APROTEC
TECHNOLOGIES MOTEURS

New assembly

A) Cylinder liners / Pistons

Assembly of liners and pistons is inspected in the factory. The clearances necessary for the correct operation of your engine are perfectly adjusted and in accordance with current manufacturing technology. Cleaning with a degreaser or with petrol is necessary prior to assembly: carefully clean pistons ring grooves and make absolutely sure that neither the sides of the grooves nor the groove-bottom radii are damaged. Dry using compressed air, without wiping, then use clean, light oil to lubricate the liners and pistons.

B) Installation and Control of rings *** Very IMPORTANT***

In the case of new cylinders, use feeler gauges to check the clearances of all rings, according to the following table:

Rectangular piston rings		Oil control rings	
Diameter	Between ring ends	Diameter	Between ring ends
Ø 38 to 44	0.15 + 0.20	Ø 50 to 59	0.15 + 0.25
Ø 45 to 59	0.20 + 0.20	Ø 60 to 74	0.20 + 0.25
Ø 60 to 74	0.25 + 0.20	Ø 75 to 88	0.25 + 0.25
Ø 75 to 88	0.30 + 0.20	Ø 89 to 125	0.30 + 0.30
Ø 90 to 108	0.40 + 0.25	Ø 126 to 148	0.40 + 0.30
Ø 109 a 125	0.40 + 0.25		

Repair assembly

A) Check all liner and piston dimensions: refer to the manufacturer's documentation and instructions.
B) Fitting rings to pistons and liners in an engine which has already run: clean liners after reboring, check clearances between ring ends, respecting the table above. Clean pistons carefully, decarbonize the grooves without scratching them: rings must be perfectly free, without excessive clearances. Fit in the correct order and orientation, remembering the offsets, without opening the rings more than is necessary in order to pass over the piston.


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1) Rings should be fitted using piston ring pliers, starting with the bottom ring. Take care not to spread the rings excessively, since this can result in deformation and a consequent reduction in sealing efficiency.
2) Strictly respect the TOP marks. Rings with TOP marks must be fitted with the mark upwards, towards the head of the piston.
3) After fitting the rings, arrange the ring gaps evenly around the perimeter of the piston (e.g. every 120° for pistons with three rings). Check edge clearances after fitting. A clearance of less than 0.100 mm is acceptable; if it is greater, the piston must be replaced. A certain degree of wear of the friction surface of the cylinder is assumed when piston rings are produced. The amount of wear must not exceed 0.100 mm (relative to the cylinder diameter). If the degree of wear is greater, fit a new cylinder liner, or rebore the cylinder and fit an oversized piston.

Assembling the piston and connecting rod

Before assembly, check the parallelism of the top and bottom of the connecting rod (deformation or distortion); if necessary, the connecting rod must be replaced. During assembly, make sure the parts are sufficiently lubricated.
It is essential to assemble pistons and connecting rods in the specified orientation.
APROTEC replacement pistons, complete with rings, are ready for fitting. The piston diameter, the assembly clearance and, if applicable, the assembly orientation, are indicated on the head of the piston. The cylinder diameter results from adding the piston diameter to the corresponding assembly clearance. For pistons with graphited skirts, the thickness of the piston diameter coating has to be deducted i.e. 0.015 to 0.020 mm, to obtain the nominal diameter marked on the head of the piston. Rings must be assembled with great care. Any unnecessary dismantling and refitting with excessive clearances results in permanent deformation, which is harmful to satisfactory functioning.
Piston gudgeon pins are often protected by anti-corrosion packaging with security clips (if required). Gudgeon pins are selected within the corresponding tolerance and are interchangeable for a given type of piston. However, certain pistons and gudgeon pins must not under any circumstances be replaced by other pistons and pins.

Technical information Pistons _ Piston rings _ Cylinder liners/Finned cylinders - Assemblies

Interference fit of gudgeon pin

The assembly of pistons and gudgeon pins with an interference fit on the connecting rod demands special care.
It is very important to be able to rotate the gudgeon pin in the piston after assembly.

Floating gudgeon pins

The gudgeon pin security clips supplied with floating-pin pistons serve to immobilise the gudgeon pin in its hole. Gudgeon pin security clips must be removed with an appropriate tool. Check that they fit perfectly in the grooves provided for the purpose and that the gap is always positioned in the direction of the piston stroke.Use only new clips and avoid compressing them excessively in order to prevent permanent deformation.

Fitting the piston

Respect the fitting orientation when fitting the piston. The gaps in the various rings must be arranged evenly around the piston perimeter. The gudgeon pin security clip must be fitted in such a way that the gap is positioned upwards or downwards. Cylinder bore or pistons and rings must be lubricated. To avoid damage when fitting the piston into the cylinder bore, a special tool must be used. The top surfaces of pistons with hard-anodized heads must not be machined. Take care to only use cylinder head gaskets and air, fuel and oil filters recommended by the engine manufacturer. Before assembly, carefully remove remaining deposits and residues from engine components (cylinder block, crankshaft, connecting rod and sump).

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