are correctly positioned for the direction of rotation of the crankshaft.

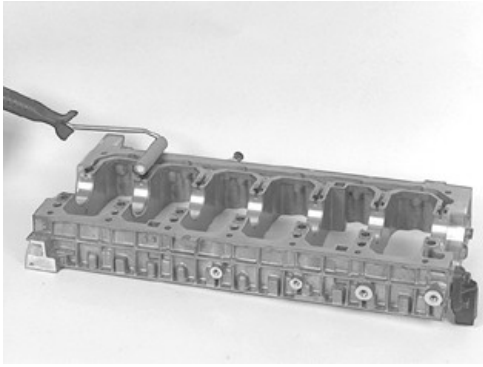
For example: The marking on the block at bearing position 1 is B. The marking on the crankshaft at the corresponding bearing position is C. This gives a red marked bearing in the block and a yellow marked bearing in the intermediate section.

Note! The thickest of the bearing caps must always be installed in the intermediate section. This is keep the centre line as straight as possible.

The intermediate section

Wipe the surfaces dry.

Apply liquid gasket 11 61 059 to the



intermediate section. The surface must be completely covered without any excess. Use roller **951 2767**.

Thoroughly lubricate all the bearing shells and the surface of the axial bearing.

Tightening the intermediate section

Install the two old screws for the flywheel and carrier plate at the rear edge of the crankshaft. Lift in these and the front of the crankshaft. Carefully position the crankshaft in the block. The crankshaft must **not** be turned before the intermediate section has been torque tightened.

Position the intermediate section.

Lubricate and install all the screws.

Install the intermediate section and the screws on the exhaust side at bearing recesses 2 and 6.

Pull the intermediate section down against the cylinder block.

Caution! The M8 screws on the exhaust side are two different lengths.

Note! Use new M10-screws.

Tighten the screws in the following order:

1. All M10 screws.....20 Nm
2. All M10 screws.....45 Nm
3. All M8 screws.....24 Nm
4. All M7 screws.....17 Nm
5. Angle-tighten all M10 screws.....90°

Tighten the screws in sequence from the centre and outwards.

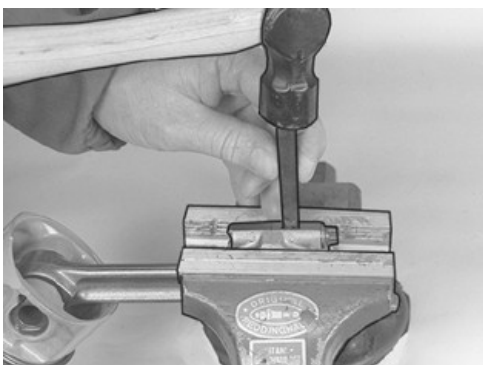
Marking the connecting rod (where applicable)

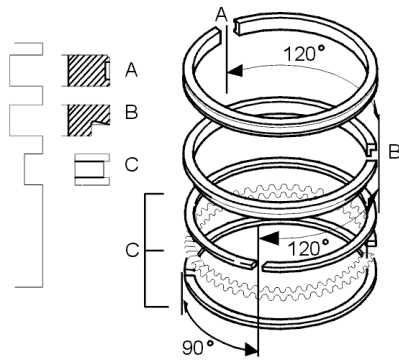
Assemble the connecting rod. Check that the cover is facing the correct direction. Tighten to **20 Nm**.

Secure the large end of the connecting rod in a vice with soft jaws (copper or aluminium).

Mark both halves with the cylinder number.

Use a centre punch or number punch.





Installing piston rings

Use piston ring pliers.

Turn the piston rings so that the openings are offset as illustrated.

A=Compression ring. The text on the piston ring must be upwards.

B=Scraper ring. Chamfered edge must face downwards.

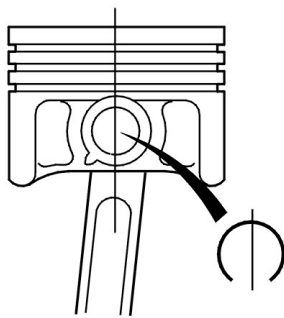
C=Oil ring. Three sections, identical on all sides.

First install the expander ring (C), then the two other rings over the expander ring.

Caution! Ensure that the piston rings can be turned easily.

Note! Incorrect positioning increases oil consumption.

Assembling pistons and connecting rods



There is an arrow on top of the piston. This must be turned forwards in the cylinder block. The connecting rods are symmetrical and can be turned freely. Marked rods however must be turned in the same direction.

Assemble the connecting rod and piston with the piston pin.

Check that the classification and any numbering for each cylinder / piston diameter correspond.

Install both the snap rings on the piston pin. Check that the snap rings are positioned correctly in the piston. The opening must be vertical.

Warning! The snap ring can easily come off. Wear protective goggles!

Wipe clean around the bearing recess in the connecting rod and the cap.

Install the bearing shells.

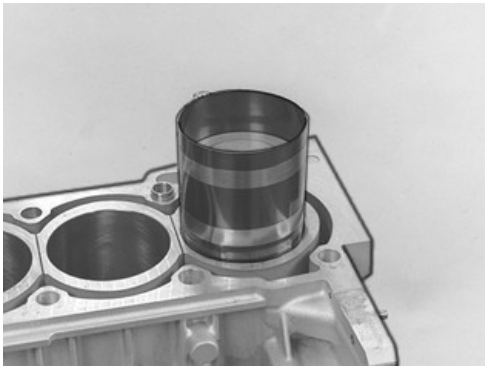
Caution! If reusing the bearing shells, they must be installed in the same position as before.

Ensure that the bearing shells are correctly positioned in relation to the direction of rotation of the crankshaft.

Installing the pistons in the cylinder bores

Use a cylinder ring compressor.

Lubricate the cylinder bore, the pistons and



the bearing shells.

Turn the crankshaft so that the connecting rod pin is at bottom dead centre (BDC) for the cylinder the piston is to be inserted in.

Ensure that the engine is in a position where the cylinder bore forms as vertical a line as possible.

Note! The arrow on top of the piston should point forward. Ensure that the classification corresponds!

Carefully press or tap the piston down (using the shaft of a hammer or similar).

When the piston releases from the piston ring compressor, remove the piston ring compressor and turn the engine 180° in the stand.

Install tool [999 5746](#) in the connecting rod.

Pull the connecting rod until it secures against the big end journals.

Tightening the connecting rod cover

Install the cover. Check that any markings correspond.

Lubricate and install new seals. Tighten in two stages:

1. **20 Nm.**
2. Angle-tighten **90°.**

Check that the connecting rod can be moved sideways.

Note! The crankshaft must not be rotated before the connecting rod cover has been tightened.

Installing the oil pump suction pipe

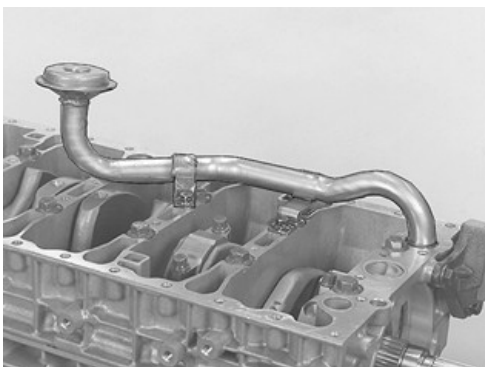
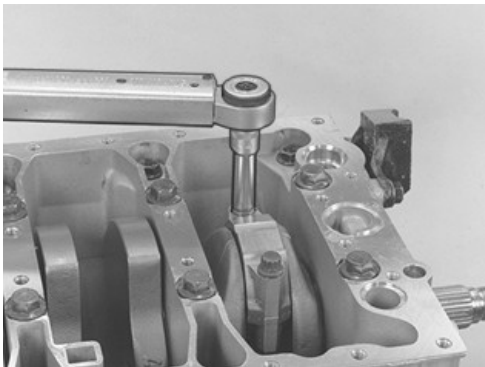
Install a **new sealing ring** on the suction pipe.

Carefully press the suction pipe down into the intermediate section.

Check that the sealing ring is correctly positioned.

Install the screws and tighten.

Install **new sealing rings** for the sump oil ducts.

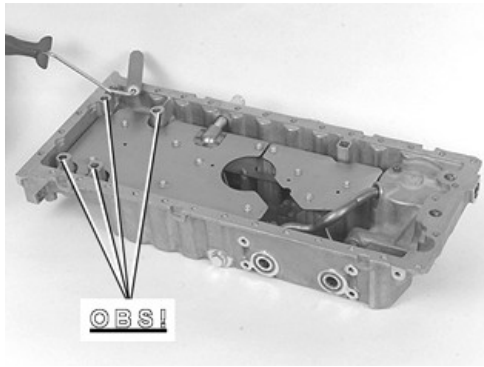


Installing the sump

Wipe the mating surfaces dry.

Apply liquid gasket 11 61 059 to the sump.

Use roller [951 2767](#) .



Note! Ensure that the area around the screw holes is also covered with liquid gasket.

The surface must be completely covered without any excess.

Position the pan and install all screws

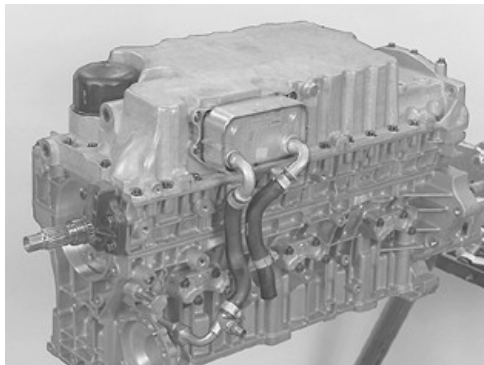
Caution! Check that the rear edge of the sump is in line with the rear edge of the cylinder block. Permissible tolerance ± 0.025 mm. Use a steel ruler and feeler gauge.

Tighten the screws from the rear of the pan and forward.

Installing the oil cooler

Install

- **new sealing rings** in the sump
- the oil cooler. Tighten
- the oil filter.



Installing the rear crankshaft seal

Use standard handle **999 1801** and drift **999 5676**.

Lubricate the drift face and thread the sealing ring onto the drift.

Tap in the seal until the drift bottoms against the block.

