Submitted by the expert from France

Informal document **GRSP-75-14**
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agenda item 17)

# Proposal for the 01 series of amendments to UN Regulation No. UN Regulation No. 153 (Fuel system integrity and electric power train safety at rear-end collision). Amendments to ECE/TRANS/WP.29/GRSP/2024/12/Rev.1.

**Submitted by the expert from France ***

The text reproduced below was prepared by the expert from France. The proposal aims to update the requirements on post-crash electrical safety of UN Regulation No. 153. The modifications to the current text of the UN Regulation are marked in bold for new or strikethrough for deleted characters.

## I. Proposal

*Paragraph 2.7.*, amend to read:

"2.7. "High ~~v~~**V**oltage" means the classification of an electric component or circuit, if its working voltage is > 60 V and ≤ 1,500 V direct current (DC) or > 30 V and ≤ 1,000 V alternating current (AC) root – mean – square (rms)."

*Paragraphs 2.9 to 2.10.,* amend to read:

"2.9. "Electrical ~~p~~**P**rotection ~~b~~**B**arrier" means the part providing protection against any direct contact to the high voltage live parts.

2.10. "Electric power train" means the electrical circuit which includes the traction motor(s), and may also include the REESS, the electric**al** energy conversion system, the electronic converters, the associated wiring harness and connectors, and the coupling system for charging the REESS."

*Paragraphs 2.12.,* amend to read:

"2.12. "Exposed conductive part" means the conductive part which can be touched under the provisions of the protection degree IPXXB **and** which is not normally energized, but which can become electrically energized under isolation failure conditions. This includes parts under a cover that can be removed without using tools."

*Paragraphs 2.15.,* amend to read:

"2.15. "Protection degree IPXXB" means protection from contact with high voltage live parts provided by either an electrical protection barrier or an enclosure and tested using a Jointed Test Finger (~~protection~~ degree IPXXB) as described in paragraph 4. of Annex 5."

*Paragraphs 2.19. to 2.20.,* amend to read:

"2.19. "Electrical circuit" means an assembly of connected ~~high voltage~~ live parts which is designed to be electrically energized in normal operation.

2.20. "Electric**al** energy conversion system" means a system (e.g. fuel cell) that generates and provides electric**al** energy for electric**al** propulsion.

* In accordance with the programme of work of the Inland Transport Committee for 2024 as outlined in proposed programme budget for 2024 (A/78/6 (Sect. 20), table 20.5), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate..

2.21. "Electronic converter" means a device capable of controlling and/or converting electric**al** power for electric**al** propulsion."

*Paragraphs 2.23.,* amend to read:

"2.23. "High Voltage Bus" means the electrical circuit, including the coupling system for charging the REESS**,** that operates on a high voltage. Where electric~~al~~ circuits are galvanically connected to each other and fulfil the specific voltage condition, only the components or parts of the electric circuit that operate on high voltage are classified as ~~a~~ high voltage bus."

*Paragraphs 2.25. to 2.27.,* amend to read:

"2.25. "Automatic disconnect" means a device that when triggered, **galvanically** ~~conductively~~ separates the electrical energy sources from the rest of the high voltage circuit of the electric power train.

2.26. "Open type traction battery" means a type of battery requiring **filling with** liquid and generating hydrogen gas **that is** released to the atmosphere.

2.27. "Aqueous electrolyte" means an electrolyte based on water solvent for the compounds (e.g. acids, bases) ~~which~~ provid~~es~~**ing** conducting ions after its dissociation."

*Paragraphs 2.30. to 2.31.,* amend to read:

"2.30. "Normal operating conditions" includes operating modes and conditions that can reasonably be encountered during **typical** ~~normal~~ operation of the vehicle including driving at legal**ly posted** speeds, parking **and** ~~or~~ stand~~idl~~ing in traffic, as well as, charging using chargers that are compatible with the specific charging ports installed on the vehicle. It does not include, conditions where the vehicle is damaged, either by a crash, road debris or vandalization, subjected to fire or water submersion, or in a state where service and or maintenance is needed or being performed

2.31. "Specific voltage condition" means the condition that the maximum voltage of a galvanically connected electric~~al~~ circuit between a DC live part and any other live part (DC or AC) is ≤ 30 V AC (rms) and ≤ 60 V DC.

Note ~~2~~**1**: When a DC live part of such an electric~~al~~ circuit is connected to **electrical** chassis and the specific voltage condition applies, the maximum voltage between any live part and the electrical chassis is ≤ 30 V AC (rms) and ≤ 60 V DC.

Note 2: For pulsating DC voltages (alternating voltages without change of polarity) the DC threshold shall be applied."

*Insert new paragraphs 2.37. to 2.39.,* to read:

"**2.37. "State of Charge (SOC)" means the available electrical charge in a REESS expressed as a percentage of its rated capacity.**

**2.38. "Fire" means the emission of flames from the vehicle. Sparks and arcing shall not be considered as flames.**

**2.39. "Explosion" means the sudden release of energy sufficient to cause pressure waves and/or projectiles that may cause structural and/or physical damage to the surrounding of the vehicle.**"

*Paragraphs 5.2.2.,* amend to read:

"5.2.2. In case of a vehicle equipped with an electric power train operating on high voltage, the electric power train and the high voltage systems which are galvanically connected to the high voltage bus of the electric power train shall meet the requirements in paragraphs 5.2.2.1. to 5.2.2.~~3~~**4**.:"

*Insert new Paragraphs 5.2.2.4.*, to read:

"**5.2.2.4. REESS fire hazards**

**For a period from the impact until 60 minutes after the impact, there shall be no evidence of fire or explosion from the REESS."**

*Insert new paragraphs 1~~1~~2. to 1~~1~~2.6.,* to read:

**"1~~1~~2. Transitional provisions**

**1~~1~~2.1. As from the official date of entry into force of the 01 series of amendments, no Contracting Party applying this UN Regulation shall refuse to grant or refuse to accept type approvals under this UN Regulation as amended by the 01 series of amendments.**

**1~~1~~2.2. As from 1 September [2026], Contracting Parties applying this UN Regulation shall not be obliged to accept type approvals to the preceding series of amendments, first issued after 1 September 2026.**

**1~~1~~2.3. Contracting Parties applying this UN Regulation shall continue to accept type approvals issued according to the original series of amendments to this UN Regulation first issued before 1 September [2026].**

**1~~1~~2.4. Contracting Parties applying this UN Regulation may grant type approvals according to any preceding series of amendments to this UN Regulation.**

**1~~1~~2.5. Contracting Parties applying this UN Regulation shall continue to grant extensions of existing approvals to any preceding series of amendments to this UN Regulation.**

**1~~1~~2.6. Notwithstanding the transitional provisions above, Contracting Parties who start to apply this UN Regulation after the date of entry into force of the most recent series of amendments are not obliged to accept type approvals which were granted in accordance with any of the preceding series of amendments to this UN Regulation."**

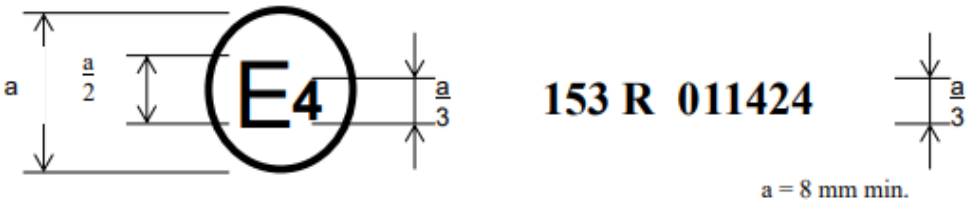
~~*Paragraph 11.(former),* renumber as paragraph 12.~~

*Annex 2*, amend to read:

# "Annex 2

## Arrangements of approval marks

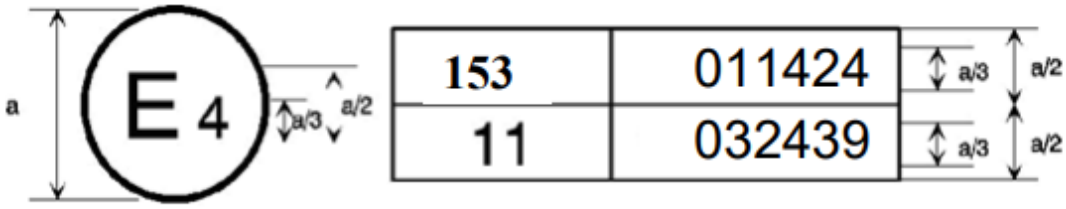
Model A
(See paragraph 4.4. of this Regulation)




The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to the protection of the occupants in the event of a frontal collision, been approved in the Netherlands (E 4) pursuant to UN Regulation No. 153 under approval number 001424. The approval number indicates that the approval was granted in accordance with the requirements of UN Regulation No. 153 **as amended by the 01 series of amendments**.

Model B

(See paragraph 4.5. of this Regulation)




a = 8 mm min.

The first two digits of the approval numbers indicate that, at the dates when the respective approvals were granted, UN Regulation No. 153 **incorporated the 01 series of amendments** and UN Regulation No. 11 incorporated the 03 series of amendments"

*Annex 3, paragraph 2.6.2.,* amend to read:

"2.6.2. The **fuel** tank ~~for liquid fuel~~ shall be filled **with water** to~~ at least~~ **mass equal to** 90 per cent ~~of its capacity either with fuel or with a noninflammable liquid having a density and a viscosity close to those of the fuel normally used~~ **of the mass of a full load of fuel as specified by the manufacturer with a tolerance of ±1 per cent; This requirement does not apply to Hydrogen fuel tanks.** All other systems (brakefluid header tanks, radiator, Selective Catalytic Reduction reagents, etc.) may be empty.

The compressed hydrogen storage system(s) and enclosed spaces of compressed hydrogen-fuelled vehicles shall be prepared in accordance with paragraph 3. of Annex 4."

*Annex 3, paragraph 2.6.5.1.,* amend to read:

"2.6.5.1. ~~The REESS shall be at any state of charge, which allows the normal operation of the power train as recommended by the manufacturer~~

**Procedures for SOC adjustment.**

**2.6.5.1.1. The adjustment of SOC shall be conducted at an ambient temperature of 20 ± 10 °C.**

**2.6.5.1.2. The SOC shall be adjusted according to one of the following procedures as applicable. Where different charging procedures are possible, REESS shall be charged using the procedure which yields the highest SOC:**

**(a) For a vehicle with a REESS designed to be externally charged, the REESS shall be charged to the highest SOC in accordance with the procedure specified by the manufacturer for normal operation until the charging process is normally terminated.**

**(b) For a vehicle with a REESS designed to be charged only by an energy source on the vehicle, the REESS shall be charged to the highest SOC which is achievable with normal operation of the vehicle. The manufacturer shall advise on the vehicle operation mode to attain this SOC."**

*Annex 5, paragraphs 4. and 4.1.,* amend to read:

"4. Physical protection

Following the vehicle impact test any parts surrounding the high voltage components shall be, without the use of tools, opened, disassembled or removed. All remaining surrounding parts shall be considered part of the physical protection.

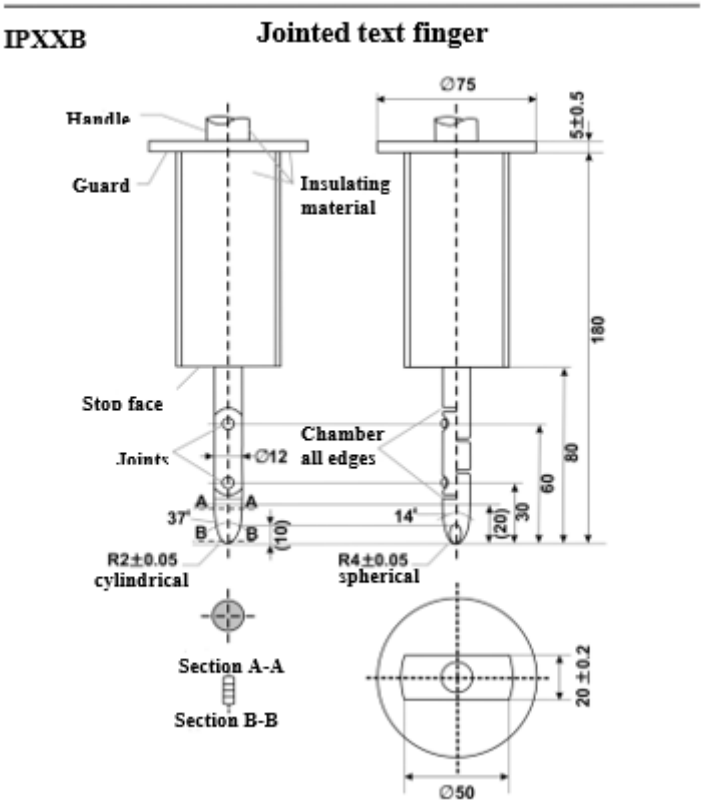
The jointed test finger described in Figure 3 shall be inserted into any gaps or openings of the physical protection with a test force of 10 N ± 10 per cent for electrical safety assessment. If partial or full penetration into the physical protection by the jointed test finger occurs, the jointed test finger shall be placed in every position as specified below.

Starting from the straight position, both joints of the test finger shall be rotated progressively through an angle of up to 90º **degree** with respect to the axis of the adjoining section of the finger and shall be placed in every possible position.

Internal electrical protection barriers are considered part of the enclosure.

If appropriate a low-voltage supply (of not less than 40 V and not more than 50 V) in series with a suitable lamp should be connected, between the jointed test finger and high voltage live parts inside the electrical protection barrier or enclosure.

Figure 3
Joint**ed** Test Finger




Material: metal, except where otherwise specified

Linear dimensions in mm.

Tolerances on dimensions without specific tolerance:

(a) ~~O~~**o**n angles: +0/**-10 seconds**~~°0′0″/ 0°0′10″~~;

(b) ~~O~~**o**n linear dimensions:

(i) **up to** ≤25 mm: +0/-0.05 ~~mm~~;

(ii) **over** ~~>~~25 mm: ±0.2 ~~mm.~~

Both joints shall permit movement in the same plane and the same direction through an angle of 90° with a 0 to +10° tolerance.

The requirements of paragraph 5.2.2.1.3. of this Regulation are met if the jointed test finger described in Figure 3, is unable to contact high voltage live parts.

If necessary~~,~~ a mirror or a fiberscope may be used **in order** to inspect whether the jointed test finger touches the high voltage buses.

If this requirement is verified by a signal circuit between the jointed test finger and high voltage live parts, the lamp shall not light.

4.1. Test method for measuring electric resistance:

(a) Test method using a resistance tester.

The resistance tester is connected to the measuring points (typically, ~~the~~ electrical chassis and electro conductive enclosure/electrical protection barrier) and the resistance is measured using a resistance tester that meets the specification ~~that~~ **as** follows:

(i) Resistance tester: Measurement current at least 0.2 A;

(ii) Resolution: 0.01 Ω or less;

(iii) The resistance R shall be less than 0.1 Ω.

(b) Test method using DC power supply, voltmeter and ammeter.

The DC power supply, voltmeter and ammeter are connected to the measuring points (Typically, electrical chassis and electro conductive enclosure/electrical protection barrier).

The voltage of the DC power supply is adjusted so that the current flow becomes at least 0.2 A.

The current "I" and the voltage "U" are measured.

The resistance "R" is calculated according to the following formula:

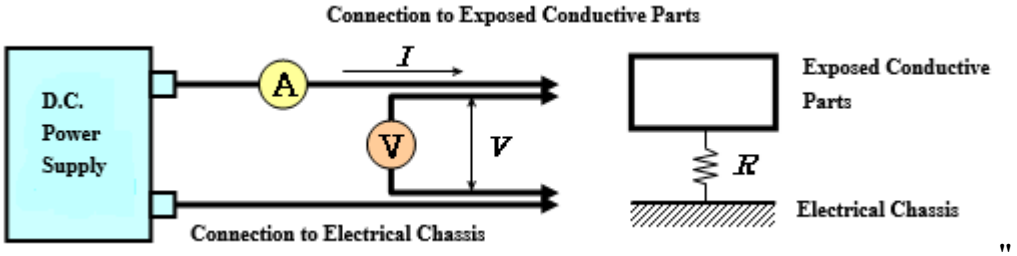
R = U / I

The resistance R shall be less than 0.1 Ω.

Note: If lead wires are used for voltage and current measurement, each lead wire shall be independently connected to the electrical protection barrier/enclosure/electrical chassis. Terminal can be common for voltage measurement and current measurement.

Example of the test method using DC power supply, voltmeter and ammeter is shown below.

Figure 4
**Example of test method using DC power supply**




"

*Annex 5 paragraphs 5.1. and 5.2.,* amend to read:

"5.1. General.

The isolation resistance for each high voltage bus of the vehicle is measured or shall be determined by calculating the measurement values of each part or component unit of a high voltage bus.

All measurements for calculating voltage(s) and electrical isolation are made after a minimum of 10 s after the impact.

5.2. Measurement method.

The isolation resistance measurement is conducted by selecting an appropriate measurement method from among those listed in paragraphs 5.2.1. to 5.2.2. of this **A**~~a~~nnex, depending on the electrical charge of the live parts or the isolation resistance.

… "

# II. Justification

~~1. UN Regulation No. 153 original series of amendment was voted before the 04 series of amendments to UN Regulation No. 94, the 05 series of amendments to UN~~

~~Regulation No. 95, the 02 series of amendments to UN Regulation No. 135 and the 02 series of amendments to UN Regulation No. 137 on the technical provisions on post-crash electrical safety. Therefore, UN Regulation No. 153 is not aligned with the other crash regulations on post-crash safety.~~

2. This proposal aims at aligning UN Regulation No. 153 with the 04 series of amendments to UN Regulation No. 94, the 05 series of amendments to UN Regulation No. 95, the 02 series of amendments to UN Regulation No. 135 and the 02 series of amendments to UN Regulation No. 137 on the technical provisions on post-crash electrical safety and REESS Safety.

In addition, based on a request from the Working Party on General Safety Provisions which progressively removes the requirement of "paragraph 9.3. no fire maintained by the fuel shall occur" in UN Regulation No. 34 and allows an equivalency with UN Regulation No. 153, it is necessary to remove in UN Regulation No. 153 the opportunity to perform test with real fuel, as it is already the case for other crash Regulations. With this suppression, the previous specification in UN Regulation No. 34 can be removed without any impact on evaluations.

3. The transitional provisions proposed for this new series of amendment are based on the ones applicable to the 04 series of amendment to UN Regulation No. 34 to keep consistency between specifications according to previous point 2.