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PROPOSAL FOR DRAFT AMENDMENTS TO REGULATION No. 48

(Installation of lighting and light-signalling devices)

Transmitted by the Chairman of the joint GRE/GRRF expert meeting
on Emergency Stop Signals (ESS)

Note: The text reproduced below was prepared by the GRE/GRRF experts during their joint meeting on ESS in order to improve road safety by the insertion into the Regulation of new provisions for the indication of emergency braking. The modifications to the existing text (up to proposal for the 03 series of amendments to the Regulation) are marked in **bold** characters.

A complimentary amendment to Regulations Nos. 13 and 13-H has also been submitted by OICA (see ECE/TRANS/WP.29/GRRF/2006/2), as Chairperson of the GRRF expert meeting on ESS.

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

A. PROPOSAL

Insert a new paragraph 2.27., to read:

"2.27. **"Emergency stop signal"** means:

- **the simultaneous operation of all of the vehicle's direction-indicator lamps, or the flashing of all of the vehicle's stop lamps**
- **to indicate to other road users to the rear of the vehicle that a high retardation force has been applied to the vehicle relative to the prevailing road conditions."**

Paragraph 5.9., amend to read:

"5.9. In the absence of specific instructions, **the photometric characteristics (e.g. intensity, colour, apparent surface, etc.) of a lamp shall not be intentionally varied during the period of activation of the lamp.**

5.9.1. Direction-indicator lamps, the vehicle-hazard warning signal, amber side-marker lamps complying with paragraph 6.18.7. below, and the emergency stop signal shall be flashing lamps.

5.9.2. The photometric characteristics of any lamp may vary:

- **in relation to the ambient light;**
- **as a consequence of the activation of other lamps, or**
- **when the lamps is being used to provide another lighting function,**

provided that any variation in the photometric characteristics is in compliance with the technical provisions for the lamp concerned."

Paragraph 5.15., amend to read:

"5.15. The colours of the light emitted by the lamps are the following:

| | |
|--------------------------------|---------------------|
| | |
| stop lamp: | red |
| emergency stop signal : | amber or red |
| rear registration plate lamp: | white |
| " | |

Insert new paragraphs 6.22. to 6.22.9.3., to read:

"6.22. EMERGENCY STOP SIGNAL

6.22.1. Presence

Optional/[Mandatory].

The emergency stop signal shall be given by the simultaneous operation of all the stop or direction indicator lamps fitted.

6.22.2. Number

As specified in paragraph 6.5.2. or 6.7.2.

6.22.3. Arrangement

As specified in paragraph 6.5.3. or 6.7.3.

6.22.4. Position

As specified in paragraph 6.5.4. or 6.7.4.

6.22.5. Geometric visibility

As specified in paragraph 6.5.5. or 6.7.5.

6.22.6. Orientation

As specified in paragraph 6.5.6. or 6.7.6.

6.22.7. Electrical connections

6.22.7.1. All the lamps of the emergency stop signal shall flash in phase at a frequency of 4.0 ± 1.0 Hz.

6.22.7.1.1. However, if any of the lamps of the emergency stop signal [to the rear of the vehicle] use filament light sources the frequency shall be $[3.5 \pm 0.5 \text{ Hz}]/[4.0 +0.0/-1.0 \text{ Hz}]$.

6.22.7.2. The emergency stop signal shall operate independently of other lamps.

6.22.7.3. The emergency stop signal shall be activated and deactivated automatically.

6.22.7.3.1. The emergency stop signal shall be activated only when the vehicle speed is above 50 km/h and the braking system is providing the emergency braking logic signal defined in Regulations Nos. 13 and 13-H.

6.22.7.3.2. The emergency stop signal shall be automatically deactivated if the emergency braking logic signal as defined in Regulations Nos. 13 and 13-H is no longer provided or if the hazard warning signal is activated.

6.22.8. Tell-tale

None

6.22.9. Other requirements

6.22.9.1. Except as provided in paragraph 6.22.9.2. below, if a motor vehicle is equipped to draw a trailer, the control of the emergency stop signal on the motor vehicle shall also be capable of operating the emergency stop signal on the trailer.

When the motor vehicle is electrically connected to a trailer, the operating frequency of the emergency stop signal for the combination shall be limited to the frequency specified in paragraph 6.22.7.1.1. However, if the motor vehicle can detect that filament light sources are not being used on the trailer for the emergency stop signal, the frequency may be that specified in paragraph 6.22.7.1.

6.22.9.2. If a motor vehicle is equipped to tow a trailer fitted with a service braking system of either continuous or semi-continuous type, as defined in Regulation No.13, it shall be ensured that a constant power supply is provided via the electrical connector for the stop lamps to such trailers while the service brake is applied.

The emergency stop signal on any such trailer may operate independently of the towing vehicle and is not required to operate either at the same frequency as, or in phase with, the towing vehicle.

6.22.9.3. Activation of the signal shall be followed within not more than [0.15 s] by the emission of light [and within not more than [0.3 s] s by its first extinction]."

Insert new paragraphs 12.12. to 12.14., to read:

"12.12. As from the official date of entry into force of Supplement 1 to the 03 series of amendments, no Contracting Party applying this Regulation shall refuse to grant approvals under this Regulation, as amended by Supplement 1 to the 03 series of amendments.

12.13. As from 36 months from the entry into force of Supplement 1 to the 03 series of amendments, Contracting Parties applying this Regulation shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by Supplement 1 to the 03 series of amendments.

12.14. Approvals granted under this Regulation before the date mentioned in paragraph 12.13. above, including extensions of such approvals, shall remain valid indefinitely."

B. JUSTIFICATION

National authorities and vehicle/system manufacturers have received, for many years, proposals from individuals and organizations concerning concepts for improving the function of the stop lamp. These proposals have particularly related to indicating a level of deceleration or braking effort that significantly exceeds the levels that are achieved in normal driving.

In recent years, a number of vehicle manufacturers have implemented such systems ("emergency stop signals") on their vehicles. However, these emergency stop signals have differing functionality and appearance. Therefore, it is appropriate that such signals should be effectively regulated and harmonized so as to limit the variety of systems entering the market and to ensure that the potential benefits which such systems offer are realized, by providing a consistent, non-ambiguous signal to following road-users.

A number of proposals for harmonizing the provisions for an emergency stop signal have been submitted to GRE, but it had not been possible to reach agreement within the main session of GRE on an amendment to Regulation No. 48. It was considered necessary that GRRF be consulted on this subject as the experts on braking. Therefore, at the request of the European Commission, a joint GRE-GRRF expert group on Emergency Stop Signals (ESS) was established. In addition to this informal group, the experts from GRE and GRRF have met separately to draft requirements relating to the Regulations Nos. 48 and 13, respectively.

Dates of Meetings involving GRE Experts:

19/05/2005 1st informal meeting of GRE experts on Emergency Stop Signals (GRE-ESS),
Brussels
20/05/2005 1st informal joint meeting of the GRE-GRRF experts on ESS, Brussels
26/09/2005 2nd informal GRE-ESS meeting, Darmstadt
08/12/2005 3rd informal GRE-ESS meeting, London

A second informal joint meeting of the GRE-GRRF experts on ESS will only take place if it is considered necessary to further clarify the distribution of responsibilities between the GRE and GRRF experts. At present, this is not envisaged as being necessary.

The objective of the group was to establish a single, unique, emergency stop signal. After much discussion, and consideration of the research conducted and system on the market, the working group has, unfortunately, only been able to partially meet this objective.

The unique part of the ESS is that it will be a flashing signal at a frequency of 4 ± 1 Hz. However, two types of lamps should be permitted to achieve this – the stop lamps or the direction indicators.

It should be noted that provisions relating to the automatic activation of the hazard warning signal have been deleted from this proposal as they are not specifically part of the ESS package,

now that the simultaneous use of direction indicators is permitted as an option for ESS. OICA will present a separate proposal for the automatic operation of the hazard warning signal, so as to reduce the risk of a delay on agreeing the ESS proposal.

Paragraph 2.27.

The term "emergency stop signal" has been used to indicate that this is a signalling device that operates existing lamps, rather than a new lamp (c.f. hazard warning signal). As such, it will require its own provisions (see paragraph 6.22.)

Exclusion of the reference to service brakes means that the definition does not preclude the activation of the Emergency Stop Signal (ESS) by means other than the driver, e.g. collision mitigation systems.

Paragraph 5.9.

This has been amended to specifically prohibit any changes in photometric performance during the operation of a lamp, unless specifically permitted.

No specific instructions are included for the enlarging of the apparent surface of stop lamps, so this is prohibited.

Paragraph 5.9.1.

Specifically permits flashing of the specified lamps.

Paragraph 5.9.2.

It is acknowledged that there are certain types of lamps that are permitted, within the regulations to have varying photometric characteristics, and these have been identified as those that vary intensities for day/night settings, either by measuring the ambient light, or by detecting that the headlamps have been switched on. In addition, certain lamps are permitted to operate at reduced intensity when providing another light function (e.g. substitution due to lamp failure). The relevant technical provisions may be in either Regulation No. 48 or the component regulation.

Paragraph 6.22.

This section follows the same general format as for hazard warning signals.

Paragraph 6.22.1.

It is proposed that the presence should be optional, rather than mandatory. Although there is evidence to suggest that these devices can enhance the safety of a vehicle by improving the reaction times and response of following drivers, particularly if they are inattentive, there is currently insufficient evidence to prove that ESS would be cost-beneficial. Therefore, installation should be at the manufacturers' discretion until further evidence is available.

Further, it should be noted, that if ESS is mandatory, it almost certainly will necessitate a new series of amendments and transitional provisions to enable enforcement of the type approval requirements and to allow all manufacturers sufficient time to implement the requirements.

Clarification, as per paragraphs 6.6.1. for hazard warning signal, that all the specified lamps must flash simultaneously.

Paragraph 6.22.2. to 6.22.6.

As the emergency signal is required to be given by the stop lamps or the direction indicator lamps, these paragraphs refer directly to those paragraphs concerning the configuration of these lamps, as per paragraphs 6.6.2. to 6.6.6.

Paragraph 6.22.7.1.

A number of considerations were taken into account when determining the permissible flash frequency ranges.

- (a) a sufficiently narrow frequency range is appropriate to ensure that the appearance of the ESS does not vary too widely from vehicle to vehicle;
- (b) a flash frequency up to 7 Hz would be the optimum solution;
- (c) filament light sources become ineffective above 4Hz;
- (d) frequencies above 5 Hz are more likely to have an effect on people who suffer from photo-epilepsy.

Therefore, the upper value of the permissible frequency range has been limited to ensure that a proposal was developed that would not be design restrictive by effectively prohibiting filament light sources, and would not introduce health and safety risks. As a consequence the permissible frequency range was agreed as 4.0 ± 1.0 Hz, with ESS that utilises lamps using filament light sources being limited to 4 Hz.

Paragraph 6.22.7.3.1.

A proposal has been submitted to GRRF to amend Regulations Nos. 13 and 13-H to require the braking system to generate an "emergency braking signal" (ECE/TRANS/WP.29/GRRF/2006/2). This proposal specifies the conditions under which the emergency braking signal shall be activated, which are actual deceleration; demanded deceleration; or ABS activation above 50 Km/h. Therefore, it is only necessary to refer to these criteria in Regulation No. 48. However, it was considered appropriate that the ESS should only be activated above 50 Km/h under all circumstances.

Paragraph 6.22.7.3.2.

As in paragraph 6.22.7.3.1., the deactivation criteria relate to the operation of the braking systems and these are contained in the proposal to amend Regulations Nos. 13 and 13-H. In addition, in order to avoid too many flashing lights on the rear of a vehicle, or possible conflict between vehicle systems, the ESS shall deactivate if the hazard warning signal is activated.

Paragraph 6.22.9.1.

The initial part is derived from the requirements for the direction indicators and hazard-warning signal.

Trailers are more likely to be fitted with filament lamps than LED light sources. Therefore, to ensure compatibility of the light source used in the trailer with flash frequency determined by the motor vehicle, it would be more appropriate to have a default to a limit of 4 Hz when a trailer is electrically connected, unless there is a means to detect whether or not filament lamps are being used.

Paragraph 6.22.9.2.

The GRRF experts noted that large trailers fitted with ABS may rely on drawing power from the stop lamp electrical line to power the ABS, in which case an alternating power can not be permitted, as this would prevent the ABS activating, with a consequential reduction in safety. Therefore, this specific requirement has been introduced to ensure that constant power is maintained for motor vehicles equipped to tow trailers with continuous or semi-continuous braking.

Regulation No. 13 defines continuous and semi-continuous braking as:

- "2.9. "Continuous braking" means the braking of a combination of vehicles through an installation having the following characteristics:
 - 2.9.1. a single control which the driver actuates progressively, by a single movement, from his driving seat;
 - 2.9.2. the energy used for braking the vehicles constituting the combination is furnished by the same source (which may be the muscular energy of the driver);
 - 2.9.3. the braking installation ensures simultaneous or suitably-phased braking of each of the constituent vehicles of the combination, whatever their relative positions;
- 2.10. "Semi-continuous braking" means the braking of a combination of vehicles through an installation having the following characteristics:
 - 2.10.1. a single control which the driver actuates progressively, by a single movement, from his driving seat;
 - 2.10.2. the energy used for braking the vehicles constituting the combination is furnished by two different sources (one of which may be the muscular energy of the driver);
 - 2.10.3. the braking installation ensures simultaneous or suitably-phased braking of each of the constituent vehicles of the combination, whatever their relative positions;"

Further, O₁ trailers are not required to be fitted with any brakes, whilst O₃ and O₄ trailers are required to be fitted with continuous or semi-continuous braking systems. However, O₂ trailers, although they are usually fitted with inertia/over-run brake, can be fitted with continuous or semi-continuous braking systems; therefore, the differentiation must be by the type of braking system fitted to the trailer, rather than by trailer type, and a motor vehicle has to be specially equipped to tow a trailer with a continuous or semi-continuous braking system.

Activation of the trailer ESS will follow the same principles as for the motor vehicle. However, the activation of the trailer ESS utilizing stop lamps will be independent from that of the motor vehicle, which means that the two systems cannot be required to flash in phase or even at the same time, i.e. the trailer could activate without the towing vehicle, and vice-versa.

Paragraph 6.22.9.3.

If ESS is to be effective, then the flashing must commence much sooner than is currently required for direction indicators and hazard warning systems (1 second). This should be regulated, but with time periods that take account of the importance of the signal, and frequency of the flash rate. At the lowest permissible flash rate (3.0Hz) a half of a cycle would take 0.167 seconds. Therefore, requiring emission of light in 0.15 seconds does not seem unreasonable; given that filament light sources are permitted to be used up to 4 Hz which would see a half cycle time of 0.125 seconds. The second half of the sentence (i.e. the extinguishing time) could perhaps be deleted as this is a function of the flashing frequency.
