

Proposal for amendments to Regulation No. 116 (protection of vehicles against unauthorized use)

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

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., 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% operating voltage** max 1 h

U = ~~24 V~~, **200% operating voltage** max 1 min.

When operating voltage >14V:

U = ~~18 V~~, **125% operating voltage** max 1 h

U = ~~24 V~~, **150% operating voltage** max 100ms

...

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% 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** $U = (15 \pm 0.2) \text{ V}$ **112,5% 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 $T = (+125 \pm 2)^\circ\text{C}$
Max test Test voltage $U = (15 \pm 0.2) \text{ V}$: **112,5% 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 $(18 \pm 0.2) \text{ V}$ **or 125% 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 $(24 \pm 0.2 \text{ for 1min}) \text{ V}$ **or 150% of the highest value of operating the voltage range, whichever is the highest, for 100ms ~~1min~~**.
- ...
- 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, para. 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, para. 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

Current situation:

In Chapter 6.4 of UN Regulation No. 116 the operating voltages (12V) and the corresponding voltage limits (9V to 15V) are specified.

Some vehicles (e.g. electric vehicles) may work with other on-board voltages e.g. 48V or even with several different on-board voltages e.g. 300V for traction battery and 12V for electronic control (sub)systems. New battery technologies (e.g. Li-Ion batteries) require different operating ranges than classic lead-acid batteries.

Commercial vehicles (trucks, buses and coaches) work with on-board voltage of 24V.

Problem definition:

The current regulation – UN Regulation No. 116 – is focusing on vehicles using 12V operating voltage. Alarm systems of e.g. commercial vehicles and busses cannot be

approved to UN Regulation No. 116, they must be further approved according to UN R97, which is no longer state of the art.

The operating voltage levels in the UN R116 do not consider state of the art electric vehicle networks. For example to prevent Li-ion batteries from self-destruction, the manufacturer has to consider voltage limits specific to this technology.

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 12V-subgrid while the traction system works at 300V. The alarm system operating voltage range cannot be at the level of that of the traction battery.

Conclusion:

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.

Current technology and intelligent battery management nowadays allow for precise control and definition of the parameters. This includes "intelligent" operating ranges in order to optimize energy management (CO₂ emission reduction). Fixed specified operating voltage ranges are therefore unnecessary or even may spoil efforts for CO₂ emission reduction in the future.

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