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Regulation No. 116 (Vehicle Alarm Systems)

Proposal for draft amendments to Regulation No. 116 (Vehicle Alarm Systems)

Submitted by the expert from the International Organization of Motor Vehicle Manufacturers *

The text reproduced below was prepared by the expert from the International Organization of Motor Vehicle Manufacturers (OICA), allowing the introduction of different operating voltage ranges according to the battery technology used. It is based on informal document GRSG-107-15. The modifications to the current text of Regulation No. 116 are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Add new paragraphs 6.1.13. and 6.1.14., to read:

"**6.1.13.** **"Operating voltage" of a system means the value in volts for the electrical voltage at which this system operates during normal operation.**

6.1.14. **"Operating voltage range" of a system is the voltage range specified by the manufacturer in which this system operates without any performance restriction.**"

Paragraph 6.4. to 6.4.2.6., amend to read (footnote unchanged):

"6.4. OPERATION PARAMETERS AND TEST CONDITIONS 8/

…

6.4.1.4. Electrical conditions

~~Rated supply voltage: 12 V~~ **Operating voltage: according to the manufacturer's instructions**

~~Operation supply voltage range: from 9 V to 15 V~~ **Operating voltage range: according to the manufacturer's instructions** in the temperature range according to paragraph 6.4.1.1.

Time allowance for excess voltages at 23 °C:

When operating voltage ≤ 14V:
U = ~~18 V,~~ **150 per cent operating voltage,** max. 1 h
U = ~~24 V,~~ **200 per cent operating voltage,** max. 1 min.
When operating voltage > 14V:
U = ~~18 V,~~ **125 per cent operating voltage,** max. 1 h
U = ~~24 V,~~ **150 per cent operating voltage,** max. 100 ms

…

6.4.2.1.2. Normal test conditions

Voltage U = ~~(12 ± 0.2) V~~ **according to the manufacturer's instructions**

Temperature……T = (23 ± 5) °C

6.4.2.2. Resistance to temperature and voltage changes

Compliance with the specifications defined under paragraph 6.4.2.1.1. shall also be checked under the following conditions:

6.4.2.2.1. Test temperature ..... T (-40 ± 2) °C

Min test ~~Test~~ voltage ~~U = (9 ± 0.2) V~~ **75 per cent of the operating voltage or the lowest value of operating voltage range, whichever is the lowest.**

Storage duration..... 4 hours

6.4.2.2.2. For parts to be fitted in the passenger or luggage compartment:

Test temperature ..... T = (+85 ± 2) °C

Max test ~~Test~~ voltage ~~U = (15 ± 0.2) V~~ **112.5 per cent of the operating voltage or the highest value of the operating voltage range, whichever is the highest.**

Storage duration ..... 4 hours

6.4.2.2.3. For parts to be fitted in the engine compartment unless otherwise specified:

Test temperature ..... T = (+125 ± 2) °C

Maximum test ~~Test~~ voltage~~U = (15 ± 0.2) V~~**: 112.5 per cent of the operating voltage or the highest value of the operating voltage range, whichever is the highest.**

Storage duration ..... 4 hours

6.4.2.2.4. The VAS, in both set and unset state, shall be submitted to an excess voltage equal to (18 ± 0.2) V **or 125 per cent of the highest value of the operating voltage range, whichever is the highest,** for 1 hour.

6.4.2.2.5. The VAS, in both set and unset state, shall be submitted to an excess voltage equal to (24 ± 0.2 **for 1 min.**) V **or 150 per cent of the highest value of operating the voltage range, whichever is the highest,** for **100 ms.** ~~1 min.~~

…

6.4.2.5. Test for safety against reversed polarity

The VAS and components thereof shall not be destroyed by reversed polarity ~~up to 13 V~~ **at operating voltage** during 2 min. After this test the operation tests according to paragraph 6.4.2.1. shall be repeated with fuses changed, if necessary.

6.4.2.6. Test for safety against short-circuits

All electrical connections of the VAS must be short-circuit proof against earth, ~~max. 13 V~~ **at operating voltage** and/or fused. After this test the operation tests according to paragraph 6.4.2.1. shall be repeated, with fuses changed if necessary."

Annex 2, Part I, Section II, Addendum, paragraph 1.3. and footnote 3/, amend to read:

"1.3. Brief description of the alarm system, if applicable, including ~~rated supply~~ **operating** voltage 3/

3/ To be indicated only for vehicle alarm systems (VAS) to be used in vehicles whose ~~rated supply~~ **operating** voltage is not 12 Volts."

Annex 2, Part II, Section II, Addendum, paragraph 1.1. and footnote 3, amend to read:

"1.3. Brief description of the alarm system, if applicable, including ~~rated supply~~ **operating** voltage 3/

3/ To be indicated only for vehicle alarm systems (VAS) to be used in vehicles whose ~~rated supply~~ **operating** voltage is not 12 Volts."

II. Justification

A. Current situation

1. Chapter 6.4. of Regulation No. 116 specifies the operating voltages (12 V) and the corresponding voltage limits (9 V to 15 V).

2. Some vehicles (e.g. electric vehicles) may work with other onboard voltages, e.g. 48 V or even with several different onboard voltages, e.g. 300 V for traction battery and

12 V for electronic control (sub)systems. New battery technologies (e.g. Li-Ion batteries) require different operating ranges than classic lead-acid batteries.

3. Commercial vehicles (trucks, buses and coaches) work with onboard voltage of 24 V.

B. Problem definition

4. The current text of Regulation No. 116 focuses on vehicles using 12 V operating voltage. Alarm systems of e.g. commercial vehicles and busses cannot be approved to Regulation No. 116, and they must be further type approved according to Regulation No. 97, which is no longer state of the art.

5. The operating voltage levels specified in Regulation No. 116 do not consider state of the art of electric vehicle networks. For example to prevent Li-ion batteries from self-destruction, the manufacturer has to consider voltage limits specific to this technology.

6. For vehicles with several operating voltages for different subsystems, the manufacturer has to consider the operating voltage of the (sub)grid to which it is integrated. This is, for example, the case when the alarm system works in a 12 V-subgrid while the traction system works at 300 V. The alarm system operating voltage range cannot be at the level of that of the traction battery.

C. Conclusion

7. Operating ranges cannot anymore be specified as fixed limits. They must be specified by the manufacturer according to the technology, operating voltage of the network and electrical network architecture.

8. Current technology and intelligent battery management nowadays allow for precise control and definition of the parameters. This includes "intelligent" operating ranges to optimize energy management (CO_2 emission reduction). Fixed specified operating voltage ranges are therefore unnecessary or even may spoil efforts for CO_2 emission reduction in the future.

9. OICA proposes to make the Regulation evolve for best suiting the evolution of technology.