Proposal how to structure the RESS safety requirements

1. Scope

The following prescriptions apply to safety requirements with respect to the Rechargeable Energy Storage Systems (RESS) of road vehicles of categories M and N equipped with one or more traction motor(s) operated by electric power and not permanently connected to the grid.

~~This document sets out minimum requirements for Rechargeable Energy Storage Systems (RESS) having a nominal energy storage capacity of more than [1 kWh] and a working voltage exceeding [60 VDC] but less than 1,500 VDC.~~

2. Definitions

“Rechargeable energy storage system (RESS)”
means rechargeable energy storage systems which provide electric energy for electrical propulsion

„Battery System“ ????

“**Working voltage**”
means the highest value of an electrical circuit voltage root mean square (rms), specified by the manufacturer or determined by measurement, which may occur between any conductive parts in open circuit conditions or under normal operating condition. If the electrical circuit is divided by galvanic isolation, the working voltage is defined for each divided circuit, respectively.

3. Technical Requirements

A) Priority Requirements

3.1 Vibration

3.1.1 Rationale

Simulates a vibration environment which a battery system will likely experience during the lifetime of the vehicle.

3.1.2 Requirement

3.1.2.1 Conditions

[ISO 12405 Part 1]

3.1.2.2 Acceptance criteria

During the test, including the defined recovery period, the battery system shall exhibit no evidence of venting or battery enclosure rupture (no degradation of protection degree), fire, or explosion, and shall maintain high voltage to ground isolation no less than specified for the RESS type under inspection.

3.1.3 Verification

Test according to [ISO 12405 part 1] /Documentation / Calculation / Simulation

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3.2 Thermal Shock Cycling

3.2.1 Rationale

Simulates a rapid environmental temperature change which a battery system will likely experience during its life.

3.2.2 Requirement

3.2.2.1 Conditions

3.2.2.2 Acceptance criteria

3.2.3 Verification

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[3.3 Humidity / Moisture Exposure

3.3.1 Rationale

Simulates a temperature/humidity environment which a RESS will likely experience during its life (only for RESS above 60 VDC)

3.3.2 Requirement

3.3.2.1 Conditions

3.3.2.2 Acceptance criteria

3.3.3 Verification]

3.4 Mechanical Shock

((Enclosure Integrity may has to be considered) related to R94, R95, R12)

3.4.1 Rationale

Simulates inertial loads which may occur during vehicle crash situation to RESS

3.4.2 Requirement

3.4.2.1 Conditions

3.4.2.2 Acceptance criteria

3.4.3 Verification

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[3.5 Fire Resistance

3.5.1 Rationale

Simulates exposure of RESS to fire from the outside or vehicle fire to the RESS

3.5.2 Requirement

3.5.2.1 Conditions

3.5.2.2 Acceptance criteria

3.5.3 Verification]

3.6 External Short Circuit
(related to R100)

3.6.1 Rationale
[Verify functionality of over current protection in presence of a short circuit external to the RESS]

3.6.2 Requirement
3.6.2.1 Conditions
3.6.2.2 Acceptance criteria
3.6.3 Verification

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3.7 Overcharge Protection ~~(RESS or via vehicle system)~~

3.7.1 Rationale

Verify functionality of the overcharge protection

3.7.2 Requirement

3.7.2.1 Conditions

3.7.2.2 Acceptance criteria

3.7.3 Verification

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3.8 Over-discharge Protection

3.8.1 Rationale

Verify functionality of the over-discharge protection and /or protect an over-discharged battery to be charged.

3.8.2 Requirement

3.8.2.1 Conditions

3.8.2.2 Acceptance criteria

3.8.3 Verification

3.9 Over-temperature Protection
(related to R100)

3.9.1 Rationale
Verify the functionality that prevents the operation at over-temperatures inside the RESS

3.9.2 Requirement
3.9.2.1 Conditions
3.9.2.2 Acceptance criteria
3.9.3 Verification

3.10 Protection against direct contact
(related to R100)

3.10.1 Rationale
Verify the functionality that protects persons to come in contact with high voltage live parts (only for RESS above 60 VDC)

3.10.2 Requirement
3.10.2.1 Conditions
3.10.2.2 Acceptance criteria
3.10.3 Verification

[3.11 Emission

(May also be part of abnormal situations like Fire Resistance etc.) and/or ECE R100 (normal use)

3.11.1 Rationale

[Emission of gases during normal use]

3.11.2 Requirement

3.11.2.1 Conditions

3.11.2.2 Acceptance criteria

3.11.3 Verification]

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[3.12 Over current charge
3.12 Short circuit (internal)
3.12.1 Rationale

3.12.2 Requirement
3.12.2.1 Conditions
3.12.2.2 Acceptance criteria
3.12.3 Verification]

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[3.13 Short circuit (internal)
3.13.1 Rationale
3.13.2 Requirement
3.13.2.1 Conditions
3.13.2.2 Acceptance criteria
3.13.3 Verification]

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B) Additional Requirements?

- **Immersion Test (RESS complete under water)**
  Rationale for the necessity maybe by NL.
- **[Dust]**
- **Marking**
- **EMC**