3.4
Fitting the pistons

Assembly of pistons and connecting rods
Before installing the connecting rods they need to be checked for distortion and twisting with a suitable testing instrument. Position the piston and the connecting rod according to the installation direction. The oiled pin is carefully inserted into the pin bores of the piston and into the connecting rod eye of the connecting rod. For pistons with tightly toleranced pin bore, insertion of the pin is easier if the piston is heated to approx. 40 °C.

For swimming pins
Retainer rings are supplied for fixation of the pin.
Used retainer rings must no longer be used. To prevent lasting deformations, the retainer rings must not be pressed together too hard.

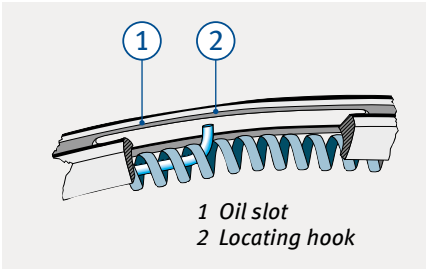
Whether the rings have safely locked into the grooves can be checked by slightly turning them. The joint of the retention must always be in direction of the piston stroke.

Assembly of connecting rod with fixed pin
The bore in the connecting rod eye must have a pressfit to the pin. For assembly the connecting rod is to be heated to 280 - 320 °C (no open flame!). Afterwards quickly insert the well oiled and cold pin into the connecting rod eye. To ensure correct positioning of the pin in the connecting rod, a device with stop pin is to be used.

Checking the piston rings
Check whether the rings can be freely (turned) rotated in the ring grooves.

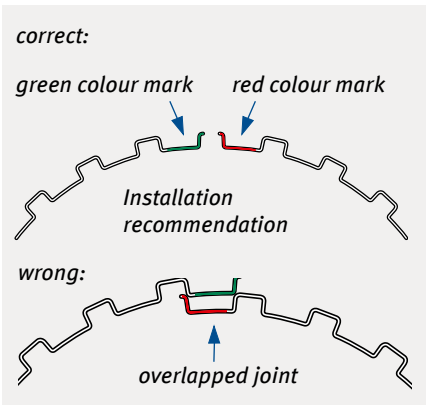
For piston rings marked with “TOP”, the marking must point to the piston crown. This ensures the intended function is working.

Spiral expander oil control rings
The joint ends of the spiral expander should always be exactly opposite the ring joint for spiral expander rings. For spiral expanders with Teflon sheath, the sheath rests against the ring joint.
In addition, for spiral expander rings with locating hook it is important that the locating hook is locked into the oil slot.



Spiral expander ring with locating hook

3-part steel rail oil control rings
During transport the spiral ends are untightened and can slip one above another. The position might need to be corrected before installation. Both colour markings at the spiral ends must be visible. If they are not visible, the spiral has overlapped and the ring is not working.
The ring joints of the 3-part oil control ring (the two steel rails and the expander spring) must be turned against each other by 120° each before installation.



Inserting the piston into the cylinder liner
Clean the cylinder block thoroughly. Make sure that all gliding surfaces are free from dirt and well oiled. Press the piston rings together with a squeezer to enable the piston gliding into the cylinder liner without resistance. For Diesel engines measure the gap dimension or piston's amount of protrusion and always adhere to manufacturer's specifications.

3.5 Running-in notes

The engine must be run in on the road if no test rig is available for implementing a defined run-in routine.

- The vehicle should not be fully laden.
- Run the engine at constantly changing speed levels not exceeding 2/3 of the maximum engine speed.
- Shift up briskly whilst driving and avoid underrevving.
- Avoid maximum gear speeds.
- Avoid lengthy uphill driving (excessive load).
- Avoid lengthy downhill driving (insufficient load and undesirable overrun).
- Do not use engine braking systems.
- Do not drive on motorways or at top speed.
- Avoid driving in congested traffic. Driving on open roads and in free-flowing urban traffic is best. But no urban traffic with extremely hot outside temperatures and with frequent stops at traffic lights and waiting times.

Note:
- Keep a constant check on the oil level during the run-in phase.
  The oil consumption can be increased.
  It is advisable to check the oil level every 50 to 100 km and top up with oil if necessary. If there is a noticeable drop in the oil level on the dipstick, continue to monitor at shorter intervals.
- Do not overfill the engine with oil.
- Oil change after 1000 km – An oil filter change is important here. The dirt and abrasion from run-in has to be removed from the engine.