

## **Proposed amendment to document ECE/TRANS/WP.29/GRSP/2012/10 (Proposal for the 02 series of amendments to UN Regulation No. 100)**

The text reproduced below was prepared by the experts from RESS and aim to reflect the result of RESS sub-group completely and correct to appropriate wording, i.e. editorial and clarification.

The modifications to the text of ECE/TRANS/WP.29/GRSP/2012/10 are marked in bold characters or marked as strikethrough.

### **I. Proposal**

*Contents*, amend to read:

*Annex 7*, Determination of hydrogen emissions during the charge procedures of the REESS ~~traction battery~~.....

*Paragraph 2.36 (d) (new)*, amend to read:

"2.36. "Type of REESS" means.....

.....

(d) the construction, materials and physical dimensions of the ~~cell's~~ casing, and

..."

*Paragraph 5.1.1.*, amend to read:

"5.1.1. Protection against direct contact

Protection against direct contact with live parts is also required for vehicles equipped with any REESS type approved ~~as a component under Part II of this Regulation~~ and part of the vehicles high voltage bus.

...."

*Paragraph 5.1.2.*, amend to read:

"5.1.2. Protection against indirect contact

Protection against indirect contact is also required for vehicles equipped with any REESS type approved ~~as a component under Part II of this Regulation~~ and part of the vehicle high voltage bus."

*Paragraph 6.4.1.3.*, amend to read:

"6.4.1.3. Acceptance criteria

During the test, there shall be no evidence of

(a) ....

~~(c1) Electrolyte leakage if tested according to Paragraph 6.4.1.1 for a period from the impact until 30 minutes after the impact there shall be no electrolyte spillage from the REESS into the passenger compartment. No more than 7 per cent by volume of the REESS electrolyte capacity shall spill from the REESS to the outside of the passenger department with the exception of open type traction batteries where spillage to the outside of the passenger compartment shall be no more than 7 per cent by volume of the REESS electrolyte capacity but not exceeding a maximum of 5.0 liters.~~

**(c1) Electrolyte leakage if tested according to Paragraph 6.4.1.1.**

**(i) For a period from the impact until 30 minutes after the impact there shall be no electrolyte spillage from the REESS into the passenger compartment.**

**(ii) No more than 7 per cent by volume of the REESS electrolyte capacity shall spill from the REESS to the outside of the passenger department.  
(for open type traction batteries a limitation to a maximum of 5 liters also applies)**

(c2) .....

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 4A **or Annex 4B of this Regulation**, or the protection degree IPXXB shall be fulfilled for the Tested-Device.

.....

To confirm compliance to (c1) of ~~p~~Paragraph 6.4.1.3., an appropriate coating shall, if necessary, be....."

*Paragraph 6.4.2.1.1., amend to read:*

"6.4.2.1.1. Vehicle based dynamic test

Compliance with the requirements of the acceptance criteria of paragraph 6.4.2.3. below may be demonstrated by REESS(s) installed in vehicles that have been subjected to a vehicle crash test in accordance with the Annex 3 of **UNECE** Regulation Nos. 12 or 94 for frontal impact, and Annex 4 of **UNECE** Regulation No. 95 for side impact. The ambient temperature and the SOC shall be in accordance with the said Regulation.

*Paragraph 6.4.2.1.2., amend to read:*

"6.4.2.1.2. Vehicle specific component test

.....

The crush force replacing the prescribed force specified in paragraph 3.2.1. of Annex 8D shall be determined by the vehicle manufacturer using the data obtained from either actual crash tests or its simulation as specified in Annex 3 of **UNECE** Regulation Nos. 12 or ~~No.~~ 94 in the direction of travel and according to Annex 4 of **UNECE** Regulation No. 95 in the direction horizontally perpendicular to the direction of travel. These forces shall be agreed by the Technical Service.

The manufacturers may, in agreement with the Technical Services, use forces derived from the data obtained from alternative crash test procedures, but these **forces** shall be ~~at least of equal to~~ or greater ~~than severity to~~ the forces that would result from using data **in accordance with the** ~~from these~~ regulations specified above.

..."

*Paragraph 6.4.2.2., amend to read:*

"6.4.2.2. Component based test

~~A~~**The** test shall be conducted in accordance with Annex 8D of this Regulation.

REESS approved according to this paragraph shall be mounted in a position which is **between the two planes; (a) a vertical plane perpendicular to the centre line of the vehicle located 420mm rearward from the front edge of the vehicle, and (b) a vertical plane perpendicular to the centre line of the vehicle located 300 mm forward from the rear edge of the vehicle.** ~~420 mm rearward and parallel to a horizontal line taken at 90 deg to the centerline of the vehicle through the foremost point of the front of the vehicle structure, and which is 300 mm forward and parallel to a horizontal line taken at 90 deg to the centerline of the vehicle through the rearmost point of the vehicle structure.~~

The mounting restriction ....

The crush force specified in paragraph 3.2.1. of Annex 8D may be replaced with the value declared by the manufacturer, where the crush force shall be documented in Annex 6 Part 2 as a mounting restriction. In this case, the vehicle manufacture who uses such REESS shall demonstrate, during the process of approval for Part 1 of this Regulation, that the contact force to the REESS will not exceed the figure declared by the REESS manufacturer. Such force shall be determined by the vehicle manufacturer using the data obtained from either actual crash test or its simulation as specified in Annex 3 of **UNECE** Regulation No. 12 or 94 in the direction of travel and according to Annex 4 of **UNECE** Regulation No. 95 in the direction horizontally perpendicular to the direction of travel. These forces shall be agreed by the manufacturer together with the Technical service.

The manufacturers may, in agreement with the Technical Services, use forces derived from the data obtained from alternative crash test procedures, but these **forces** shall be ~~at least of equal to~~ or greater ~~than severity to~~ the forces that would result from using data **in accordance with the** ~~from these~~ regulations specified above."

*Paragraph 6.4.2.3., amend to read:*

"6.4.2.3. Acceptance criteria

During the test s there shall be no evidence of

(a) ....

~~(c1) Electrolyte leakage, if tested according to 6.4.2.1. for a period from the impact until 30 minutes after the impact, there shall be no electrolyte spillage from the REESS into the passenger compartment. No more than 7 per cent by volume of the REESS electrolyte capacity shall spill from the REESS to the outside of the passenger department with the exception of open type traction batteries where spillage to the outside of the passenger compartment shall be no more than 7 per cent by volume of the REESS electrolyte capacity but not exceeding a maximum of 5.0 liters.~~

**(c1) Electrolyte leakage if tested according to Paragraph 6.4.1.1.:**

- (i) For a period from the impact until 30 minutes after the impact there shall be no electrolyte spillage from the REESS into the passenger compartment.**
- (ii) No more than 7 per cent by volume of the REESS electrolyte capacity shall spill from the REESS to the outside of the passenger department.  
(for open type traction batteries a limitation to a maximum of 5 liters also applies)**

(c2) .....

For a high voltage REESS, the isolation resistance of the Tested-Device shall ensure at least 100 Ω/Volt for the whole REESS measured in accordance with Annex 4A **or Annex 4B of this Regulation**, or the protection degree IPXXB shall be fulfilled for the Tested-Device.

..."

*Annex 6, Part 1, item 3.4.*, amend to read:

"3.4. ~~Number of battery cells~~ Electrical specification."

*Annex 7*

*The title*, amend to read:

"DETERMINATION OF HYDROGEN EMISSIONS

DURING THE CHARGE PROCEDURES OF THE ~~TRACTION BATTERY~~ **REESS"**

*Paragraph 4.1.*, amend to read:

"4.1. Chassis dynamometer

The chassis dynamometer shall meet the requirements of the 06 series of amendments to **UNECE** Regulation No. 83."

*Paragraph 5.1.4.4. (new)*, amend to read:

"5.1.4.4. The vehicle shall be connected to the mains. The REESS is charged according to normal charge procedure as specified in paragraph 5.1.4.7. below."

*Paragraph 5.1.4.9. (new)*, amend to read:

"5.1.4.9. The end of the emission sampling period occurs  $t_1 + t_2$  or  $t_1 + 5$  h after the beginning of the initial sampling, as specified in Paragraph 5.1.4.6. The different times elapsed are recorded. The hydrogen concentration, temperature and barometric pressure are measured...."

*Paragraph 5.2.4.9. (new), amend to read:*

"5.2.4.9. The end of the emission sampling period occurs  $t_1 + t_2$  or  $t_1 + 5$  h after the beginning of the initial sampling, as specified in Paragraph 5.2.4.6. The different times elapsed are recorded. The hydrogen concentration, temperature and barometric pressure are measured...."

*Paragraph 5.2.5.11. (new), amend to read:*

"5.2.5.11. The end of test period occurs  $t'_1 + 30$  minutes after the beginning of the initial sampling, as specified in Paragraph 5.2.5.8. The times elapsed are recorded. The hydrogen concentration, temperature and barometric pressure are measured to give the final readings  $C_{H_2f}$ ,  $T_f$  and  $P_f$  for the charging failure test, used for the calculation in paragraph 6."

*Annex 8 (new), amend to read:*

"Annex 8

...

Discharge rate: ~~The~~ Discharge procedure including termination criteria **shall be** as defined by the manufacturer. If not specified, **then it shall be a** discharge with 1C current.

..."

*Annex 8A*

*Paragraph 2.1., amend to read:*

"2.1. This test shall be conducted either with the complete REESS or with a related REESS subsystem(s) including the cells and their electrical connections. If the manufacturer chooses to test with related subsystem(s), the manufacturer shall demonstrate that the test result can reasonably represent the performance of the complete REESS with respect to its safety performance under the same conditions. If the electronic management unit for the REESS is not integrated **in the casing enclosing the cells to the REESS**, then ~~such a control unit~~ **the electronic management unit** may be omitted from **installation on the test Tested-Device** if so requested by the manufacturer."

*Paragraph 3.2., amend to read:*

"3.2. Test Procedures

The tested-Devices shall be ....

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. **The approval of a REESS tested according to this Paragraph shall be limited to approvals for a specific vehicle type."**

*Annex 8B, paragraph 2.*, amend to read:

- "2. This test shall be conducted either with the complete REESS or with a related REESS subsystem(s) including the cells and their electrical connections. If the manufacturer chooses to test with related subsystem(s), the manufacturer shall demonstrate that the test result can reasonably represent the performance of the complete REESS with respect to its safety performance under the same conditions. If the electronic management unit for the REESS is not integrated **in the casing enclosing the cells to the REESS**, then ~~such a control unit~~ **the electronic management unit** may be omitted from **installation on the test Tested-Device** if so requested by the manufacturer."

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

- "2.1. This test shall be conducted either with the complete REESS or with a related REESS subsystem(s) including the cells and their electrical connections. If the manufacturer chooses to test with related subsystem(s), the manufacturer shall demonstrate that the test result can reasonably represent the performance of the complete REESS with respect to its safety performance under the same conditions. If the electronic management unit for the REESS is not integrated **in the casing, enclosing the cells**, then ~~such a control unit~~ **the electronic management unit** may be omitted from installation on the Tested-Device if so requested by the manufacturer."

*Annex 8D*

*Paragraph 2.1*, amend to read:

- "2.1. This test shall be conducted with either the complete REESS or with a related REESS subsystem(s) ~~of the REESS~~ including the cells and their electrical connections. If the manufacturer chooses to test with related subsystem(s), the manufacturer shall demonstrate that the test result can reasonably represent the performance of the complete REESS with respect to its safety performance under the same conditions. If the electronic management unit for the REESS is not integrated ~~to in the casing enclosing the cells, to the REESS~~, then ~~such a control unit~~ **the electronic management unit** may be omitted from **installation on the Tested-Device** if so requested by the manufacturer."

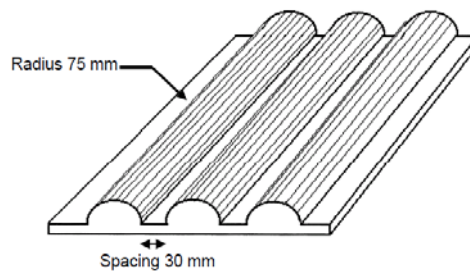
*Paragraph 3.2.0.*, shall be deleted

Paragraph 3.2.1., amend to read:

"3.2.1. Crush force

The Tested-Device shall be crushed between a resistance and a crush plate as described in figure 1 7 with a force of at least 100 kN, but not exceeding 105 kN, unless otherwise specified in accordance with Paragraph 6.4.2 of this Regulation, with an onset time less than 3 minutes and a hold time of at least 100 ms but not exceeding 10s.

Figure 1



**Dimension of the crush plate:**

**600 mm x 600 mm or smaller**

A higher crush force,..."

Annex 8E

Paragraph 2.1., amend to read:

"2.1. This test shall be conducted either with the complete REESS or with a related REESS subsystem(s) ~~of the REESS~~ including the cells and their electrical connections. If the manufacturer chooses to test with related subsystem(s), the manufacturer shall demonstrate that the test result can reasonably represent the performance of the complete REESS with respect to its safety performance under the same conditions. If the electronic management unit for the REESS is not integrated **in the casing enclosing the cells** ~~to the REESS~~, then ~~such a control~~ **the electronic management unit** may be omitted from **installation on the test Tested-Device** if so requested by the manufacturer. Where the relevant..."

Paragraph 3.3., amend to read:

"3.3. The flame to which the Tested-Device is exposed shall be obtained by burning commercial fuel for positive-ignition engine (hereafter called "fuel") in a pan. The quantity of fuel shall be sufficient to permit the flame, under free-burning conditions, to permit the flame, under free-burning conditions, to burn for the whole test procedure. ~~The fuel temperature shall be ambient temperature.~~

The fire shall cover..."

Annex 8F

Paragraph 2., amend to read:

"2. This test shall be conducted either with the complete REESS or with related REESS ~~S~~subsystem(s) including the cells and their electrical connections. If the manufacturer chooses to test with related subsystem(s), the manufacturer shall demonstrate that the test result can reasonably represent the

performance of the complete REESS with respect to its safety performance under the same conditions. If the electronic management unit for the REESS is not integrated ~~in the casing enclosing the cells to the REESS~~, then ~~such a control~~ **the electronic management unit** may be omitted from **installation on the test-Tested-Device** if so requested by the manufacturer."

*Paragraph 3.2.*, amend to read:

"3.2. Short circuit

.....

The positive and negative terminals of the **Tested-Device** ~~TESTED-DEVICE~~ shall be connected to each other to produce a short circuit. The connection used for this purpose shall have a resistance not exceeding 5 m Ω.

..."

*Paragraph 3.3.*, amend to read:

"3.3. Standard Cycle and observation period

Directly after the termination of the short circuit a standard cycle as described in Annex 8 Appendix 1 shall be conducted, if not inhibited by the ~~REESS~~ **Tested-Device**.

..."



*Annex 8G*

*Paragraph 2.*, amend to read:

- "2. This test shall be conducted, under standard operating conditions, either with the complete REESS (this maybe a complete vehicle) or with related REESS subsystem(s), including the cells ..."

*Paragraph 3.3.*, amend to read:

- "3.3. Standard Cycle and observation period

Directly after the termination of charging a standard cycle as described in Annex 8 shall be conducted, if not inhibited by the ~~REESS~~ **Tested-Device**.

..."

*Annex 8H, paragraph 2.*, amend to read:

- "2. This test shall be conducted, under standard operating conditions, either with the complete REESS (this maybe a complete vehicle) or with related REESS subsystem(s), including the cells ..."

*Annex 8I*

*Paragraph 1.*, amend to read:

- "1. PURPOSE

The purpose of this test is to verify the performance of the protection measures of the REESS against internal overheating during **the** operation, ~~and~~ **even under** the failure of the cooling function if **applicable available**. In the case..."

*Paragraph 2.1.*, amend to read:

- "2.1 The following test may be conducted with the complete REESS (maybe as a complete vehicle) or with related **REESS** subsystem(s) ~~of the REESS~~, including the cells and their electrical connections. If the manufacturer chooses to test with related subsystem(s), the manufacturer shall demonstrate that the test result can reasonably represent the performance of the complete REESS with respect to its safety performance under the same conditions. **The test may be performed with a modified Tested-Device as agreed by the manufacturer and the Technical Service. These modifications shall not influence the test results.** ~~In order to facilitate the test, necessary alteration of the REESS component may be implemented subject to the agreement between the manufacturer and the Technical Service to the extent that such alteration will not influence the results of this test."~~

## II. Justification

*Insert a new paragraph 19, to read:*

"...

18. Since the REESS has ..time are needed.

19. **Finally, REESS sub-group referred to the IEEE Standard 1725 (2006) Annex E "Temperature rise on each position in the car under clear weather" to determine the chamber temperature.**

..."

*Paragraph 52, amend to read:*

"52. Overcharging of REESS can lead to very high thermal power loss due to current....The test end criteria has been mentioned in further **technical references such as safety test standards e.g.** IEC 62660-2 "Secondary batteries for the propulsion of electric road vehicles" and SAE J2464 "Electric and Hybrid Electric Vehicle Rechargeable Energy Storage System (RESS) Safety and Abuse Testing."

*Paragraph 53, amend to read:*

53. If no over-discharge protection measures have been installed, the REESS has to be discharged to 25 per cent of its nominal voltage level. The test end criteria has been given in the ISO-12405 **-1** "Electrically propelled road vehicles -Test specification for lithium-ion traction battery packs and systems – **Part I High-power applications**" and the SAE J2929 "Electric and Hybrid Vehicle Propulsion Battery System Safety Standard".

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