



# Vehicle Safety for Electric and Hybrid Vehicles

With its Safety Engineering segment, Continental applies a specifically developed engineering and testing process for electric vehicles and their special requirements.

Our engineering team is skilled in the field of vehicle safety and specially trained in legal requirements, for example ECE-R 100. This regulation applies to the integration and release of high-voltage components.

In addition, we are well grounded in the requirements for chassis and interior automotive light weight construction. Light weight construction comes into play during the development process of electric vehicles, in order to compensate for the additional weight caused by the electric powertrain integration.

With our systems engineering, numerical simulation and testing facilities, we ensure that the vehicle will fulfil the legal requirements worldwide, as well as the demands put on vehicles in the field. Furthermore, we are able to draw on additional engineering skills within the Continental Corporation.

In our workshop we possess the tools and the expertise for handling the high-voltage technology of electric vehicles, from preparation work on a component level to complete vehicle crash testing and post test analysis.



### **Our Know how – Optimal Vehicle Safety**

For conventionally driven cars with combustion engines, all the development tools and engineering solutions for vehicle safety are well known and state of the art development is recognised.

Today, with the introduction of the new high-voltage technology and the amount of new components that need integrating, we are facing new challenges concerning vehicle safety, both during normal usage, as well as in an accident.

Continental Safety Engineering works to ensure that today's levels of vehicle safety will be maintained during the introduction of new high-voltage technologies. We fully understand the worldwide legal vehicle safety standards and specific requirements that have to be fulfilled by the high-voltage components.

### **Our System Engineering for Electromobility**

During the prototype and concept phases of the development process, an extensive system FMEA (failure mode and effects analysis) is set up. In the meantime, we conduct a hazard analysis as a guidance tool for fulfilling the requirements of ISO 26262. Potential risks are shown, evaluated and countermeasures are defined in an early project phase, before expensive tooling for series production is started. We support the integration and application of power electronics, high-voltage wiring, power cut-off, the high-voltage battery and other high-voltage components. Design is supported by numerical simulation and tests at component level and full vehicle. Finally, the development is approved by homologation and release testing which is the basis for our safety release recommendations.

### **Our Test Equipment**

- › Impactor tests to prove structure stiffness of battery and housing
- › Sled tests to validate the durability of high-voltage components during crash acceleration signals
- › Crash tests to validate complete electric vehicles regarding passenger protection, protection against electric shocks and structural characteristics of battery and powertrain components
- › The test procedure and documentation of high-voltage systems will be conducted after ECE R 100 / FMVSS 305

### **Our Personnel**

Our staff in system engineering and testing are highly skilled in the field of passive safety requirements for testing of high-voltage electric vehicles. Our engineers and test personnel have been qualified through special courses and will be continuously trained on high-voltage technology.