

## Max. Wear Limit of Cylinder Bores in the event of Repairs

In driving direction or crosswise direction	0.10
Runout and conicity	0.05

## Special Tool

Internal measuring instrument 50–100 mm dia.	000 589 04 19 00
--	------------------

## Visual Inspection

When judging scored or streaky cylinder walls it is often difficult for the workshop to decide whether the damage is already serious and requires removal or repairs of the engine, or whether the markings are harmless. The following information will be of assistance in making an expert and correct decision.

**Note:** “Longitudinal streaks” (in piston pin direction) cannot be caused by shaft scratches or seizure, since there is not contact between piston skirt and cylinder wall.

With regard to marks on the cylinder walls the first important difference is between “optical streaks” and “seizure streaks”. As a rule “optical streaks” are about 3 mm wide, they are produced by the piston ring gaps and do not destroy the honing structure, “seizure streaks” however, obliterate the honing structure.

Figs. 1–4 show a variety of typical damage patterns.

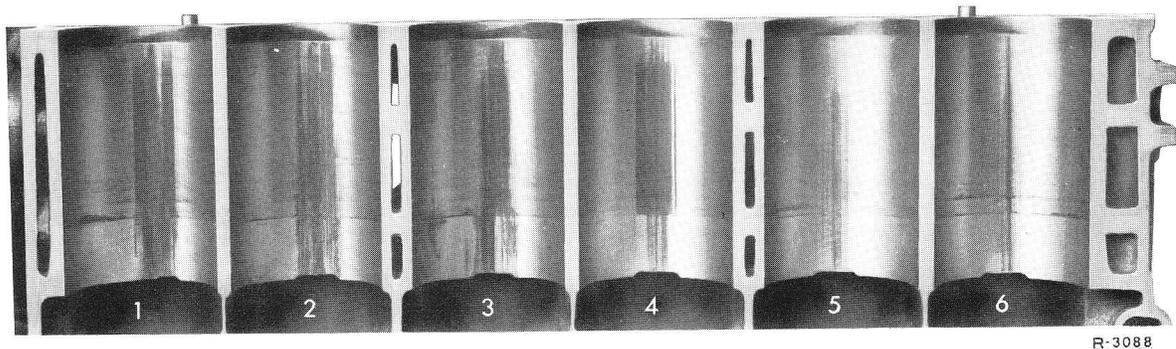


Fig. 1

- Cyl. 1–3 Piston shaft has seized. Honing structure is destroyed. Engine must be removed.
- Cyl. 4 Oil ring and piston shaft seizure. Honing structure is destroyed. Engine must be removed.
- Cyl. 5 and 6 Piston shaft is scratched. Honing structure not destroyed. Engine may remain in operation.

# 07.0 Evaluation of Cylinder Walls

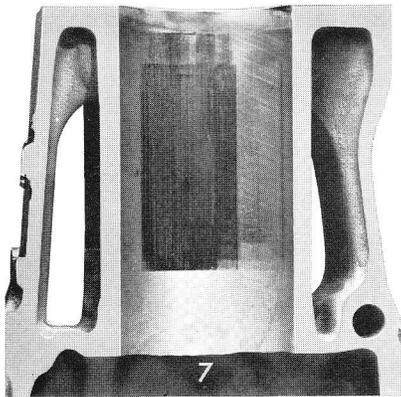


Fig. 2  
Ring seizure in longitudinal direction, approx. 30 mm wide. The step produced by the oil ring can clearly be seen. Honing structure is destroyed. Engine must be removed.

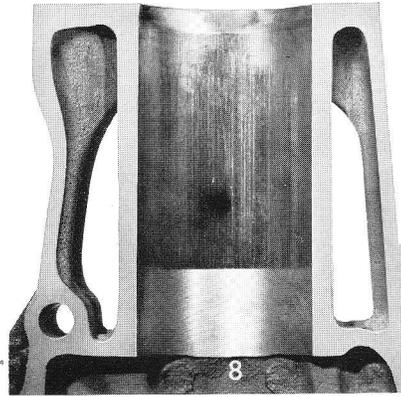


Fig. 3  
Oil ring seizure extended around total half of cylinder bore. Honing structure is destroyed. Engine must be removed.

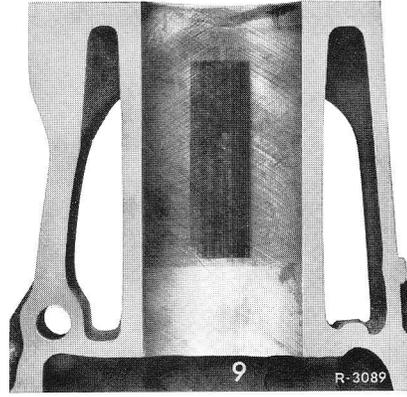


Fig. 4  
Medium oil ring seizure. Honing structure still clearly visible, engine may remain in operation.

## Measuring of Cylinder Bores

In addition to the visual inspection, measuring of the cylinder bores is imperative, particularly when complaints are received about "high oil consumption". Use an internal measuring instrument (Fig. 5) to measure the clean cylinder bores at the 6 measuring points or when the pistons have not been removed and are at bottom dead center at measuring points 1, 2 and 3 (Fig. 6), once in the piston pin axis (longitudinal direction A) and then in the vertical direction thereto (crosswise direction B).

Measuring point 3 is just above the piston at BDC.

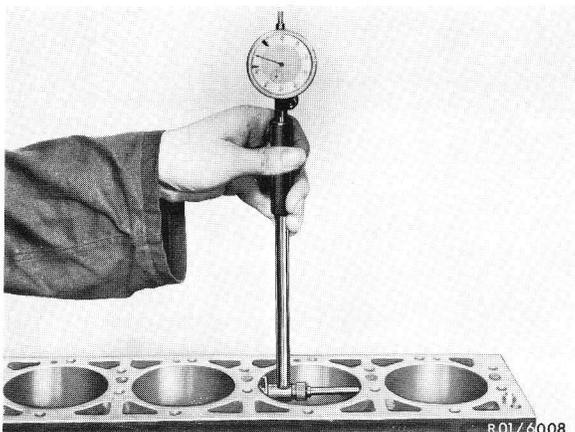


Fig. 5

Oil consumption is increased by:

1. Out-of-round above 0.04 mm.
2. Increased wear in cylinder center (measuring points 3 and 4). difference larger than 0.03 mm
3. Normal wear above 0.12 mm (as compared with outlet bore measuring point 6).

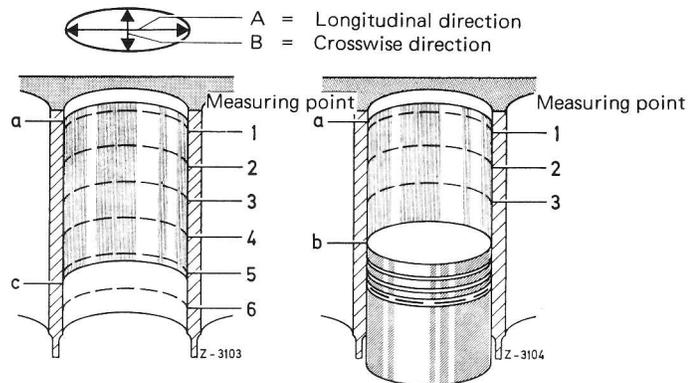


Fig. 6

- a Top reversal point of first piston ring
- b Bottom dead center of piston
- c Bottom reversal point of oil scraper ring

**Note:** 0.01 mm wear per 10,000 km may be considered normal as a comparative measurement between measuring point 1 (directly below the top reversal point (a) of the first piston ring) and measuring point 6 (below the bottom reversal point (c) of the oil scraper ring).