

## 3 Piston crown

## Melting of the piston crown and top land, 3.2.1 **Otto engine**

**Symptoms** The three pistons in Figure 1 illustrate the progression of the melting. The right-hand and centre pistons have small fused areas at the edge of the crown. On the left-hand piston, the crown area has melted away. Similar to Figure 1, Figure 2 shows a further stage of the destruction. Even on the stem of the exhaust valve (left), there is melted-away piston material, showing that a part of the piston "has left the engine in a molten state". Figure 3 shows the locally-molten and broken out bowl rim and top land. The eyelet of the cylinder head gasket in Figure 4 exhibits deformations and is pressed together over a part of the circumference, at the rim on the cylinder side.

**Cause** Uncontrolled preignitions caused by glowing combustion residues, valves which have and overheated because of inadequate valve clearance and incorrectly-fitted or damaged **Effect** cylinder head gaskets cause very high temperature peaks, which can be as high as the melting point of the piston material, approx. 577 ~ C. An over-lean fuel-air mixture caused by wrong carburetor adjustments or faults in the mixture controls or the injection nozzles (dirt) for petrol injection equipment as well as fuel with an insufficient octane rating and an over advanced ignition also lead to faulty combustion (see 2.2.2 and 3.7). As a consequence, preignition may be generated which leads to the damage pattern described.

**Remedy** Use recommended fuel (octane rating). Check correct adjustment of ignition, carburetor, and injection equipment.Do not immediately subject vehicles which have been used for a consider-able period only for short-haul driving to full load the next time you drive on the motorway. If the sealing surfaces of the cylinder head or of the cylinder block have been reworked, fit a thicker gasket, or for oversize pistons, ensure a smaller compression height.