



State of Health is not always the same: AVILOO provides clarity in assessing electric vehicle batteries

The health status of the battery is often the biggest unknown when buying a used electric vehicle. The so-called SoH (State of Health) is intended to provide guidance, but what does this value actually reveal? And how is it determined? AVILOO, a specialist in independent battery diagnostics, provides clarity.

Wiener Neudorf, September 16th 2025 - The health status of an electric vehicle's battery remains the biggest question mark for potential buyers. The SoH (State of Health) was introduced as a metric to provide insight into the current condition of the battery, making it a key indicator. However, SoH cannot be measured directly, it reflects the battery's condition in relation to its original state. "SoH is not always SoH," emphasizes Patrick Schabus, Chief Product Officer at AVILOO, and adds: "There are different reference values and calculation methods, which can lead to significantly varying results."

Different Reference Values: Capacity vs. Energy

The capacitive SoH is based on the remaining capacity of the battery in ampere-hours. While it is theoretically independent of temperature and driving behavior, in practice it is influenced by both. Additionally, internal resistance is not considered, which can lead to an overestimation of the actual range. "Increased internal resistance reduces range, especially in older vehicles, the capacitive SoH is often too optimistic," explains Schabus.

The energetic SoH, on the other hand, measures the usable energy in kilowatt-hours and is directly linked to range. "If a vehicle has 90% energetic SoH, it means that 90% of its original range is still available," Schabus continues. However, the calculation is complex, as it depends on temperature and load profile. At AVILOO, it is standardized according to the WLTP cycle at 23 °C.

Calculation Methods: Pack vs. Cell Level

The method of calculation also affects the reliability of the SoH. The simplest approach is to calculate it at pack level, but this only provides rough estimates, as it lacks data on individual cells. Much more precise is the cell-level analysis, where the state of charge of each individual cell is recorded, including balancing status. Two methods are used to determine the overall SoH:

Average Cell: A widely used but imprecise method, as it does not adequately account for the weakest cells.

Weakest Cell: The most accurate method, where the weakest cell determines the overall condition, comparable to the weakest link in a chain.



The AVILOO Approach: State of Certified Energy (SoCE)

AVILOO relies on the State of Certified Energy (SoCE), an energetic SoH at cell level based on the internationally recognized GTR22 standard. The usable energy is measured under defined conditions, and the weakest cell is used for calculation. "Our goal is to precisely represent a vehicle's actual range in relation to its original state, transparent, traceable, and independent," says Schabus.

AVILOO PREMIUM Test: The Most In-Depth Battery Analysis on the Market

The AVILOO PREMIUM Test is the world's most accurate analysis product for used EV batteries. During a test drive, high-resolution data such as current, cell voltage, and temperature are recorded in real time and processed in the AVILOO Cloud. The analysis is performed at cell level and considers essential parameters such as internal resistance, time constants, and resting voltage curves. "Our cell models are based on extensive lab measurements of real vehicle modules," says Schabus. "Only this way can we determine the state of charge of each individual cell with precision—far more accurately than the vehicle's Battery Management System (BMS)."

The result is a certified battery certificate that transparently and reliably shows the vehicle's actual remaining range—a decisive advantage for dealers, fleet managers, and buyers.

AVILOO FLASH Test: Fast, Efficient, and Data-Driven

For situations requiring quick decisions - such as in vehicle trading or service cases - AVILOO offers the FLASH Test. It is based on a machine learning model trained on tens of thousands of PREMIUM tests. Using predictors such as vehicle age, mileage, and charging behavior, the SoH is reliably determined in just three minutes, without fully discharging the battery. "The FLASH Test is ideal for fast assessments without compromising accuracy," says Schabus. "It shows how data-driven innovation creates real value."

Conclusion

Battery health assessment is complex, and the SoH value alone is often not enough. Buyers and dealers should not blindly trust reported values but rely on certified, independent tests. With its battery certificate, AVILOO offers a reliable solution for greater transparency and security in the used EV market.

About AVILOO

AVILOO is the global leader in battery diagnostics for electric and plug-in hybrid vehicles. The company develops and markets precise, fast, and manufacturer-independent tests to detect the State of Health (SoH) and defects in drive batteries of used vehicles. Test results are provided in detailed reports and certificates. All analysis methods and certificates are TÜV and CARA certified, ensuring complete transparency and safety for used car buyers, sellers, and users - both commercial and private. The AVILOO FLASH Test is currently the fastest comprehensive diagnostic solution on the global market, offering a cost-effective and easy-to-use process that takes just three minutes. AVILOO currently covers over 96% of all available brands.

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