

► PISTONS AND CONNECTING RODS

Removal

1. Remove cylinder head.
2. Remove oil pan, suction and lubricant oil flux pipes.
3. Position the block in the horizontal position.
4. Before removing piston, remove carbon deposits accumulated on liner top. Horizontally position cylinders and cylinder piston to be cleaned at BDC. Fill with a cloth the space above of the top of the piston. Remove carbon with a brush or sandpaper and clean the area with a cloth.
4. Remove pistons.

Disassembly

1. Remove the piston rings.
2. Remove snap rings and manually remove piston pin. If it is difficult to remove pin, heat the piston in water or oil up to 80 °C (176 °F).
3. Remove connecting rod bushing.



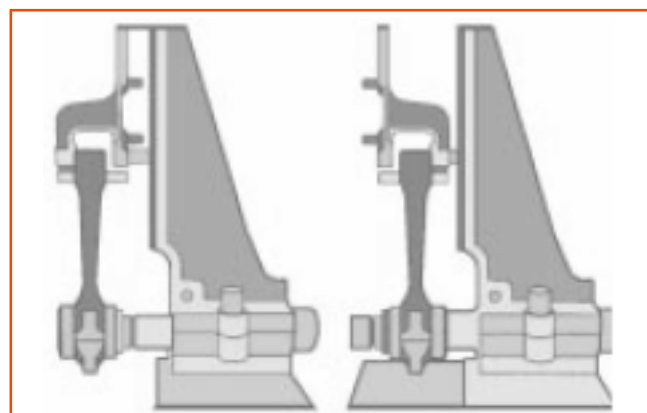
Cleaning and inspection

1. Check if the pistons have risks or damages in lateral and upper faces. Carefully remove carbon residues from the grooves.
2. Assembly a new ring and check its clearance in the groove. If it is over than indicated next, piston must be replaced.



Lateral clearance	Millimeters	
Ring of the 1st groove, compression	0.050	0.090
Ring of the 2nd groove, compression	0.050	0.090
Ring of the 3rd groove, compression	0.030	0.065

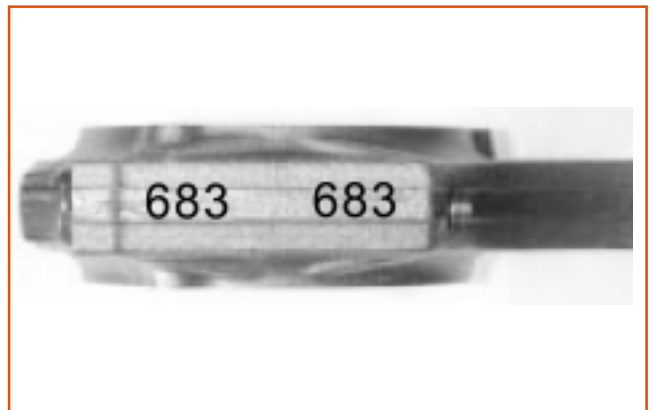
3. Measure piston pin outer diameter with micrometer.
4. Measure piston pin housing with bore gauge. The measurements must be taken in the horizontal, vertical and diagonal direction in relation to the hole that houses the pin.
5. Check connecting rod warping and alignment.



- In case of any irregularity, replace the part and make a new position number demarcation of the connecting rod in the engine block. Example of connecting rod that will work in the first cylinder, marked with electric pencil.



- Connecting rod and cap have serial number on one of its side. When assembling cap, check if its serial number corresponds to the connecting rod number.

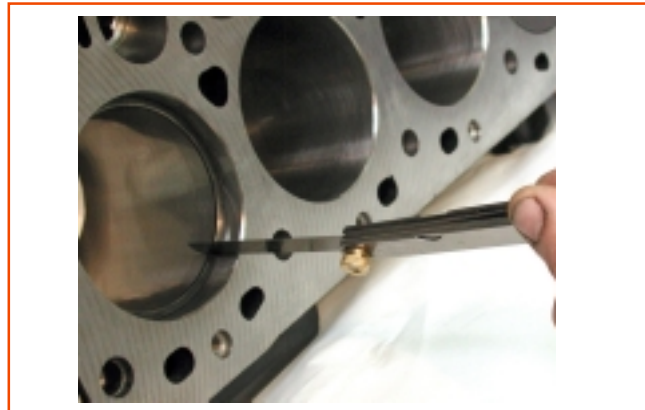


- On one of the sides, connecting rod has the code of weight, that goes from, approximately, 1259 to 1322 grams and it is identified only by the two last weight digits, by an ink mark on the body of the connecting rod.

Note: In the four kits assembly (piston, connecting rod and rings), the variation of the set can be of, at maximum, 5.5 g.

- Measure bushing and shell housings in the horizontal, vertical and diagonal positions. When measuring shells housing, correctly position connecting rod cap, tightening according specification.

10. Check clearance between piston rings ends in cylinder. Clearance must be checked separately. Use piston to introduce the ring between 40 and 50 mm below block surface. Cylinder bore must be within specified measures. See the correct clearance between ends below.



Clearance between ends	Millimeters	
	1st groove, compression ring	0.400
2nd groove, compression ring	0.300	0.550
3rd groove, oil ring	0.300	0.550

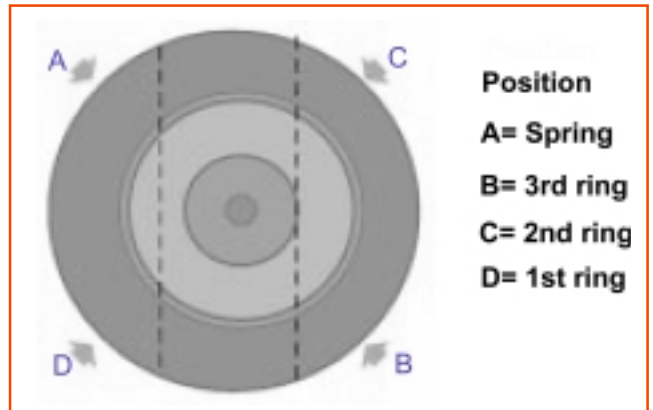
Assembly:

1. To assembly, all parts must be cleaned. Assembly bushing in connecting rod, making sure that lubrication holes are aligned. Machine bushing inner diameter.

2. Assembly piston in connecting rod, with combustion chamber turned to the same side of the shell lock. Manually install pin and snap rings. If it is difficult to assembly the pin, heat the piston in water or oil at 80 °C (176 °F). The piston must be carefully handled, because any damage on its surfaces may cause bad engine operation. Assembly connecting rod and piston in the same cylinder whether they have not been replaced.

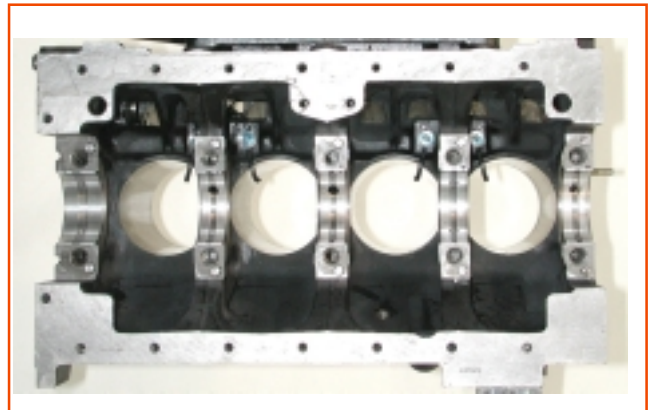


3. Assembly ring spring in piston 3rd groove and next ring, with ends in opposite position from spring ends. Install 2nd and 1st rings with TOP mark or inner chamfer upwards. Note that 2nd and 1st grooves rings have different thickness.
4. Clearances between rings ends must not be aligned in the same direction of piston pin or skirt. Position rings according the illustration.
5. Assembly new shells on connecting rod body, correctly positioning locks.



Installation

1. Set engine block in horizontal position. Lubricate grooves, inside liners, connecting rod shells and crankshaft crankpin.
2. When assembling piston, make sure that the arrow is aiming the engine front side. Install connecting rod with the tool nr. 8130646, avoiding scratching the liner.
3. Assembly piston in cylinder, using tool nr. 8130647 and a rod of wood to push the piston.
4. In turbocharged engines, there is one injector of lubricant oil for each engine cylinder. During piston assembly in the cylinder, check the position of the connecting rod in relation to the injector, avoiding breaking its injection pipe.
5. The positioning of the oil injector inside the engine block is checked with the engine viewed from the top, without cylinder head.



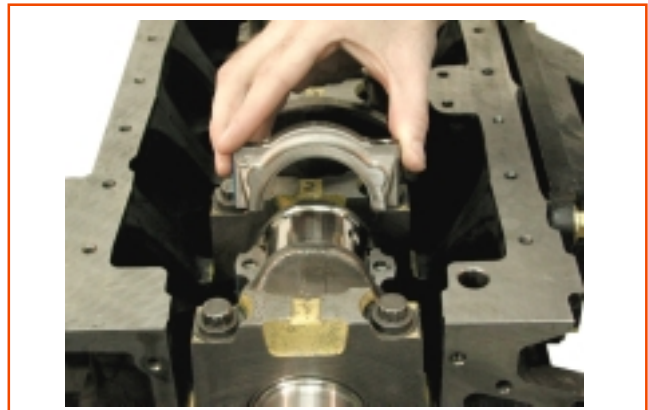
6. Complete lubricant oil injector for cylinder inside and piston pin lubrication is shown below.



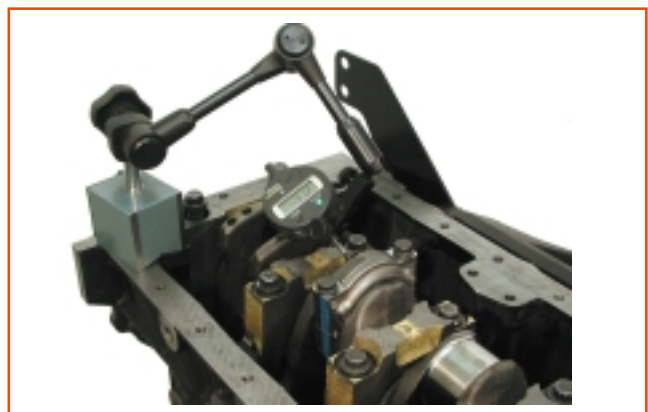
7. Assembly new shell in connecting rod cap, correctly positioning locks. Lubricate shell and crankshaft crankpin.



8. Assembly cap on connecting rod corresponding to the cylinder, watching blue mark on cap, bolt and connecting rod, and tighten according specified. Manually turn crankshaft when assembling each connecting rod. If it is difficult to turn, check all tightening applied in connecting rods fixation.



9. Check axial clearance (0.15 to 0.35 mm) between assembled connecting rod and crankpin with dial indicator gauge.



10. Position piston at TDC. Check piston height in relation to engine block surface with dial indicator gauge and tool nr. 8130004, see CYLINDER HEAD SPECIFICATIONS.
11. Assembly suction, flux pipes and lubricant oil pan.

