



Piston ring joint clearance and oil consumption

Misconceptions about piston ring joint clearances

Situation:

Sometimes complaints are received about the piston ring joint clearance on compression rings that have been supplied new. Here, rather than the usual piston ring joint clearance of approx. 0.3 to 0.6 mm, clearances of 1 to 2 mm are found and, for this reason, are judged to be too great. This happens most often with the second compression ring, where it is assumed that the wrong part has been supplied or there is a manufacturing fault.

Technical background:

Up to 90% of the total pressure force of the compression ring is generated by combustion pressure during the combustion cycle (Fig. 1). The combustion gases enter the ring grooves and pass to the rear of the piston ring. Here the combustion pressure boosts the pressure force of the piston rings on the cylinder wall. This pressure boost acts on the first compression ring and to a lesser degree on the second compression ring.

The challenge:

When idling and in part-load operation the combustion pressure is lower than in full-load operation. As a result, the compression rings are forced against the cylinder wall with reduced pressure. The effect of this is primarily seen in the oil scraping function of the second compression ring. In certain engines this will result in increased oil consumption.

Remedy:

For the reasons described, engine manufacturers deliberately adjust (enlarge) the joint clearance in the piston rings as part of the design. The larger gap means the combustion pressure is applied more quickly in the ring groove and consequently to the rear of the piston ring (Fig. 2).

This adjustment helps to improve the scraping and sealing function and also the oil consumption when idling and in part-load operation.

Note:

All piston rings are supplied by Motorservice in accordance with the engine manufacturer's specifications, ensuring all operating parameter requirements are met in full.

Additional information:

It is often thought that large piston ring joint clearances result in increased oil consumption. However, this assumption has no foundation in fact. Large piston ring joint clearances cause slightly raised blow-by rates, but not excessive oil consumption.

It's true that, with increasing wear, the piston rings become enlarged, as do the piston ring joint gaps. If the cross section of the piston ring is reduced, the ring will cease to function as effectively and will no longer seal properly. An enlarged joint gap and excessive oil consumption are both the result of radial piston ring wear.

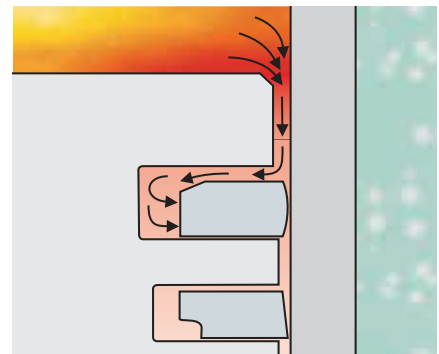


Fig. 1

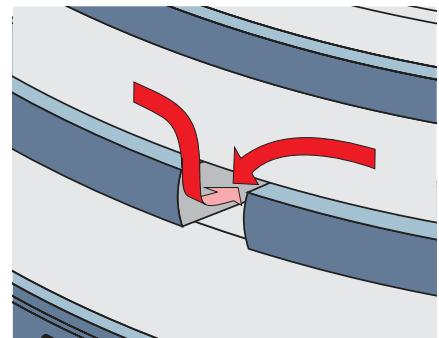


Fig. 2