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agenda item 3.3.)

PROPOSAL FOR DRAFT AMENDMENTS TO REGULATION No. 48

(Installation of lighting and light-signalling devices)

Transmitted by the expert from Germany

Note: The text reproduced below has been prepared by the expert from Germany, proposing new provisions in order to clarify the discrepancies between electrical supply conditions during the type approval test and the electrical supply conditions in the vehicle in service. The amendment was initially based on the text of a document without a symbol (informal document No. 22), distributed during the fiftieth GRE session (see report TRANS/WP.29/GRE/50, para. 21).

During the fifty-third GRE session, the document has been revised by Germany on the basis of informal document GRE-53-6, distributed without a symbol (see report TRANS/WP.29/GRE/53, para. 9). The revised proposal incorporates comments from France, the Netherlands, Germany, GTB and IEC. The modifications to the current text of the Regulation are marked in **bold** characters.

Note: This document is distributed to the Experts on Lighting and Light-Signalling only.

A. PROPOSAL

Add new paragraphs 2.26. to 2.26.2.4., to read:

"2.26. Voltages:

2.26.1. Terms relating to a vehicle's electrical system:

2.26.1.1. "Working voltage" means the voltage supplied by the vehicle power supply at the terminals of the lamp(s) installed in the vehicle or at the terminals of the trailer connector socket.

2.26.1.2. "Nominal working voltage" means the working voltage measured under nominal test conditions.

2.26.1.3. "Nominal voltage": The characteristic voltage of a vehicle's electrical system. It is equal to the nominal voltage of the battery used (in general a vehicle has a nominal voltage of 12 or 24 V depending on the number of battery element(s)). The nominal voltage is in correlation with the rated voltage of the light source.

2.26.1.4. "Vehicle test voltage": The value at which the voltage of the external power supply is stabilized for the measurement of working voltages.

2.26.1.5. "Dedicated power supply" means for the purpose of this Regulation a power supply, which is part of the vehicle's electrical system and not part of the lighting device approval, controlling the working voltage.

2.26.2. Terms relating to light sources:

2.26.2.1. "Rated voltage": The voltage marked on the light source,

2.26.2.2. "Rated wattage": The wattage marked on the light source.

2.26.2.3. "Directly-operated light sources": light sources operated at the working voltage supplied by the generator of the vehicle or a dedicated power supply, which correlates to the rated voltage.

2.26.2.4. "Indirectly-operated light sources": light source operated at the working voltage supplied by a dedicated power supply or through electronic light source control gear at a voltage or a range of voltages under which the lamps have been approved and which do not correlate to the rated voltage."

Add new paragraphs 5.25. to 5.25.3., to read:

"5.25. Working voltage:

5.25.1. The working voltage shall not deviate from the ~~operating~~ voltage or the range of voltages at which the lamps have been approved.

- 5.25.2. The nominal working voltage shall be measured as specified by Annex 11.
- 5.25.3. In case of lamps using light sources, directly operated by the vehicle power supply, the nominal working voltage shall be:
- 6.0V ± 0.3V, for a voltage system of nominal 6V;
13.0V ± 0.5V, for a voltage system of nominal 12V;
27.0V ± 1.0V, for a voltage system of nominal 24V."**

Insert a new Annex 11, to read:

"Annex 11

CONDITIONS FOR ON VEHICLE VOLTAGE MEASUREMENTS

1. SCOPE

This annex specifies a method for measuring the working voltages present at the contacts of the light sources in the lighting and light signalling devices fitted to motor vehicles and their trailers, and at the terminals of the trailer connector socket, if fitted 1/. It also specifies the voltages required to ensure proper working of these devices.

2. CONDITIONS OF MEASUREMENT

2.1. General conditions

2.1.1. The ambient temperature for measurements shall be:

**23 ± 5 °C, for tests on power-driven vehicles and
23 ± 10°C for tests on trailers.**

2.1.2. The external stabilized power supply shall be capable of delivering sufficiently the output current and voltage required for the tests. Its internal resistance shall not exceed 0.003 Ω. Residual ripple shall not exceed 25 mV peak to peak.

2.1.3. For voltage measurements, measuring instruments of a quality category at least equal to 0.5 shall be used. Internal resistance shall be not less than 1,000 Ω per volt. With pointer instruments, the measuring range shall be such that all readings are made in the upper third of the measuring scale.

1/ This method of measurement has been written for the case in which the socket of the trailer connector is mounted on the towing vehicle. It applies equally to an articulated vehicle in which the socket is mounted on the semi-trailer, for which case, however, the words "plug" and "socket" should be interchanged wherever they refer to a trailer connector (see figure 1 in ISO 3559 – (Date of version: 1976)).

With digital instruments, the uncertainty of measurement shall not exceed ± 0.5 per cent of the value indicated.

For measurement of AC – voltages as well as to measure PWM – voltages (Puls Width Modulated Voltages) the instrument shall be capable of measuring such voltages in a proper way e.g. by sampling method, etc. (if possible a standard should be referenced).

3. PREPARATION OF VEHICLE

The battery shall be fully charged. In case of dispute, the definition of a fully charged battery shall be that given in IEC Publication 95-1.xx edition 19xx.

4. TEST PROCEDURE

4.1. Determination of vehicle test voltage for power-driven vehicles

4.1.1. Warming up

Starting with the vehicle at ambient temperature and prepared in accordance with paragraph 4. 2/, the engine shall be run as follows:

- (a) for 15 min at half the speed at which maximum power is developed;**
- (b) for approximately 5 s at idling speed;**
- (c) for 5 min as in (a).**

Throughout this warming-up period, the following electrical circuits shall be switched on:

- driving beam lamps;**
- front position lamps;**
- rear position lamps;**
- rear registration plate lamps;**
- instrument panel lighting;**
- windscreen wipers at maximum sweep frequency with the windscreen wet, or equivalent resistance;**
- heater fan at its lowest running speed;**
- all other electrical loads, which are necessarily permanently switched on.**

4.1.2. Immediately after warming up, the voltage across the battery terminals shall be measured with the engine running at half the speed at which maximum power is developed and with the electrical circuits specified in paragraph 5.1.1 switched on; this measured voltage shall be recorded as the vehicle test voltage. The engine shall then be stopped.

2/ Suitable measures to ensure adequate engine cooling during the test shall be specified by the manufacturer, where necessary. Thermostatically controlled cooling fans driven by electric motors shall be powered from an independent supply.

4.2. Measurement of working voltages on power-driven vehicles.

4.2.1. All voltage measurements shall be made with the lighting equipment as installed.

In case of use of a dedicated power supply to provide a voltage or voltages for a lighting device, the output voltage of that dedicated power supply will be taken into account only.

In case of use of a light source control gear, which is part of a lighting device, the input voltage to that light source control gear will be taken into account only.

4.2.2. With the engine stopped, and the ignition supply circuit disconnected, an external voltage stabilized power supply shall be connected to the terminals of the battery and adjusted to provide at these terminals the vehicle test voltage determined in accordance with paragraph 4.1.2.

4.2.3. The following electrical circuits shall be switched on while all working voltages are measured:

4.2.3.1. In case of single level lighting system and/or a two level system at nighttime level:

- front position lamps;
- rear position lamps;
- rear registration plate lamps;
- instrument panel lighting;
- all lighting functions to be switched on, which could be switched on simultaneously;
- windscreen wipers at maximum sweep frequency with the windscreen wet, or equivalent resistance;
- heater fan at its lowest running speed;
- all other electrical loads, which are necessarily permanently switched on except for the ignition supply.

4.2.3.2. In case of a two level system at daytime level:

- DRL function, if applicable;
- all lighting functions to be switched on, which could be switched on simultaneously;
- windscreen wipers at maximum sweep frequency with the windscreen wet, or equivalent resistance;
- heater fan at its lowest running speed;
- all other electrical loads, which are necessarily permanently switched on except for the ignition supply.

4.2.4. Working voltages to be measured

4.2.4.1. On all vehicles, measurements shall be made under the condition as specified in paragraph 4.2.2.

On vehicles, which are fitted with a trailer connector socket, these measurements shall be made without an electrical load applied to the connector socket.

4.2.4.2 On vehicles which are fitted with a trailer connector socket, additional measurements shall be made in accordance with ISO 3559 – (Date of version: 1976).

4.3 Measurement of working voltages on trailers

4.3.1 The trailer plug shall be coupled to a test socket conforming to Table 1 below. The socket shall be connected to an external voltage stabilized power supply adjusted to provide a vehicle test voltage of 13 or 27 V, which is applied simultaneously to the terminals of the test socket feeding all circuits as shown in ISO 3559 – (Date of version: 1976).

Table 1:

| <u>The state of standards is the following:</u> | | |
|--|---|---|
| 12 V system: | 7 – pole connector, type 12N (normal) | ISO 1724, Third edition, 1997 |
| | 7 – pole connector, type 12S (supplementary) | ISO 3732, third edition, 1997 |
| 24 V system: | 7 – pole connector, type 24N (normal) | ISO 1185, Second edition, 1997 |
| | 7 – pole connector, type 24S (supplementary) | ISO 3731, third edition, 1997 |
| 12 V system: | 13 – pole connector | ISO 11 446, Second edition, 1995 |
| 24 V system: | 15 – pole connector | ISO 12 098, First edition, 1994 |

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B. JUSTIFICATION

1. An amendment to UNECE Regulation No. 7 has been adopted to allow a dedicated voltage instead of the reference luminous flux for measurement of the luminous intensity during type approval.

This new measuring procedure requires an amendment to this regulation to avoid additional discrepancies between type approval conditions and operating conditions in the vehicle.

2. In recent years, the electrical power consumption of vehicles has been increasing more and more. Therefore, the 42 Volt network is in development. But also in the conventional vehicle network, the voltage has also been increasing due to the increasing power consumption, which was under discussion in several former meetings.

Certain vehicle manufacturers, therefore, installed electronic control units into the vehicles to control the electrical power consumption or to limit the voltage level, e.g. to increase the lifetime of filament lamps especially but not only in headlamps.

3. The ISO Standard 3559 from 1976 describes clearly the conditions for conditioning of the engine and the load conditions to carry out the voltage measurement, but the test procedure is relative extensive. Therefore, to have test requirements, which focus on the principle in question, a special Annex 11 to the Regulation No. 48 on the base of ISO 3559 is proposed.
