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1958 Agreement:

Consideration of draft amendments to existing

UN Regulations submitted by GRE

Proposal for Supplement 5 to the 03 series of amendments to UN Regulation No. 53 (Installation of lighting and light-signalling devices for L₃ vehicles)

Submitted by the Working Party on Lighting and Light-Signalling*

The text reproduced below was adopted by the Working Party on Lighting and Light-Signalling (GRE) at its eighty-ninth session (ECE/TRANS/WP.29/GRE/89, para. 29). It is based on ECE/TRANS/WP.29/GRE/2023/17, as modified by informal document GRE-89-28. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration at their March 2024 sessions.

* 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.



Add new paragraphs 2.23. and 2.24. and their subparagraphs to read:

- "2.23. "Adaptive front lighting system" (or "AFS") means a lighting device type-approved according to UN Regulation No. 149, providing beams with differing characteristics for automatic adaptation to varying conditions of use of the dipped beam (passing beam).
- 2.23.1. "AFS control signal" (V, E, W) means the input to the AFS in accordance with the paragraph 6.18.6.3. of this Regulation.
- 2.24. Definitions with regard to AFS:
- 2.24.1. "Class" of the passing beam (C, V, E or W) means the designation of the passing beam, identified by particular provisions according to UN Regulation No. 53 (for explanation only - the provisions of the passing beam classes are dedicated to the conditions as follows: C for the basic passing beam, V for use in lit areas such as towns, E for use on roads such as motorways, W for use in adverse conditions such as wet road);
- 2.24.2. "Functional unit" means a part of a lighting unit providing a specific light distribution which may be used for different modes or classes."

Add new paragraphs 3.2.8. to 3.2.8.7. to read:

- "3.2.8. Where an AFS is fitted on the vehicle, the applicant shall submit a detailed description providing the following information:
- 3.2.8.1. The lighting functions and modes for which the AFS has been approved;
- 3.2.8.2. The related AFS control signals and their technical characteristics as defined according to annex 14 to UN Regulation No. 149.
- 3.2.8.3. The provision being applied to adapt automatically the front lighting functions and modes according to paragraph 6.18.6.3. of this Regulation;
- 3.2.8.4. Special instruction, if any, for the inspection of the light source and the visual observation of the beam;
- 3.2.8.5. The documents according to paragraph 6.18.8.1. of this Regulation;
- 3.2.8.6. The lamps that are grouped or combined with or reciprocally incorporated in the AFS;
- 3.2.8.7. Lighting units which are designed to comply with the requirements of paragraph 6.18.5. of this Regulation."

Paragraph 5.4., amend to read:

- "5.4. In the absence of specific instructions, the height and orientation of the lamp shall be verified with the vehicle unladen and placed on a flat horizontal surface, its median longitudinal plane being vertical and the handlebars being in the position corresponding to the straight-ahead movement. The tyre pressure shall be those prescribed by the manufacturer for the particular conditions of loading required in this Regulation.
- In the case where an ADB or an AFS is installed, with the system in its ADB or AFS neutral state."

Paragraph 5.13., amend to read:

- "5.13. Colours of the lights
- ...
- Adaptive front lighting system (AFS): white"

Insert a new paragraph 5.15.9. to read:

- "5.15.9. Adaptive front lighting system (AFS) (paragraph 6.18.)"

Insert a new paragraph 5.24. to read:

"5.24. Where an AFS is fitted, it shall be considered equivalent to the passing-beam headlamp(s)."

Add new paragraphs 6.18. to 6.18.8.1.3. to read:

- 6.18. Adaptive front lighting system (AFS)
- Where not otherwise specified below, the requirements for the passing-beam headlamps (paragraph 6.2.) of this Regulation apply to the relevant part of the AFS.
- 6.18.1. Presence
- Optional
- 6.18.2. Number
- One.
- 6.18.3. Arrangement
- No special requirements
- 6.18.4. Position
- The AFS shall, prior to the subsequent test procedures, be set to the neutral state;
- 6.18.4.1. In width and height:
- 6.18.4.1.1. An independent AFS installation unit may be installed above, below or to one side of another front lamp: if these lamps are one above the other the reference centre of the AFS installation unit shall be located within the median longitudinal plane of the vehicle; if these lamps are side by side their reference centre shall be symmetrical in relation to the median longitudinal plane of the vehicle.
- 6.18.4.1.2. An AFS installation unit that is reciprocally incorporated with another front lamp, shall be fitted in such a way that its reference centre lies within the median longitudinal plane of the vehicle. However, when the vehicle is also fitted with an independent driving beam headlamp, or a driving-beam headlamp that is reciprocally incorporated with a front position lamp alongside the AFS installation unit, their reference centre shall be symmetrical in relation to the median longitudinal plane of the vehicle.
- 6.18.4.1.3. Two AFS installation units, of which either one or both are reciprocally incorporated with another front lamp shall be installed in such a way that their reference centres are symmetrical in relation to the median longitudinal plane of the vehicle.
- 6.18.4.1.4. If installed, additional lighting unit(s) which provide bend lighting, type approved as part of the AFS according to UN Regulation No. 149, shall be installed under the following conditions:
- In the case of (a) pair(s) of additional lighting units, they shall be installed so that their reference centre(s) are symmetrical in relation to the median longitudinal plane of the vehicle.
- In the case of a single additional lighting unit, its reference centre shall be coincident with the median longitudinal plane of the vehicle.
- 6.18.4.1.5. Height: a minimum of 500 mm and a maximum of 1,200 mm above the ground.
- 6.18.4.1.6. In length: at the front of the vehicle. This requirement is regarded as satisfied if the light emitted does not cause discomfort to the driver either directly or indirectly by means of the rear-view mirrors and/or reflective surfaces of the vehicle.
- 6.18.4.1.7. In the case of two AFS installation units: the distance separating the illuminating surfaces of two AFS installation units must not exceed 200 mm.

- 6.18.5. Geometric visibility
- For each lighting function and mode provided:
- The angles of geometric visibility prescribed for the respective lighting functions according to paragraph 6.2.4. of this Regulation, shall be met by at least one lighting unit that is energized to perform said function and mode(s), according to the description of the applicant. Individual lighting units may be used to comply with the requirements for different angles.
- 6.18.5.1. Vertical orientation:
- the vertical inclination of the headlamp shall be set according the procedure described in the paragraphs 6.2.5.1. through 6.2.5.4. of this Regulation.
- 6.18.5.2. Headlamp levelling system
- 6.18.5.2.1. In the case where a headlamp levelling device is necessary to satisfy the requirements of paragraph 6.18.5.1., the device shall be automatic.
- 6.18.5.2.2. In the event of a failure of this device, the passing beam shall not assume a position in which the dip is less than it was at the time when the failure of the device occurred.
- 6.18.5.2.3 Measuring procedure:
- After adjustment of the initial setting of beam orientation, the vertical inclination of the passing beam or, when applicable, the vertical inclination of all different lighting units that provide or contribute to the cut-off(s) of the basic passing beam according to paragraph 6.18.5.1. above, shall be verified for all loading conditions of the vehicle in accordance with the specifications in paragraphs 6.2.5.1. to 6.2.5.4. of this regulation.
- 6.18.5.3. An HIAS may be installed for the AFS. In this case the requirements as specified in paragraph 6.2.5.5. and 6.2.5.6. of this Regulation shall be fulfilled.
- 6.18.5.4. Additional lighting unit(s) may be activated in conjunction with the AFS. In this case the requirement as specified in paragraph 6.2.5.7. and 6.2.5.8. of this Regulation shall be fulfilled.
- 6.18.6. Electrical connections
- 6.18.6.1. Passing-beam lighting:
- (a) The control for changing over to the passing beam shall switch OFF all main-beam headlamps simultaneously;
- (b) The passing beam may remain switched ON at the same time as the main-beams;
- (c) In the case of lighting units for the passing beam being discharge light sources, the gas discharge light sources shall remain switched ON during the main-beam operation.
- 6.18.6.2. The passing-beam headlamps switching ON and OFF shall fulfil the requirements for “Electrical connection” in paragraph 5.10. and 6.2.6. of this Regulation.
- 6.18.6.3. Automatic operation of the AFS
- The changes within and between the provided classes and their modes of the AFS lighting functions as specified below, shall be performed automatically without causing discomfort, distraction or glare, neither for the driver nor for the other road users.
- The following conditions apply for the activation of the classes and their modes of the passing beam and, where applicable, of the main-beam and/or the adaptation of the main-beam.

- 6.18.6.3.1. The class C mode(s) of the passing beam shall be activated if no mode of another passing beam class is activated.
- 6.18.6.3.2. The class V mode(s) of the passing beam shall not operate unless one or more of the following conditions is/are automatically detected (V-signal applies):
- (a) Roads in built-up areas and the vehicle's speed not exceeding 60 km/h;
 - (b) Roads equipped with a fixed illumination, and the vehicle's speed not exceeding 60 km/h;
 - (c) A road surface illumination of 1 cd/m² and/or a horizontal road illumination of 10 lx being exceeded continuously;
 - (d) The vehicle's speed not exceeding 50 km/h.
- 6.18.6.3.3. The class E mode(s) of the passing beam shall not operate unless the vehicle's speed exceed 60 km/h and one or more of the following conditions is /are automatically detected:
- (a) The road characteristics correspond to motorway conditions ⁽¹⁾ or the vehicle's speed exceeds 110 km/h (E-signal applies);
 - (b) In case of a class E mode of the passing beam which, according to the system's approval documents / communication sheet, complies with a "data set" of UN Regulation No. 149, Table 12 only.
- Data set E1: The vehicle's speed exceeds 100 km/h (E1-signal applies);
- Data set E2: The vehicle's speed exceeds 90 km/h (E2-signal applies);
- Data set E3: The vehicle's speed exceeds 80 km/h (E3-signal applies).
- 6.18.6.3.4. The class W-mode(s) of the passing beam shall not operate unless the front fog lamp, if any, are switched OFF and the wetness of the road has been automatically detected (W-signal applies).
- 6.18.6.4. It shall always be possible for the driver to set the AFS to the neutral state and to return it to its automatic operation.
- 6.18.7. Tell-tale:
- 6.18.7.1. The provision of paragraphs 6.2.7. (for the passing-beam headlamp) of this Regulation apply to the respective parts of an AFS.
- 6.18.7.2. A visual failure tell-tale for AFS is mandatory. It shall be non-flashing. It shall be activated whenever a failure is detected with respect to the AFS control signals or when a failure signal is received in accordance with paragraph 4.13. of UN Regulation No. 149. It shall remain activated while the failure is present. It may be cancelled temporarily but shall be repeated whenever the device which starts and stop the propulsion system is switched ON and OFF.
- 6.18.8. Other requirements
- 6.18.8.1. Verification of compliance with AFS automatic operation requirements
- 6.18.8.1.1. The applicant shall demonstrate with *a concise description* or other means acceptable to the Type Approval Authority:
- (a) The correspondence of the AFS control signals
 - (i) To the description required in paragraph 3.2.8. of this Regulation; and

¹ Traffic direction being separated by means of road construction, or, a corresponding lateral distance of opposing traffic is identified. This implies a reduction of undue glare from vehicles headlamp in opposing traffic.

- (ii) To the respective AFS control signals specified in the AFS type approval documents; and
 - (b) Compliance with the automatic operating requirements according to paragraph 6.18.6.3.1. through 6.18.6.3.4. above.
- 6.18.8.1.2. To verify, whether, according to the paragraph 6.18.6.3., the AFS automatic operation of the passing-beam functions does not cause any discomfort, the technical service shall perform a test drive which comprises any situation relevant to the system control on the basis of the applicants description; it shall be notified whether all modes are activated, performing and de-activated according to the applicant's description; obvious malfunctioning, if any, shall be contested (e.g. excessive angular movement or flicker).
- 6.18.8.1.3. The overall performance of the automatic control shall be demonstrated by the applicant by documentation or by other means acceptable by the Type Approval Authority. Furthermore, the manufacturer shall provide a documentation package which gives access to the design of "safety concept" of the system. This "safety concept" is a description of the measures designed into the system, for example within the electronic units, so as to address system integrity and thereby ensure safe operation even in the event of mechanical or electrical failure which could cause any discomfort, distraction or glare, either to the driver or to oncoming and preceding vehicles. This description shall also give a simple explanation of all the control functions of the "system" and the methods employed to achieve the objectives, including a statement of the mechanism(s) by which control is exercised.

A list of all input and sensed variables shall be provided and the working range of these shall be defined. The possibility of a fallback to the basic passing beam (class C) function shall be a part of the safety concept.

The function of the system and the safety concept, as laid down by the manufacturer, shall be explained. The documentation shall be brief, yet provide evidence that the design and development has had the benefit of expertise from all the system fields which are involved.

For periodic technical inspections, the documentation shall describe how the current operational status of the "system" can be checked.

For type approval purposes this documentation shall be taken as the basis reference for the verification process."
