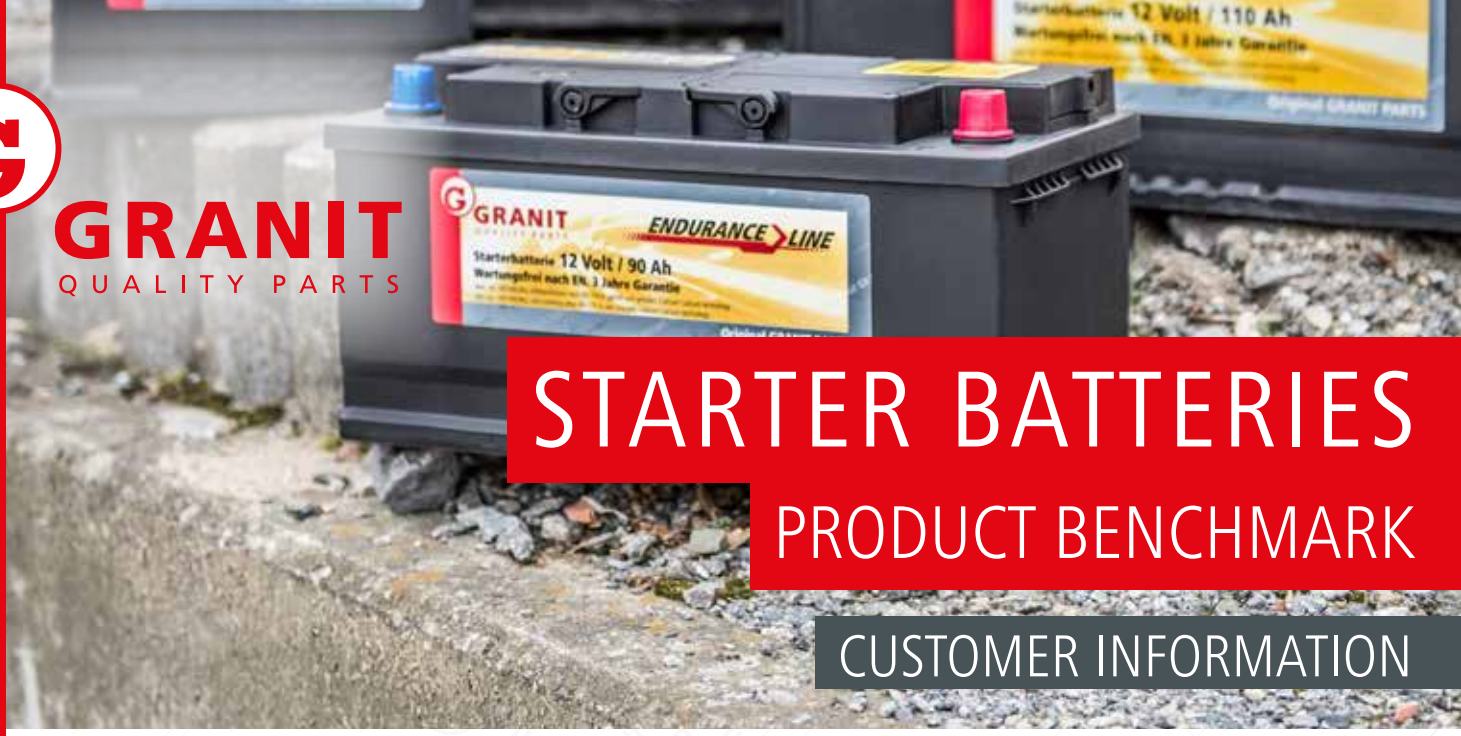

GRANIT
QUALITY PARTS

STARTER BATTERIES

PRODUCT BENCHMARK

CUSTOMER INFORMATION

A comparison was made between the GRANIT 90 Ah starter battery with part number 58558838G and the 88 Ah starter batteries from two leading manufacturers who also supply the automotive industry, as well as a 90 Ah starter battery from another brand.

COMPARISON OF FEATURES

» Determination of the actual reserve capacity Cre according to standard DIN EN 50342-1:2012-10
» Calculation of the nominal capacity Cn from the actual reserve capacity Cre according to standard DIN EN 50342-1:2012-10
» Determination of the cold cranking current CCA

TEST REPORT NO. 2019-01/1246 TO 2019-01-1250

Steinbeis-Transferzentrum Werkstoff- und Bauteilprüfung (WBP)

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

TEST RESULTS

DETERMINATION OF THE ACTUAL RESERVE CAPACITY CRE ACCORDING TO STANDARD DIN EN 50342-1:2012-10

During this test, the time it takes for the starter battery to reach the cut-off voltage of 10.5 V required by the standard is determined. The standard ensures that the starter battery is charged and discharged with a specified cycle. With a 90 Ah starter battery, the calculated time is 158.4 minutes, with an 88 Ah battery it is 154.3 minutes.

All the starter batteries tested achieve the required time. However, there are some differences in the area above this value which are shown in the following table:

Manufacturer	Nominal capacity according to manufacturer	Required reserve capacity	Determined reserve capacity	Deviation in %
GRANIT	90 Ah	158.4 min.	192.0 min.	+21.3 %
OE manufacturer 1	88 Ah	154.3 min.	188.7 min.	+22.3 %
OE manufacturer 2	88 Ah	154.3 min.	176.3 min.	+14.3 %
Brand X	90 Ah	158.4 min.	179.7 min.	+13.4 %

Here it becomes clear that the reserve capacities are exceeded by all manufacturers. However, only the starter batteries from GRANIT and one of the OE manufacturers achieve above-average values of +21.3 % and +22.3 % respectively. The starter batteries from the other brand and the other OE manufacturer have a significantly lower positive deviation of almost ten percentage points each.

CALCULATION OF THE NOMINAL CAPACITY CN FROM THE ACTUAL RESERVE CAPACITY CRE ACCORDING TO STANDARD DIN EN 50342-1:2012-10

Here the nominal capacity Cn is calculated from the actual reserve capacity Cre. The standard provides a special formula that takes into account different factors such as the type of starter battery.

The direct correlation between the actual reserve capacity Cre and the nominal reserve capacity Cn results in the following values:

Manufacturer	Nominal capacity according to manufacturer	Required reserve capacity	Determined reserve capacity	Deviation in %
GRANIT	90 Ah	192.0 min.	105.9 min.	+17.7 %
OE manufacturer 1	88 Ah	188.7 min.	104.4 min.	+18.6 %
OE manufacturer 2	88 Ah	176.3 min.	98.5 min.	+11.9 %
Brand X	90 Ah	179.7 min.	98.5 min.	+11.2 %

Even from the actual nominal capacity, which is calculated from the reserve capacity, you can see the high quality of the GRANIT starter battery. It boasts the second highest percentage deviation. The GRANIT starter battery therefore has the highest determined nominal capacity of the starter batteries compared. The OE manufacturer, which together with GRANIT already achieved above-average values in the first category, also does very well here.

DETERMINATION OF THE COLD CRANKING CURRENT CCA:

A standard cold cranking current tester was used to determine the cold cranking current before and after the tests mentioned above. According to the standard, the valid cold cranking current is only reached during the test after the third charging cycle, as the chemical processes within the starter battery do not develop their full power until this point.

The results were summarised in a table to allow them to be visualised more easily:

Manufacturer	Cold cranking current according to specification	Determined cold cranking current on delivery	Determined cold cranking current after test
GRANIT	770 A	705 A	870 A
OE manufacturer 1	680 A	675 A	805 A
OE manufacturer 2	740 A	710 A	820 A
Brand X	720 A	630 A	820 A

The GRANIT starter battery also leads in terms of its cold cranking properties, and with a cold cranking current on delivery of 705 A and a cold cranking current after testing of 870 A boasts the two highest values of the products tested.

CONCLUSION:

- GRANIT starter batteries boast a high level of technical quality, as proven in the aforementioned tests.
- GRANIT also offers a three-year guarantee against material and manufacturing defects.
- The GRANIT own brand delivers what it promises and offers an optimum price-performance ratio.