

Directions and Standards for electric vehicles

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Introduction

Vehicles must correspond to certain requirements to be allowed to drive on public roads

- safety for occupants and pedestrians
 - Passive safety
 - Active Safety
- Environmental protection and energy efficiency (Euro 5 and 6)

The Bochum University of Applied Sciences in cooperation with the TÜV Nord mobility examined regulations and standards for electric vehicles like the BOmobil on commonalities and specific requirements.



The electric vehicle BOmobil

Vehicle approval

The major requirement for road vehicles and their trailers is the **EU Directive 2007/46/EC**

Applicable to:

- systems,
- Components,
- separate technical units and
- the whole vehicle



European approval mark



UNECE approval mark

Directives of the European Union can also be replaced by equivalent ECE regulations of the United Nations Economic Commission for Europe (UNECE).

Considered vehicle classes



Source: <http://de.wikipedia.org/wiki/Personenkraftwagen>

Category M₁ are passenger cars for comprising not more than eight seats in addition to the driver's seat.



Source: http://de.wikipedia.org/wiki/Nissan_Kubistar

Category N₁ are small vans for the carriage of goods, with a maximum weight mass not exceeding 3.5 tons. Even like the BOmobil.

ECE-R 13H Braking of passenger cars

Sets the requirements for braking systems for M1 and N1 vehicles.

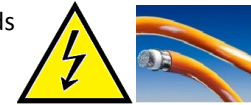
Includes **electric regenerative braking systems**.

- Category A is not part of the service braking system
 - Activated by accelerator control and/or the gear selector neutral position
- Category B is part of the service braking system
 - Activated by breaking pedal

ECE-R 100 Battery electric vehicle safety

Protection against electric hazards

- Against direct contact on live parts
- Against indirect contact by a failure (e.g. IT-System, protective isolation)



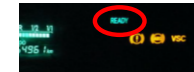
Traction battery safety

- fuses, circuit breakers and service disconnect



Functional safety

- 'active driving possible mode'



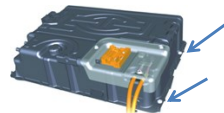
Stability of battery containment

From ECE-R 34, ECE-R 67, ECE-R 110 for liquid fuel, liquid gas and compressive gas

Battery container must have the same standards as conventional container systems

➡ Sled tests are conducted to verify the strength of fixations:

- 20g forward and backward
- 8g lateral to both directions
- 4.5g vertical upwards
- 1g vertical downwards



Source: Battery containment, BMW

Current status of the Directives and Regulations

- Some directives and regulations will be adapted on electric vehicles, but not until yet
- For components like inverter, traction batteries etc. there are no specific directive or regulation existing at the moment

➡ For this part the general product safety 2001/95/EC is valid ←

General product safety

All new products which will be sold in the European Union and no specific directive lists

2001/95/EC General product safety



If the product corresponds to the state of the art



CE marking

Ready for sell in the European Economic Area

Standard Organisations

	National layer e.g. Germany	Regional layer e.g. Europe	International layer
General			
Electro-technology			

Source: DIN

Standards

For example:

- ISO 26262 Functional safety
 - Software in electronic control units
 - Hardware like electronic control units or inverter
- UN 38.3 Transport police for lithium-ion Batteries
 - Tests for single cells and battery packs on Transportation-related damage



UN 38.3 Test 6: Impact
Source: CETECOM

Thank you!



Questions?

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