Revised Proposal of amendments to ECE/TRANS/WP.29/GRSP/2014/11 - Draft Regulation on electric vehicles of category L, submitted by the Informal Working Group REESS

Submitted by the expert from the International Motorcycle Manufacturers Association

The text reproduced below was prepared by the expert from the International Motorcycles Manufacturers Association (IMMA) to introduce amendments clarifying the current text and correcting some of the text to what was agreed in the Informal Group RESS, for discussion in 12/IWG RESS meeting.

The modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters.

I Proposal

Paragraph 1.1 and 1.2., amend to read

Part I and II of this regulation do not cover post-crash safety requirements of road vehicles.

1.1. Part I: Safety requirements with respect to the electric power train of vehicles of categories L[1] with a maximum design speed exceeding 6 km/h, equipped with one or more traction motor(s) operated by electric power and not permanently connected to the grid, as well as their high voltage components and systems which are galvanically connected to the high voltage bus of the electric power train.

~~Part I of this regulation does not cover post-crash safety requirements of road vehicles.~~

1.2. Part II: Safety requirements with respect to the Rechargeable Energy Storage System (REESS) of vehicles of categories [L] with a maximum design speed exceeding 6 km/h, equipped with one or more traction motors operated by electric power and not permanently connected to the grid.

Part II of this Regulation does not apply to REESS(s) whose primary use is to supply power for starting the engine and/or lighting and/or other vehicle auxiliaries systems.

Insert paragraph 5.1.3.3., and renumber thereafter.

5.1.3.3. Fuel cell vehicles

If the minimum isolation resistance requirement cannot be maintained over time, then protection shall be achieved by any of the following:

[1] As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.2, para. 2. - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

(a) **Double or more layers of solid insulators, barriers or enclosures that meet the requirement in paragraph 5.1.1. independently;**

(b) **On-board isolation resistance monitoring system together with a warning to the driver if the isolation resistance drops below the minimum required value. The isolation resistance between the high voltage bus of the coupling system for charging the REESS, which is not energized besides during charging the REESS, and the electrical chassis need not be monitored. The function of the on-board isolation resistance monitoring system shall be confirmed as described in Annex 5.**

Paragraph 5.2.3., amend to read:

"5.2.3. Protection against electrolyte spills

Vehicles shall foresee that no spilled electrolyte from the REESS and its components shall reach the driver, rider or passenger nor any person around the vehicle during normal condition of use and/or functional operation.

When the REESS **is in** the ~~put~~ upside-down **positions**, no electrolyte shall spill."

Paragraph 6.4.2.2.2., amend to read:

"6.4.2.2.2. For a high voltage REESS the isolation resistance of the tested-device shall ensure at least 100 Ω/Volt for the whole REESS measured after the test in accordance with Annex 4B to this Regulation.~~, or the protection degree IPXXB shall be fulfilled for the tested-device."~~

Paragraph 12., shall be deleted

Annex 6 - Part 1 amend to read

Annex 6 - Part 1

Essential characteristics of road vehicles or systems

1. General

1.1. Mark (trade name of manufacturer): .....

1.2. Type: .....

1.3. Vehicle category: .....

1.4. Commercial name(s) if available: .....

.....

1.5. Manufacturer's name and address: .....

.....

1.6. If applicable, name and address of manufacturer's representative: .....

1.7. Drawing and/or photograph of the vehicle: .....

1.8. Approval number of the REESS: .....

1.9 Passenger compartment: Yes / No [2]: .....

1.10 Centre and/or side stand: Yes / No [1]: .....

2. Electric motor (traction motor)

2.1. Type (winding, excitation): .....

2.2. Maximum net power and / or maximum 30 minutes power (kW): .....

3. REESS

3.1. Trade name and mark of the REESS: .....

3.2. Indication of all types of cells: .....

3.2.1. The cell chemistry:.....

3.2.2. Physical dimensions:.....

3.2.3. Capacity of the cell (Ah): .....

3.3. Description or drawing(s) or picture(s) of the REESS explaining:

3.3.1. Structure:.....

3.3.2. Configuration (number of cells, mode of connection, etc.): .....

3.3.3. Dimensions:.....

3.3.4. Casing (construction, materials and physical dimensions): .....

3.4. Electrical specification: .....

3.4.1. Nominal voltage (V): .....

3.4.2. Working voltage (V): .....

3.4.3. Capacity (Ah): .....

3.4.4. Maximum current (A): .....

3.5. Gas combination rate (in per cent): .....

3.6. Description or drawing(s) or picture(s) of the installation of the REESS in the vehicle: .....

[2] Strike out what does not apply.

3.6.1. Physical support:.....

3.7. Type of thermal management .....

3.8. Electronic control:.....

4. Fuel Cell (if any)

4.1. Trade name and mark of the fuel cell: .....

.....

4.2. Types of fuel cell: .....

4.3. Nominal voltage (V): .....

4.4. Number of cells: .....

4.5. Type of cooling system (if any): .....

4.6. Max Power(kW): .....

~~4~~**5**. Fuse and/or circuit breaker

4**5**.1. Type: .....

4**5**.2. Diagram showing the functional range: .....

~~5~~**6**. Power wiring harness

~~5~~**6**.1. Type: .....

~~6~~**7**. Protection against Electric Shock

~~6~~**7**.1. Description of the protection concept: .....

~~7~~**8**. Additional data

7**8**.1. Brief description of the power circuit components installation or drawings/ pictures showing the location of the power circuit components installation: .....

~~7~~**8**.2 Schematic diagram of all electrical functions included in power circuit: .....

~~7~~**8**.3. Working voltage (V): .....

~~7~~**8**.4 System descriptions for low performance driving mode(s) ……

~~7~~**8**.4.1 Systems' SOC level(s) for which power reduction is activated, descriptions, rationales ……

~~7~~**8**.4.2 Descriptions for systems' reduced power mode(s) and similar mode(s), rationales……

Annex 8A, paragraph 3.3., amend to read:

3.2. Test procedures

The tested-devices shall be subjected to a vibration having a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes

This cycle shall be repeated 12 times for a total of 3 hours in the vertical direction of the mounting orientation of the REESS as specified by the manufacturer.

The correlation between frequency and acceleration shall be as shown in table 1 and table 2.

Table 1
Frequency and acceleration (gross mass of Tested-Device less than 12 kg)

Frequency [Hz]	Acceleration [m/s2]
7 - 18	10
18 - approximately 50 [1)]	gradually increased from 10 to 80
50 - 200	80

Table 2
Frequency and acceleration (gross mass of Tested-Device of 12 kg or more)

Frequency [Hz]	Acceleration [m/s2]
7 - 18	10
18 - approximately 25 [1)]	gradually increased from 10 to 20
25 - 200	20

[1)] The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency is increased until the maximum acceleration as described in table 1 or table 2 occurs.
At the request of the manufacturer, a higher acceleration level as well as a higher maximum frequency may be used.
At the request of the manufacturer a vibration test profile determined by the vehicle-manufacturer, verified for the vehicle application and agreed with the Technical Service may be used as a substitute for the frequency - acceleration correlation of table 1 or table 2. **[remove return]** The approval of a REESS tested according to this condition shall be limited to approvals for a specific vehicle type.
After the vibration, a standard cycle as described in Annex 8, Appendix 1 shall be conducted, if not inhibited by the tested-device.

The test shall end with an observation period of 1 h at the ambient temperature conditions of the test environment.

Annex 8C, paragraph 2.1., amend to read:

"2.1. General test conditions

The following conditions shall apply to the removed REESS at the start of the test:

(a) **Adjust the SOC to fully charge before** ~~Before~~ starting the test~~.the SOC is at least 95 per cent of the normal operating range as given by the manufacturer;~~

(b) The test shall be performed at 20°C+/- 10° C. "

Annex 8D, the Title, amend to read:,

"Mechanical shock ~~resulting from stationary vehicle fall down.~~"

Annex 9B, paragraph 1 and 2, amend to read:,

"1 General

The isolation resistance shall be measured after the water resistance performance test has been conducted. ~~The degree of protection of the REESS shall meet the requirement mentioned below.~~

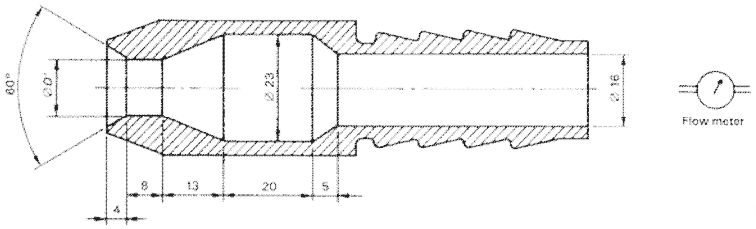
2 Procedure

The following testing procedure shall be applicable to vehicles with on-board (built-in) charger.

In accordance with the test procedure to evaluate IPX5 protection against ingress of water, the Water Resistance shall be carried out by:

(a) spraying with a stream of fresh water the enclosure from all practicable directions with a standard test nozzle as shown in figure 1.

Figure 1
Test device to verify protection against water jets (hose nozzle)



ϕD'=6.3 mm unit: mm

The conditions to be observed are as follows:

(i) internal diameter of the nozzle: 6.3 mm;

(ii) delivery rate: 12.5 l/min ± 5 per cent;

(iii) water pressure: to be adjusted to achieve the specified delivery rate;

(iv) core of the substantial stream: circle of approximately 40 mm diameter at 2.5 m distance from nozzle;

(v) test duration per square metre of enclosure surface area likely to be sprayed: 1 min;

(vi) minimum test duration: 3 min;

(vii) distance from nozzle to enclosure surface: between 2.5 m and 3 m.

(b) subsequently, apply 500V DC ~~between all the inputs and the vehicle's exposed conductive parts including the electrical chassis~~ **between all high voltage inputs and the vehicle's exposed conductive parts/electrical chassis** if present to measure the insulation resistance."

II. Justification

Paragraph 1.1 and 1.2., amend to read

The new paragraph will clarify that also part 2 does not contain any post-crash safety requirements, and as the result, the section 12 "Introductory Provision" can be deleted.

Insert Paragraph 5.1.3.3.

FC Vehicles should remain in the scope of the new UN Regulation for L-category vehicles as a number of manufacturers are engaged in the development and deployment of this technology on L-category vehicles. As the isolation resistance requirements in 5.1.3. are also applicable to FCV, additional provisions as specified in 5.1.3.3. are needed: When considering water cooled FC systems, it may be difficult to maintain isolation resistance at high voltage units for the full vehicle life, as the coolant may touch the high voltage electrical parts directly, leading to aging of these parts. In order to relieve this difficulty the paragraph 5.1.3.3. provides for alternative measures. These alternative measures are also applicable in UN-R100-02.

Para 5.2.3:

Adjustment of the text, in view of a more clear interpretation.

Para 6.4.2.2.2.

IMMA proposes to further improve the language previously agreed in IG RESS: The "protection degree IPXXB" is not necessary here, because the requirement of IPXXB is already semantically integrated in "Rupture" by its terminology definition.

Section 12

The initially proposed section 12 in ECE/TRANS/WP.29/GRSP/2014/11 was not supported at 55/GRSP. An alternative solution in the scope is proposed to provide assurance that this UN Regulation does not contain post-crash safety requirements.

Annex 6 Part 1.

These details were part of the agreed text by RESS-IG. IMMA proposes to re-insert this original details as in the previous RESS working documents. The subjects to be covered by this new UN Regulation are all of category L vehicle propelled by electric power train, including all of EV/HEV/FCV.

Annex 8A, Paragraph 3.2.,

A return should be removed in the layout of the text to avoid misreading.

Annex 8C

This clause was modified after the last agreed proposal in RESS IG. The change results from alignment with provisional conclusion from recent discussion in IG EVS, nevertheless IMMA suggests that the alignment is made with the EVS-GTR when the discussion in EVS GTR is concluded. Meanwhile IMMA suggests keeping the language that was initially agreed in IG RESS.

Annex 8D, Title change to "Mechanical shock"

This revised title provides simplification.

Annex 9B, para 1.

The sentence, proposed to be removed, was added after the last meeting of IG RESS, without discussion in IG RESS.

What should be measured here is the isolation resistance of the vehicle (between the AC-input and exposed conductive part or electrical chassis) not the REESS.

The following sentence can be appropriate if clarification of the current text is considered necessary by GRSP:

"The degree of protection of the vehicles with on-board chargers shall meet the requirement mentioned below:"

Annex 9B, para 2.

Some low voltage vehicle inputs are not directly connected to the REESS and may have a galvanic connection to the vehicle chassis (i.e. – 12V ground circuits) and should not be included in this test. The test is intended to assess protection against ingress of water and its potential effect on the High Voltage bus.