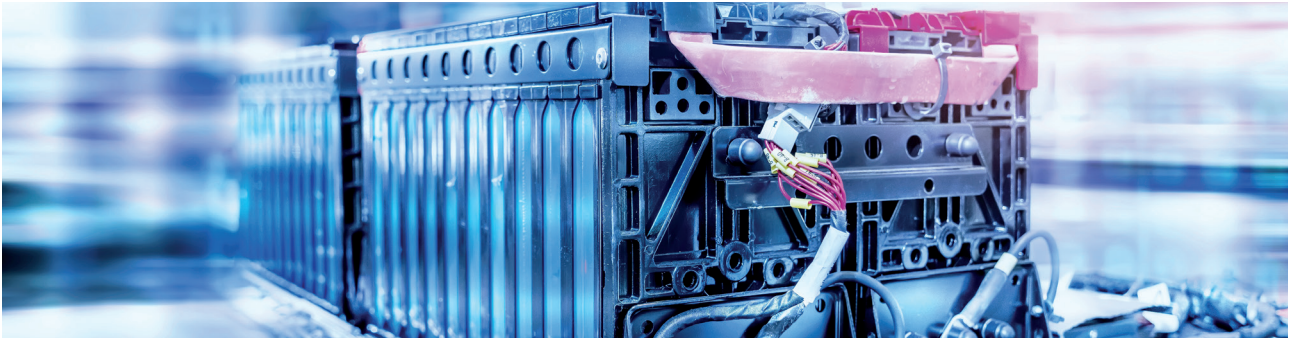


Battery Safety for e-Mobility

LITHIUM-ION BATTERIES: ACCUMULATORS OF THE FUTURE

In the state-of-the-art battery test centre **cetecom advanced** supports battery and car manufacturers in the safety qualification of high-capacity Li-Ion battery systems. **cetecom advanced** employs highly qualified battery specialists; the test facilities consist of separately secured premises, equipped to face the most extreme cases. The lab and test areas are continuously enhanced following the latest standards.



AUTOMOTIVE BATTERY SAFETY

The safety of lithium-ion batteries, especially for use in electric vehicles and energy storage systems is very important. In particular, the high energy density in form of chemical elements and the usually high electric charge must be controlled, even in extreme situations in order to avoid hazards.

SAFETY TESTS

In our battery test centre, all safety-related disciplines and events which can occur during the use of lithium-ion batteries are available for testing at **cetecom advanced**:

- Mechanical Stress (Crush-Tests, Crash-Test bench, Vibration; if required under various climatic conditions)
- Electrical Stress (Overdischarge, Short Circuit)
- Climatical Stress
- Artificial Aging
- EMC - Electromagnetic Compatibility of the Battery Management System (BMS)
- Immersion / Flooding
- Recording system to display the test results (Highspeed camera, Infrared video camera, Data recording)

UN TRANSPORTATION TESTS

Before a Li-Ion-Battery may be released for transportation via normal shipping ways, it must be established that the battery system behaves safely in typical situations they may occur during transportation. **cetecom advanced** tests according to the UN Transportation Test rules ST-SG-AC.10-11, 38.3. These have been defined by the United Nations and are internationally recognized:

T1: Altitude Simulation, T2: Thermal Test, T3: Vibration, T4: Shock, T5: External short circuit, T6: Impact / Crush, T7: Overcharge, T8: Forced discharge

ABUSE TESTS

cetecom advanced offers stress tests to ensure the flawless operation of high capacity batteries - even under extreme conditions:

- Electrical (Overcharge, Overdischarge, Short Circuit)
- Mechanical (Crush Tests, Roll-over)

- Propagation (Nail Penetration, Overheat, Overcharge)
- Climatic (heat, cold, temperature cycling, humidity, corrosion)

ECE R100/R136

ECE R100/R136 compile unified requirements with regard to the homologation of cars considering the specific requirements for the electric power train.

cetecom advanced's Battery Test Centre is able to conduct extensive stress testing according to test cases defined for ECE R100/R136 or, if required, also following customized test schemes:

- Vibration test
- Thermal shock and cycling test
- Mechanical shock
- Mechanical integrity
- Fuel Fire
- External short circuit protection
- Overcharge protection
- Overdischarge protection
- Over-temperature protection
- Overcurrent protection

SPECIAL CUSTOMER SERVICES

The development of advanced lithium-ion battery packs requires expertise and experience in order to strike a balance between the demanded system load and the required reliability and safety. **cetecom advanced** supports assemblers of battery packs in the development of safer battery systems, no matter which application area.

- DIN EN IEC 63057
- IEC 62619
- SAEJ2929

FORENSICS

cetecom advanced is able to better identify and comprehend the underlying causes if lithium-ion battery failures using forensic analysis methods. This allows battery manufacturers to address these issues and enhance lithium-ion battery safety.