

Proposal for amendment to ECE/TRANS/WP.29/GRSG/2022/10

Supplement 2 to the Original Version of UN Regulation No. 158 (Reversing motion)

Submitted by the expert from the Informal Working Group on Awareness of Vulnerable Road Users Proximity

The text was reproduced below was prepared by the experts from the Informal Working Group VRU-Proxi to amend UN Regulation No. 158 so that misunderstandings are avoided in the certification process. This proposal supersedes ECE/TRANS/WP.29/GRSG/2022/10. The modifications to the existing text are marked in bold for new or strikethrough for deleted characters. The additional modifications to ECE/TRANS/WP.29/GRSG/2022/10 are marked in **red**.

I. Proposal

Paragraph 2.1.5.1. amend to read:

"2.1.5.1. **"Acoustic Audible** information" means information using auditory signals provided by a detection system as defined in paragraph 2.1.5. above to enable the driver to detect objects in the area adjacent to the vehicle. "

Paragraph 2.1.2.2.2. amend to read:

"2.1.2.2.2. **"The principal radii of curvature at one point on the reflecting surface (ri)"** means the values obtained with the apparatus defined in Annex 7, ~~measured on the arc of the reflecting surface passing through the centre of this surface parallel to the segment b, as defined in paragraph 6.1.2.1.2. of this Regulation and on the arc perpendicular to this segment."~~

Paragraph 6.1.2.1.2., shall be deleted

Paragraph 15.2.1. amend to read:

"15.2.1. Requirements

When tested under the conditions defined in Annex 9 the requirement for close-proximity rear-view field of vision shall be considered to be satisfied if the defined field of vision can be seen:

- (a) For the test objects in the first row (Test objects A, B, and C):
A 0.15 m x 0.15 m area ~~or~~ **located on the side or on** the top of the test object shall be visible at least one position on each test object.
- (b) for the test and D);
The whole test object shall be seen. "

Paragraph 15.2.1.4. amend to read:

"15.2.1.4. Via a means of rear visibility (~~mirror or~~ RVCS or other, **except mirrors**) complying with this UN Regulation; or "

Paragraph 15.2.2. amend to read:

“15.2.2. The close-proximity rear-view field of vision shall be established using ambinoocular vision, the eyes being at the “driver's ocular points” as defined in paragraph 12.1. above. The fields of vision shall be determined when the vehicle is in running order as defined in the consolidated Resolution on the Construction of vehicles (R.E.3) (ECE/TRANS/WP.29/78/Rev.6, para. 2.2.5.4.), plus for M₁ and N₁ vehicles one front seat passenger (75 kg). When established through windows, the glazing shall have a total light transmission factor in accordance with UN Regulation No. 43, Annex 24.

~~In case of direct view from the driver's looking back ocular points the vertical position of rear seat headrests shall be set at the designed position of assumed to use or the highest position if the headrest has multiple position settings or at the position agreed with the Technical Service.”~~

Paragraph 16.1.1.3., amend to read:

“16.1.1.3. Deactivation

The rear-view image shall remain visible during the backing event until either, the driver modifies the view, or the vehicle direction selector is no longer in the reverse position or the backing event is finished.

Modifying the view means to switch to any other camera views.

The view can be manually switched off when the vehicle is not moving rearward.

The system may be switched off when the vehicle detects a coupling by means of a coupling device. **In that case the monitor may be used to display other views (e.g. view of a rear-mounted camera on a trailer)."**

Paragraph 16.1.3.1., amend to read:

“16.1.3.1. The monitor defined size shall be visible without **any** obstruction from the ocular reference point. ~~Virtual testing is acceptable.~~

[In case of temporary obstruction, the driver shall be able to see the monitor under the conditions defined in annex 9 paragraph 1.3.3.5.

If the driver is not able to see the monitor in all normal adjusted driving positions, it is deemed to comply to this requirement if the vehicle is fitted with at least an audible or haptic information signal given to the driver within a maximum of 0.6 seconds after the start of the backing event and complying with the technical requirements as described in paragraph 17 when tested according to Annex 10]

Or

[In case of temporary obstruction, the driver shall be able to see the close proximity rear view field of vision under the conditions defined in annex 9 paragraph 1.3.3.5.

If the driver is not able to see the close proximity rear view field of vision in all normal adjusted driving positions, it is deemed to comply to this requirement if the vehicle is fitted with at least an audible or haptic information signal given to the driver within a maximum of 0.6 seconds after the start of the backing event and complying with the technical requirements as described in paragraph 17 when tested according to Annex 10]

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Paragraph 17.1. amend to read:

“17.1. System activation

The system shall be activated when the backing event starts. If proper functioning cannot be effected, either the system shall automatically shut off or the driver shall be able to deactivate the system manually.

The detection system shall remain active as long as the vehicle direction selector is in the reverse position.

In case the vehicle can detect coupling with a coupling device, the system may be switched off. **In that case the information signal may be used for informing the rear detected status."**

Paragraph 17.2.1. amend to read:

"17.2.1. The system shall have at least two kinds of information signal selected from **acoustic audible**, optical, and haptics."

Paragraph 17.2.2. amend to read:

"17.2.2. **Acoustic Audible** information

When an object is detected in the rear horizontal area as described in paragraph 1.3. of Annex 10. while the reverse gear is selected/engaged, **acoustic audible** information in accordance with ISO 15006:2011 shall be given.

In presenting **acoustic audible** information, the distance may be identified at two or more acoustic signals. These acoustic signals, differentiating distances and detection widths, may be indicated by changing the frequency of the intermittent sound. A faster intermittent sound or continuous sound shall be used as the distance becomes closer."

Paragraph 17.2.3. amend to read:

"17.2.3. Duration of signalling

Signalling for an object shall last as long as the object is detected and shall end when the object is no longer detected or when the system is deactivated.

To reduce the driver's discomfort, the **acoustic audible** signal can be automatically suspended temporarily after a certain time set by the manufacturer has elapsed, provided that the system remains activated. If, while the **acoustic audible** signal is automatically suspended temporarily, the distance to the object becomes shorter, the **acoustic audible** signal shall be automatically resumed. If the distance to the object becomes longer, the **acoustic audible** signal may remain suspended."

Paragraph 17.3.1. amend to read:

"17.3.1. Response time

At least one of the **acoustic audible** or haptic information signals that meets the requirements as described in 17.2., shall be given to the driver within a maximum of 0.6 seconds after the start of the backing event, when tested according to paragraph 2. of Annex 10."

Annex 9, paragraph 1.3.1., amend to read:

"1.3.1. Lighting

The ambient illumination conditions in which testing is conducted consists of light that is evenly distributed from above and is at an intensity of between 7,000 lux and 10,000 lux, as measured at the centre of the exterior surface of the vehicle's roof.

At the request of the manufacturer, the test may be carried out at lower ambient illumination intensity conditions."

Insert new Paragraph 1.3.3.5 to Annex 9, to read::

1.3.3.5. [Monitor visibility] **or** [the close proximity rear view field of vision]

The driver has adapted to the ambient light conditions.

The driver seating position is adjusted to all driving position in order to consider all driver heights.

[In case of **monitor** located behind a temporary obstacle (for example steering wheel spoke during reversing manoeuvre), the driver shall be able to see **the monitor display** in all normal reversing motion conditions when the driver is restrained by the installed crash protection system, adjusted in accordance with the manufacturer's instructions, and is free to move within constraints of that system (**eg. head movement**).

It shall be demonstrated by the applicant to the Technical Service that the **extrem height of driver and each binocular vision have been considered. Virtual testing is acceptable.**]"

Or

[In case of **monitor** located behind a temporary obstacle (for example steering wheel spoke during reversing manoeuvre), the driver shall be able to see **the close proximity rear view field of vision display** in all normal reversing motion conditions when the driver is restrained by the installed crash protection system, adjusted in accordance with the manufacturer's instructions, and is free to move within constraints of that system (**eg. head movement**)."]

It shall be demonstrated by the applicant to the Technical Service that the **extrem height of driver and each binocular vision have been considered. Virtual testing is acceptable.**]"

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Annex 9, paragraph 3.5., amend to read:

"3.5. Calculate visual angle subtended by test objects.

Use the following equation to calculate the subtended visual angles:

$$\theta_i = 60 \sin^{-1} \left(\frac{d_i}{a_{eye} S_{scale}} \right)$$

where i can take on the value of either test object G, H, or I, and arcsine is calculated in units of degrees.

At the request of the manufacturer, compliance with the requirements to the object size, paragraph 3 under this annex may be demonstrated by calculation. This shall include the object size, overlay requirements within the required field of vision and the resolution of the Rear-View Camera system.

The validity of the calculation method shall be established to the satisfaction of the Technical Service."

Annex 10, paragraph 1., amend to read:

"1. Rear horizontal area detection

Acoustic audible warning systems shall fulfil the test as specified in paragraph 1.3.1. in this Annex. However, if **acoustic audible** warning systems fulfil the test as specified in paragraph 1.4. in this Annex, the test as specified in paragraph 1.3.1. in this Annex shall be considered to be satisfied."

Annex 10 paragraph 1.3.2 amend to read:

"1.3.2. Minimum detection rate

The minimum detection rate required for the rear horizontal area shall be as follows:

- (a) 90 percent for A1 as defined in paragraph 5.4.3. of ISO 17386:2010;
- (b) 87 percent for the rear-2 range in A2 as defined in paragraph 5.4.3. of ISO 17386:2010.

There shall be no undetected hole larger than a square consisting of two-by-two grids.

Here, the rear horizontal area test procedures shall be as per paragraph 7.3. of ISO 17386:2010.

When **an information signal** ~~the warning~~ is provided for more than 5 seconds continuously, it is judged that the test object is detected. The detection test shall be performed 1 time for each test object. However, if necessary, according to the agreement of the Technical Service and manufacturer, it can be judged that the test object is detected in case **an information signal is** ~~warnings are~~ provided in 4 out of 5 tests."

Annex 10 paragraph 1.4.2 amend to read:

"1.4.2. Minimum detection rate

The minimum detection rate required for the area of ten points shall be 100%.

When **an information signal** ~~the warning~~ is provided for more than five seconds continuously, it is judged that the test object is detected. The detection test shall be performed one time for each test object. However, if necessary, according to the agreement of the Technical Service and manufacturer, it can be judged that the test object is detected in case **an information signal is** ~~warnings are~~ provided in four out of five tests."

Annex 10, paragraph 2.1., amend to read:

"2.1. Test conditions

- (a) The vehicle shall be left in a parked parking status until it is ensured that all electronic systems are de-activated; or for a minimum of 30 minutes.
- (b) It is permissible for the test person or equipment to be already situated within the vehicle.
- (c) Ensure the vehicle gear selector is **not in reverse gear** ~~in neutral or forward gear~~.
- (d) The test may start with opening the driver door. Once the door is opened, it shall be closed again."

II. Justification

1. This document is combined with agreed proposals, GRSG-121-17 and GRSG-121-39, and with several new amendment proposals.
2. The word "audible" is changed to "acoustic" for alignment with other UN Regulations such as UN Regulations Nos.127, 151, 159, etc.
3. New proposal of deleted text that is not needed in this UN Regulation taken from UN Regulation No. 46.
4. New proposal about monitor or **detection system** utilization of other views or **rear detection status of trailer** when the system is deactivated due to coupling with trailer, etc.
5. **New proposal of deleted text that is not needed in this UN Regulation remained from past discussions about numbers of seating row.**

6. New proposal about monitoring temporary obstruction: ~~it is generally accepted that indicators and tell tales as well as speedometers may be temporarily obscured by a turned steering wheel. Therefore, monitoring the obstruction of the image, as long as it is only NOT permanent, shall be accepted.~~

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Temporary obstruction may be permitted provided that the vehicle guarantees the visibility of the monitor to the driver or the driver's alert in the case of the presence of a VRU in the rear zone of the vehicle during a turned steering wheel.

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From the principle of regulation ECE121, all driving condition have to be considered (straight on and also turning maneuver), as well all the driver's height and seating position adjustment. Visibility through the driver's eyes need to be assessed considering driver restraint systems and capability of the driver's head to move within constraint of the restraint system.

7. **New proposal about object size calculation: due to a very high variance of vehicle configurations and equipment, the camera mounting position may vary at one specific vehicle type to ensure robustness and functionality. This will result in many slightly different camera mounting positions, which all needed to be tested physically. To reduce the testing effort and ensure an appropriate covering of all camera positions it shall be possible to demonstrate the compliance of the requirements to the object size (paragraph 3, Annex 9) by calculation. A virtual testing is already accepted in paragraph 16.1.3.1.**

8. **The word "warning" is changed to "information signal". There is no "warning" defined in the this regulation, it should be replaced by "information signal" to be harmonized with the regulation requirements text.**

9. This proposal was recently introduced at the last VRU-Proxi IWG session, and it is in square brackets because there were opinions on whether it should be stated explicitly or not.