FORM+TEST PRÜFSYSTEME

Better be Safe -

Battery Testing Systems

ORIGINAL FORM+TEST® PRÜFSYSTEME

The Future of Mobility – with State-of-the-art Testing Technology

At present, the automotive industry is undergoing the biggest changes since its beginnings. The familiar fossil fuels must be replaced in new drive concepts. Already, electric drives offer a promising solution.

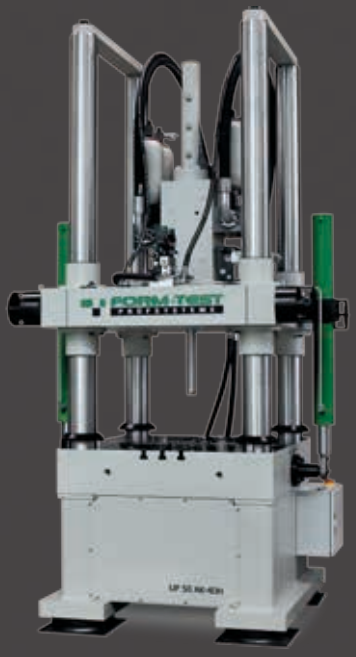
Electrical drive trains applied, are well-known technology with high power densities and efficiencies. The required energy storage devices - mostly batteries - do impose a high risk potential in case of damage due to their chemical structure. At the same time, a limited amount of mechanical material data is available, but needed for the safe design of the components.

For a sufficient data basis for component design, but also for tests with a scientific claim in basic research, suitable testing technology is necessary.

Due to years and years of experience with reliable testing technology, FORM+TEST can perfectly combine this know-how with new applications.

Common tests on individual battery cells as well as complete modules include:

- pressure test
- penetration test
- vibration test
- mechanical shock test / drop test for crash simulation



impact tests with high loading speeds

test system with climatic chamber and control station

Safety first

What makes the mechanical tests particularly difficult is the operational safety of the experimental setup. Batteries can catch fire during the experiment or toxic gases can volatilize. FORM+TEST combines its testing solutions with comprehensive advice and direct support up to the first independent test at the customer‘s site. This also includes competent training of the test engineers and technicians with a special sensitization of the hazards. As an additional service, FORM+TEST supports the preparation of relevant documents for a comprehensive hazard analysis.

This analysis is based on the definition of the hazard levels agreed with the customer, shown as an example in the following table according to EUCAR. The implementation is carried out in accordance with the commonly prescribed ATEX directives.

Hazard-Level	Description	Safety level and results
0	No effect	No effect, no functional limitation.
1	Start of passive safety system	No demage, no leakage, no gas leak, no fire, no fracture, no explosion, no exothermal reaction, no thermal runaway. Cell reversibly damaged, repairs of safety installations necessary.
2	Damage	No leakage, no gas leak, no fire, no fracture, no explosion, no exothermal reaction, no thermal runaway. Cell irreversibly damaged, repairs of security installations necessary.
3	Leakage (weight loss < 50%)	No gas leak, no fire, no fracture, no explosion. Leakage of electrolyte < 50%
4	Gas leakage (weight loss > 50%)	No fire, no fracture, no explosion. Leakage of electrolyte > 50%
5	Fire	No fracture, no explosion, no flying parts.
6	Fracture	No explosion, but flying parts of the active mass.
7	Explosion	Decomposition of battery cell.

Standards:

- ISO 12405
- UN 38.3
- GBT31467.3
- ATEX 99/92/EG and 2014/34/EU

impact test by means of drop weight test

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