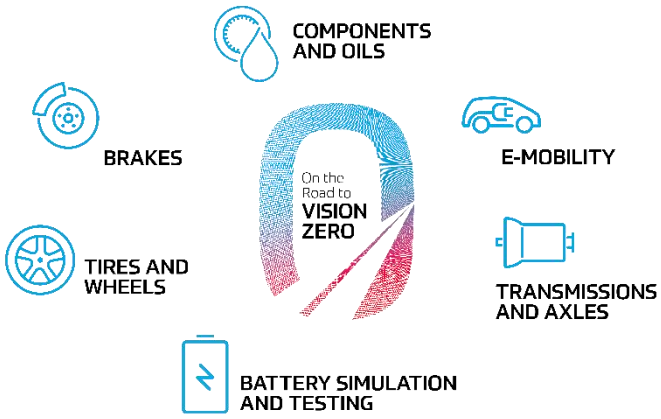
# ZF Test Systems

ZF Test Systems develops, produces and retrofits test systems for on- and off-road mobility. As specialists for validation and development test facilities, we improve the quality of driveline, active chassis, tires and wheels as well as brakes and thus contribute to enhanced safety and comfort for the driver. Besides that, we offer DC power electronics based on SiC for simulating and testing batteries.

For us, there is no conflict between well-proven technology and innovative solutions. Rather these are the recipe for a reliable, customized test bench technology exactly tailored to the customer's specific requirements. We see ourselves as a complete system supplier and problem solver; with the experience and creativity of our employees we understand the customer's needs and requirements and find the ideal solution together.

Driven by the force and competence of a globally active engineering group, we are developing solutions for future mobility and are prepared for the forthcoming requirements like autonomous driving and E-mobility. We recognize sustainable trends early and are providing our customers with solutions to secure competitiveness also in the future.




# ZF Test Systems – battery testing

ZF offers a broad portfolio to allow service providers and OEMs worldwide to certify their batteries for a passenger EV. The testing expertise includes:

- Performance & Endurance Testing
- Environmental Testing
- Abuse & Mechanical Testing

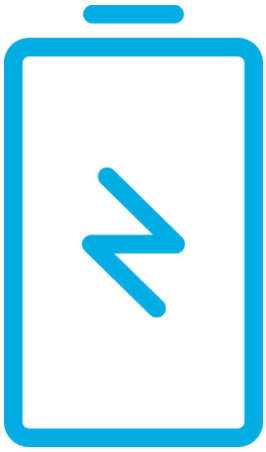
We offer testing for all battery types - from cell to module to pack.

We can consider according to the following norms in our tests: UL, IEC, UN, ISO and automotive (e.g. LV124)

Key for a succesfull operation of test facilites is an efficient and effective test field design considering the work flow of the test objects within the facility with the support of the available software solutions.

Besides testing and validation of batteries for R&D applications, ZF can also provide EoL testing of batteries at the end of each production line. These tests include but are not limited to:

- Isolation tests
- HPPC tests
- Leakage tests
- Communication tests



## Battery Testing – Our Expertise

### Performance & Endurance Testing

- Durability
- Electrical, thermal and mechanical aging
- Capacity, resistance and efficiency tests
- Swelling force measurements

### Environmental Testing

- UN 38.3 transportation tests
- Vibration and shock tests
- Corrosion tests
- IP-class tests
- Vacuum chamber tests
- Dust chamber tests

### Abuse & Mechanical Testing

- Crush tests
- Thermal propagation tests
- Overcharging, deep discharge, short circuit tests
- Fire resistance tests
- Drop tests