



**GRANIT**  
QUALITY PARTS

# PISTON SETS PRODUCT BENCHMARK

## CUSTOMER INFORMATION

### PISTON SETS 100 MM

The piston set from GRANIT with part number 38002061 was compared with the piston sets from an OE manufacturer and a European competitor.

#### COMPARISON OF FEATURES

- » Material analysis and hardness test
- » Macroscopic examination of the piston for cavities and pores
- » Determination of the chrome plating on the compression rings

#### TEST RESULTS

##### MATERIAL ANALYSIS AND HARDNESS TEST

These tests provide information about the materials used and the resilience of the products. Selecting the right materials is crucial in ensuring piston set durability.

- Pistons: all three manufacturers use the material AlSi12CuMgNi. The hardness values achieved by the manufacturers are almost identical.
- Piston rings: the same material is used by all manufacturers. The hardness values recommended in the relevant technical literature for piston rings under medium load are observed without exception.
- Liners: all liners are made of the same material and the hardness values correspond to the specifications.
- The materials used and the hardness values are identical for all three manufacturers tested, or can be regarded as equivalent.

##### MACROSCOPIC EXAMINATION OF THE PISTON FOR CAVITIES AND PORES

During the macroscopic examination of the pistons, cuts are made through the pistons. The cross sections are examined in detail for cavities and pores. Pistons containing cavities or pores can fail during use and cause major engine damage.

- On the micrographs of the pistons from the OE manufacturer and GRANIT, no cavities or pores are visible.
- On the micrograph of the piston from the European competitor, cavities and pores are visible.
- It was determined that the processing quality of the materials used for the pistons from GRANIT and the OE manufacturer is comparable. Pores and cavities, as discovered in the samples from the European competitor, indicate inferior manufacturing processes that may lead to major engine damage such as piston breakage.



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prüfung (WBP)**

This product comparison was carried out on behalf of GRANIT PARTS by the Steinbeis Transfer Center laboratory.

## DETERMINATION OF THE CHROME PLATING ON THE COMPRESSION RINGS

These tests allow conclusions to be drawn about the wear resistance of the piston rings. Selecting the right layer thickness is crucial in ensuring the service life of the piston rings.

- From a technical point of view, piston rings should have a chrome layer of between 100 µm and 150 µm. The piston ring sets from the OE manufacturer and GRANIT consistently adhere to these values. The second compression ring in the piston set from the European competitor falls slightly short of this value, and the oil scraper ring falls well below it.
- The piston ring sets from the OE manufacturer and GRANIT adhere to the required values. They therefore offer good protection against wear. With the piston ring set from the European competitor, it can be assumed that the oil scraper ring is subjected to increased wear and that the service life of the piston set is reduced.

Measured values	OE manufacturer	European competitor	GRANIT
<b>Piston ring 1</b>			
Hardness HB	321	278	255
Cast iron type	GG	GL	GL
Chrome layer	111 µm	104 µm	101 µm
<b>Piston ring 2</b>			
Hardness HB	285	255	255
Cast iron type	GL	GL	GL
Chrome layer	146 µm	91 µm --	103 µm
<b>Piston ring 3 (oil)</b>			
Hardness HB	224	220	217
Cast iron type	GL	GL	GL
Chrome layer	142 µm	69 µm	101 µm

### NOTE:

Compared with the other manufacturers, the GRANIT piston rings (1 + 2) have the lowest hardness values, but this is not indicative of a lack of quality. The relevant technical literature states that optimum hardness falls within the range of 200 - 350 HB. A hardness of 255 HB is therefore a good result. Excessive hardness quickly leads to piston ring breakage, and the wear resistance of the piston rings is ensured by the chrome layer. The hardness values exhibited by ring 1 and ring 2 are identical, which is evidence of an extremely stable manufacturing process.



## CONCLUSION

### GRANIT PISTON SETS BOAST OE QUALITY

- The product qualification established in GRANIT's own laboratory results in consistently high product safety.
- GRANIT Quality Parts deliver what they promise and offer an optimum price-performance ratio.
- Defective replacement parts can lead to very high repair costs and loss of earnings.