

**Economic and Social Council**Distr.: General  
6 August 2021

Original: English

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**Economic Commission for Europe****Inland Transport Committee****World Forum for Harmonization of Vehicle Regulations****Working Party on Lighting and Light-Signalling****Eighty-fifth session**

Geneva, 26–29 October 2021

Item 6 (a) of the provisional agenda

**UN Regulation No. 48 (Installation of lighting and light-signalling devices):****Proposals for amendments to the latest series of amendments****Proposal for Supplements to UN Regulation No. 149 and to the 06, 07 and 08 series of amendments to UN Regulation No. 48****Submitted by the expert from the International Automotive Lighting and Light Signalling Expert Group\***

This document was prepared by the experts from the International Automotive Lighting and Light Signalling Expert Group (GTB) with the aim to allow driver assistance projections, on the road ahead of the vehicle, as part of the Adaptive Driving Beam (ADB). This proposal is based on ECE/TRANS/WP.29/GRE/2020/4/Rev.1 and informal documents GRE-84-24 and GRE-84-38-Rev.1. It addresses the comments and concerns raised by some Contracting Parties at the eighty-fourth session of the Working Party on Lighting and Light-Signalling (GRE) and at the subsequent GTB special meetings with interested Contracting Parties on 1 June 2021 and on 6 July 2021. The proposed modifications to the current text of the UN Regulations are marked in bold for new or strikethrough for deleted characters.

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\* In accordance with the programme of work of the Inland Transport Committee for 2021 as outlined in proposed programme budget for 2021 (A/75/6 (Sect.20), para 20.51), 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.



## I. Proposal

### A. New Supplement to the 06, 07 and 08 series of amendments to UN Regulation No. 48

*Add new paragraphs 2.7.8. and 2.7.9. to read:*

**“2.7.8. “Driver Assistance Projection” means a modification of the light distribution for driver assistance purposes.**

**2.7.9. “RCT (Risk of Collision Time)” means the estimated time for the own vehicle and the preceding vehicle to collide, assuming that the relative speed, at the time of estimation, remains constant.”**

*Add a new paragraph 3.2.9. to read:*

**“3.2.9. Where a system is able to provide driver assistance projections on the road, a list of the patterns and symbols shall be provided by the manufacturer.”**

*Add a new paragraph 5.35. and related sub-paragraphs to read:*

**“5.35. General provisions relating to Driver Assistance Projection**

**The Driver Assistance Projection shall be constituted of patterns, symbols or both.**

**5.35.1. Symbols and patterns shall be related and limited only to warning/highlighting:**

- (a) the presence of hazardous traffic situation**
- (b) the presence of other road users which require the driver’s attention**
- (c) to maintain the distances to surrounding road users and infrastructure**
- (d) to maintain the correct lane**

**The patterns and symbols shall be explained in the owner’s handbook.**

**5.35.2. The only symbols and patterns that may be used for the Driver Assistance Projection, and their associated underlying conditions, are listed in Annex [16].**

**5.35.3. It shall be always possible to manually deactivate and reactivate the system which operates the Driver Assistant Projection.**

**5.35.4. The projected symbols and patterns shall no longer be projected when their associated underlying conditions allowing them to be shown do not exist anymore.**

**5.35.5. The projected symbols and patterns shall stop flashing when their associated underlying conditions allowing them to flash do not exist anymore.**

**5.35.6. The Driver Assistance Projection shall be deactivated automatically in case of an electrically detectable failure of the system that affects the visual information.”**

*Paragraph 6.22.9.2.4., amend to read:*

“6.22.9.2.4. To verify that the adaptation of the main-beam, **including Driver Assistance Projection**, does not cause any discomfort, distraction or glare, neither to the driver nor to oncoming and preceding vehicles, the technical service shall perform a test drive according to paragraph 2. in Annex 12. This shall include any situation relevant to the system control on the basis of the applicant’s description. The performance of the adaptation of the main beam shall be documented and checked against the applicant’s description. Any obvious malfunctioning shall be contested (e.g. excessive angular movement or flicker).”

*Add a new paragraph 6.22.9.3.2. and its subparagraphs to read:*

“**6.22.9.3.2. The adaptive main beam may produce the Driver Assistance Projection in order to warn the driver appropriately regarding special traffic situations or conditions.**

**6.22.9.3.2.1. The lateral distance from the outer edges of the Driver Assistance Projection with respect to the trajectory of the centre of gravity of the vehicle shall not be more than 1,250 mm. This shall be demonstrated by the manufacturer by calculation or by other means accepted by the Type Approval Authority.**

**6.22.9.3.2.2. Driver Assistance Projection shall not interfere with information displayed by the Field of Vision Assistant as defined in UN Regulation No. 125.**

**6.22.9.3.2.3. Flashing and/or transforming of driver assistance projections is not permitted, unless expressly allowed for the situations described in Annex [16].**

**6.22.9.3.2.4. Driver Assistance Projection shall not operate when the windshield wiper is switched ON and its continuous operation has occurred for a period of at least two minutes.”**

*In Annex 1, item 9.22., amend to read:*

“9.22.	Adaptive front lighting system (AFS):	yes/no <sup>2</sup>
<b>9.22.1.</b>	<b>Main-beam ADB</b>	<b>yes/no<sup>2</sup></b>
<b>9.22.1.1.</b>	<b>Main-beam ADB + Driver Assistance Projection</b>	<b>yes/no<sup>2</sup>”</b>

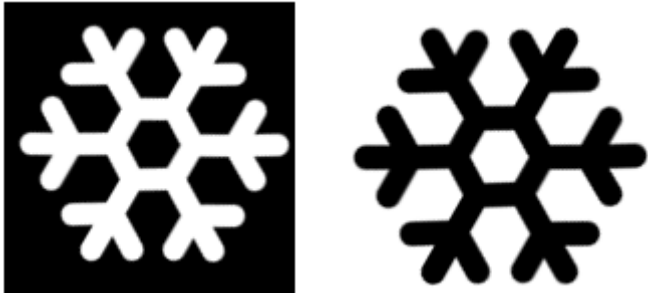

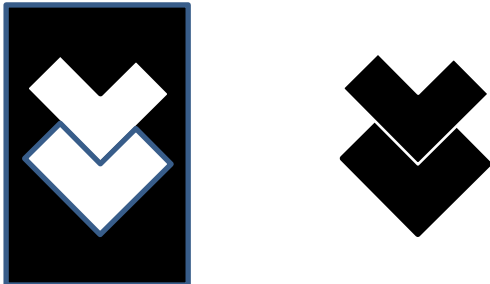
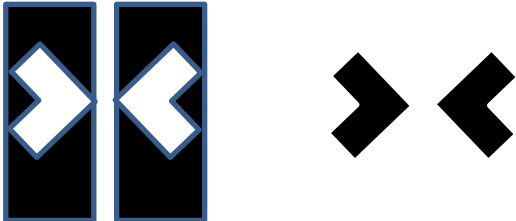

*Add a new paragraph 2.8. in Annex 12; to read:*

“**2.8. For the test sections A, B, C and E in the table above the engineers conducting the tests shall evaluate Driver Assistance Projection if installed.”**

*Add a new Annex [16] to read:*

“Annex [16]

**Symbols and patterns for the use as Driver Assistance Projections and Explanations of the Warnings/Highlights**

<i>Symbols and Pattern</i>	<i>Use case</i>	<i>Conditions and remarks</i>
	Slippery road warning	Shall not flash
	Risk of collision warning	Triggered when the relative speed is larger than 30 km/h and Risk of Collision Time is less than 1.4 s.  Flashing at 4.0 hz +/- 1.0 hz allowed.
	Wrong way warning	Activated when the vehicle is entering a one-way road or a highway in opposite direction.  Flashing at 4.0 hz +/- 1.0 hz allowed.
	Lane keeping assist warning	Activated when the vehicle unintentionally exits its lane.  Shall not flash.
	Predicted trajectory	May be transforming according to the predicted trajectory of the vehicle.  Shall not flash

”

## B. New Supplement [4] to UN Regulation No. 149

Add a new paragraph 3.1.3.4. to read:

**“3.1.3.4. In the case of Driver Assistance Projection according to UN Regulation No. 48, it shall specify the size (horizontal and vertical angular limits) of the zone used for performing said projections.”**

Renumber existing paragraphs 3.1.3.4. to 3.1.3.7. accordingly.

Add a new paragraph 5.3.3.8. and its subparagraph to read:

**“5.3.3.8. The Driver Assistance Projection according to UN Regulation No. 48, paragraph 6.22.9.3.2., may be part of the driving-beam light distribution within a zone limited by the following angles:**

**vertically: - 1.2° and below**

**horizontally: ± 25°**

**The Driver Assistance Projection may be produced by modifying the beam pattern in the zone defined above, where the luminous intensity in any point of the entire driving beam shall not exceed the maximum value (IM) according to paragraph 5.1.3.5. and not less than the minimum intensities prescribed in Table 15 Part B.**

**5.3.3.8.1. The colour of the light emitted for Driver Assistance Projection shall be white.”**

## II. Justification

1. Despite the difficulties faced in developing a suitable proposal on Driver Assistance Projections, mainly due to the travelling restrictions caused by the COVID-19 pandemic, GTB has continued its work on this item, in cooperation with International Organization of Motor Vehicle Manufacturers (OICA), with the aim to improve ECE/TRANS/WP.29/GRE/2020/4/Rev.1.

2. This new proposal reflects several improvements made in order to address the comments and concerns raised by some Contracting Parties at the eighty-fourth session of the Working Party on Lighting and Light-Signalling (GRE) and at the subsequent GTB special meetings with interested Contracting Parties on 1 June 2021 and on 6 July 2021.

3. The following justifications refer to the changes that have been introduced to ECE/TRANS/WP.29/GRE/2020/4/Rev.1.

4. Amendments to UN Regulation No. 48.

*Paragraph 2.7.8.*

4.1. In UN Regulation No. 48, requirements were separated from definitions for better understanding. We then propose to move the part of the proposed definition dealing with required characteristics of the Driver Assistance Projections to the new paragraph 5.35. and related sub-paragraphs. In addition, to avoid ambiguities, unclear requirements such as “easily/intuitively understandable” have been removed.

*Paragraph 2.7.9.*

4.2. Having introduced in Annex [16] a specific requirement on the conditions for triggering the “Risk of collision warning”, a definition of the term used became necessary.

*Paragraph 5.35. and related sub-paragraphs*

4.3. The requirements previously contained in paragraph 2.7.8. have been moved to sub-paragraph 5.35.1. while the content of sub-paragraph 5.35.2. has been taken from paragraph 6.22.9.3.2. Based on the comments received from Contracting Parties, the following aspects have been addressed in the new paragraphs 5.35.3. to 5.35.6.:

- conditions in which the Driver Assistance Projection can/cannot be shown,
- the need for manual deactivation and reactivation,
- the automatic deactivation in case of failure.

*Paragraph 6.22.9.2.4.*

4.4. This paragraph now includes a reference to the need to test the conformity of Driver Assistance Projection when the ADB tests are carried out.

*Paragraph 6.22.9.3.2.*

4.5. The second sentence is moved to paragraph 5.35.2. since it is a general requirement for Driver Assistance Projection and not a specific requirement for those produced by an ADB only.

*Paragraph 6.22.9.3.2.1.*

4.6. Upon request from some Contracting Parties, the maximum allowed projection width has been reduced (from the originally proposed 1,875 mm to 1,250 mm per side), to further ensure the non-visibility by other road users of the projected symbols/patterns.

*Paragraph 6.22.9.3.2.2.*

4.7. A requirement about the possible interference of symbols or patterns of Driver Assistance Projection with the information displayed by the Field of Vision Assistant defined in UN Regulation No. 125 has been introduced, to take into account the concerns expressed by some Contracting Parties.

*Paragraph 6.22.9.3.2.3.*

4.8. A general provision to forbid the flashing and the transformation of symbols and patterns has been introduced. Very few exceptions have been maintained under specific conditions as indicated in Annex [16].

*Paragraph 6.22.9.3.2.4.*

4.9. Due to the concerns expressed by some Contracting Parties about the possible disturbance caused by the projections on wet surfaces, it has been decided to forbid the use of Driver Assistance Projection in case of wet road. This requirement is intended as provisional, pending the availability of further studies on this matter and of suitable test procedures to evaluate the system from this point of view.

*Annex 1, item 9.22.*

4.10. The request for indication of the presence or not of the Driver Assistance Projection has been introduced.

*Annex 12, paragraph 2.*

4.11. In this paragraph a specification for testing the conformity of Driver Assistance Projection when the ADB tests are carried out has been included.

*Annex [16]*

4.12. The content of this Annex has been extended to include both the allowed symbols/patterns and the specific conditions allowing them to be shown.

4.13. In paragraph 6.22.9.3.2.3. the general prohibition to flash and to transform symbols and patterns is prescribed, but some exceptions are foreseen. Consequently, we introduced in this Annex:

- the possibility of flashing in very specific situations (driving in opposite direction, imminent risk of collision) to emphasize their danger; the suggested flashing rate is the high frequency one ( $4.0 \pm 1.0$  Hz), already prescribed for the “Emergency stop signal”.
- the possibility of transforming exclusively the pattern for the predicted trajectory in such a way that, during the trajectory changes, the projection remains in the correct

area in front of the vehicle. This will provide an advanced indication of the trajectory to be followed (particularly in case of deviations from the usual directions due to obstacles on the lane, avoiding strong and potentially dangerous manoeuvres) and also to avoid that the projected pattern could be displayed on the opposite or side lane in respect to the one on which the vehicle is travelling.

- Regarding the “Risk of collision warning”, the relative speed larger than 30 km/h and the Risk of Collision Time less than 1.4 s were based on the existing requirements for the “Rear-end collision alert signal”, as prescribed in paragraph 6.25.7.5. of UN Regulation No. 48.
5. Amendments to UN Regulation No. 149.

*Paragraph 3.1.3.4.*

5.1. The reference to UN Regulation No. 48 was added, to specifically refer to the function “Driver Assistance Projections” as defined and regulated by the said Regulation.

*Paragraph 5.3.3.8.*

5.2. The limits of the projection area have been changed to 1.2° (from 1.0°) to take into account the concerns raised by some CPs about the possible visibility from other road users of the projected symbols with consequent risk of distraction.

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