



FAILURE INFORMATION

MELTING ON THE PISTON RING LANDS AND THE PISTON CROWN FOR DIESEL ENGINES

Description of the Failure

The piston material melts from the piston crown. Aluminum surfaces, except for the piston top ring material, melt and flow over.

Melted piston material progresses towards the pin bore area and melts the areas out of the piston top ring. There is no mark of wearing and seizure at the piston skirt. (Figure 1, Figure 2)



Figure 1



Figure 2

Causes of the Failure

In direct-injection diesel engines, if the injection nozzle does not spray the fuel properly, unburned fuel remains inside the combustion chamber after the combustion time. Burning of the unburned fuel inside the combustion chamber continues during the exhaust time. The piston crown gets softer due to continuous burning and melts. The causes of this are;

- The injection nozzle needle is stuck in the groove.

- The injection nozzle needle does not cut off the fuel completely and continues to drip it.
- The injection adjustment is faulty or defective.
- The valve adjustments are defective and the valves cause leakage.
- The injection nozzle needle is blocked due to excessive carbon. It should be checked.

Recommendations

- Faulty and defective injection nozzles should be replaced. (Stuck nozzle needle, leaking/dripping nozzle needle, blocked nozzle needle due to soot/carbon, injection nozzle with weak pressure etc.)

- The injection nozzle adjustment should be performed accurately in accordance with the values specified by the manufacturer. The injection pressure and the spraying pattern should be checked.

- An injection nozzle appropriate for the combustion chamber of the piston should be chosen.

- The valve adjustments should be performed in accordance with the values recommended by the manufacturer. The valves should be checked for proper operation. Defective and faulty valves should be replaced.

- Nozzle jets should be checked and adjusted properly in the engines, which have oil cooling nozzle jet.

- In engines, engine cylinder heads of which are grinded during the engine overhauling operation, the piston head nose should be at the values specified by the manufacturer in the catalogues.

- Fuels recommended by the engine's manufacturer should be used inside the engine. Rural diesel fuel should not be used.

- If bio-fuels are used, the oil replacement intervals should be kept very short.

NOTE: In order to check the injection nozzle for dripping, you should clean the needle with a piece of cloth. You should apply a pressure less than 20 bars onto the injection nozzle. No dripping or wetting should occur in the needle within 10 seconds.

