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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****Ninetieth session**

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Item 6 (c) of the provisional agenda

**Installation UN Regulations:****UN Regulation No. 86 (Installation of Lighting and Light-Signalling Devices for Agricultural Vehicles)****Proposal for a draft amendment to the 03 series of amendments of UN Regulation No. 86****Submitted by the experts from the European Agricultural Machinery Association\***

The text reproduced below was prepared by the experts from the European Agricultural Machinery Association (CEMA) further to the discussions at the eighty-ninth session of the Working Party on Lighting and Light-Signalling (GRE) and two sessions of an ad-hoc group on agricultural vehicles set for this purpose. This proposal is based on ECE/TRANS/WP.29/GRE/2023/12 and intended to cover agricultural vehicles of any dimensions, to bring technical clarifications and to provide editorial corrections. The modifications to the 03 series of amendments of the Regulation 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 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.



## I. Proposal

Paragraph 2.4.1., amend to read:

"2.4.1. "Illuminating surface of a lighting device" (main-beam headlamp, dipped-beam headlamp, front fog lamp, reversing lamp and cornering lamp) means the orthogonal projection of the full aperture of the reflector, or in the case of headlamps with an ellipsoidal reflector of the "projection lens", on a transverse plane. If the lighting device has no reflector, the definition of paragraph ~~2.5.2.~~ **2.4.2.** shall be applied. If the light-emitting surface of the lamp extends over part only of the full aperture of the reflector, then the projection of that part only is taken into account.

In the case of a dipped-beam headlamp, the illuminating surface is limited by the apparent trace of the cut-off on to the lens. If the reflector and lens are adjustable relative to one another, the mean adjustment should be used."

Paragraph 3.2.5., amend to read:

"3.2.5. A statement of the method used for the definition of the apparent surface (see paragraph ~~2.40.~~ **2.5.**)"

Paragraph 3.3., amend to read:

"3.3. An unladen vehicle fitted with a complete set of lighting and **light**-signalling equipment, **as prescribed in paragraph 3.2.2. above**, and representative of the vehicle type to be approved shall be submitted to the Technical Service conducting approval tests."

Add a new paragraph 5.22. to read:

"**5.22. All lamps (devices) shall, where applicable, be type approved according to the corresponding device UN Regulations as specified in the relevant subparagraphs of paragraph 6. of this Regulation when installed on a vehicle.**

Paragraph 6.2.5., amend to read:

"6.2.5. Geometric visibility: Defined by angles  $\alpha$  and  $\beta$ .  
 $\alpha = 15^\circ$  upwards and  $10^\circ$  downwards,  
 $\beta = 45^\circ$  outwards and  $5^\circ$  inwards.  
**Notwithstanding provisions of paragraph 5.17 and related subparagraphs, Within within this field, virtually the whole at least 90 % of the apparent surface of the lamp shall be visible.**

The presence of partitions or other items of equipment near the headlamp shall not give rise to secondary effects causing discomfort to other road users."

Paragraph 6.4.4.2., amend to read:

"6.4.4.2. Height: Not less than 250 mm and not more than 1,200 mm above the ground.

However, if the shape, structure, design or operational conditions of the vehicle makes it impossible to keep the lamp within 1,200 mm it is allowed to keep the lamp within a maximum height of 4,000 mm.

In the latter case the lamp shall be installed with ~~an~~ a downwards inclination of

At least 3° for a mounting height larger than 2,000 mm and not more than 3,000 mm

and

At least 6° for a mounting height larger than 3,000 mm and within a maximum height of 4,000 mm.

No inclination is needed for mounting height up to 2,000 mm."

*Paragraph 6.5.8., amend to read:*

"6.5.8. Operating tell-tale:

Mandatory for all direction-indicator lamps not directly visible to the driver. It may be optical or audible or both.

If it is optical, it shall be a green flashing light which, in the event of the malfunction of any of the direction-indicator lamps other than the repeating side direction-indicator lamps or the side-marker lamps when flashing, is either extinguished, or remains alight without flashing, or shows a marked change of frequency.

If it is entirely auditory, it shall be clearly audible and shall show a marked change of frequency in the event of any malfunction.

If a tractor is equipped to tow a trailer, it shall be equipped with a special optical operating tell-tale for the direction indicator lamps on the trailer unless the tell-tale of the drawing vehicle allows the failure of any one of the direction-indicator lamps on the tractor combination thus formed to be detected.

**In relation with the previous subparagraph, in order to allow failure detection of any direction-indicator lamps installed on the trailer and generating a variation of few milliamperes in case of failure (i.e. LED direction-indicator lamps), these lamps shall be compliant to the requirements specified in ISO 13207-1:2012."**

*Paragraph 6.8. and its sub-paragraphs, amend to read:*

"6.8. Front position lamps (UN Regulation No. 7 or 148)

6.8.1. Presence:

Mandatory on all vehicles of category T.

Mandatory on all vehicles of categories R and S exceeding 1,600 mm in overall width.

Optional on other vehicles of categories R and S.

The front position lamps may be omitted if end-outline marker lamps are installed and meet all the installation requirements for front position lamps.

6.8.2. Number:

Two, ~~or four or six (see paragraph 6.8.4.2.),~~ type-approved according to the 02 or

		subsequent series of amendments to UN Regulation No. 7, or to the 00 or subsequent series of amendments to UN Regulation No. 148.
6.8.3.	Arrangement:	No individual specifications. <b>If more than two front position lamps are fitted, at least one pair of front position lamps shall be fixed.</b>
6.8.4.	Position	
6.8.4.1.	Width:	<p><b>For at least one pair of front position lamps, <del>That</del> that point on the illuminating surface which is farthest from the vehicle's median longitudinal plane shall be not more than 400 mm from the extreme outer edge of the vehicle. <del>The clearance between the respective inner edges of the two illuminating surfaces shall be not less than 500 mm.</del></b></p> <p><b>For at least one pair of front position lamps the distance between the inner edges of the two apparent surfaces in the direction of the reference axes shall be not less than 500 mm. This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1,400 mm.</b></p> <p><b>For additional pairs of front position lamps, the distance between the inner edges of the two apparent surfaces in the direction of the reference axes shall be not less than 100 mm.</b></p>
6.8.4.2.	Height:	<p><del>Above the ground</del> <b>For at least one pair of front position lamps, not less than 400 mm and not more than 2,500 mm above the ground.</b></p> <p><del>In the case of vehicles equipped for the fitting of portable devices at the front, which may obscure the mandatory front position lamps, two additional front position lamps may be fitted within a maximum height of 4,000 mm.</del> <b>For additional pairs of front position lamps, not more than 4,000 mm above the ground.</b></p>
6.8.4.3.	Length:	No specifications provided that the lamps are aligned forwards and the angles of geometrical visibility specified in paragraph 6.8.5. are complied with.
6.8.5.	Geometric visibility:	<p><b>The single pair or the combination of all pairs of front position lamps shall fulfil the following requirements:</b></p> <p>Horizontal angle: <del>For the two front position lamps:</del> 10° inwards and 80° outwards. However, the angle of 10° inwards may be reduced to 5° if the shape of the bodywork makes it impossible to keep to 10°. For vehicles with any overall width not exceeding 1,400 mm this angle may be reduced to 3° if</p>

the shape of the bodywork makes it impossible to keep to 10°.

Vertical angle: 15° above and below the horizontal. The vertical angle below the horizontal may be reduced to 10° if the height of the lamp above the ground is less than 1,900 mm, and to 5° if this height is less than 750 mm.

- 6.8.6. Orientation: Towards the front.
- 6.8.7. Electrical connections: No individual specifications (see paragraph 5.11.).  
However, if a front position lamp is reciprocally incorporated with a direction-indicator, the electrical connection of the front position lamp on the relevant side of the vehicle or the reciprocally incorporated part of it may be such that it is switched off during the entire period (both ON and OFF cycle) of activation of the direction-indicator lamp.
- 6.8.8. Tell-tale: Mandatory. This tell-tale shall be non-flashing. It shall not be required if the instrument panel lighting can only be turned on simultaneously with the front position lamps."

*Paragraph 6.9. and its sub-paragraphs, amend to read:*

- "6.9. Rear position lamps (UN Regulation No. 7 or 148)
- 6.9.1. Presence: Mandatory.  
**The rear position lamps may be omitted if end-outline marker lamps are installed and meet all the installation requirements for rear position lamps.**
- 6.9.2. Number: Two, **four** or **six more** (~~see paragraphs 6.9.4.3. and 6.9.5.1.~~), type-approved according to the 02 or subsequent series of amendments to UN Regulation No. 7, or to the 00 or subsequent series of amendments to UN Regulation No. 148.
- 6.9.3. Arrangement: No individual specifications. If ~~four more~~ **than two** rear position lamps ~~according to paragraph 6.9.5.1.~~ are fitted, at least one pair of rear position lamps shall be fixed.
- 6.9.4. Position
- 6.9.4.1. Width: ~~Except as provided in paragraph 6.9.5.1.~~ **For at least one pair of rear position lamps,** that point on the illuminating surface which is farthest from the vehicle's median longitudinal plane shall be not more than 400 mm from the extreme outer edge of the vehicle.  
**For at least one pair of rear position lamps,** ~~The~~ the distance between the inner edges of

- the two ~~illuminating surfaces~~ **apparent surfaces in the direction of the reference axes** shall be not less than 500 mm. This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1,400 mm.
- For additional pairs of rear position lamps, the distance between the inner edges of the two apparent surfaces in the direction of the reference axes shall be not less than 100 mm.**
- 6.9.4.2. Height: ~~Except as provided in paragraph 6.9.5.1. above the ground~~ **For at least one pair of rear position lamps**, not less than 400 mm and not more than 2,500 mm **above the ground**.
- For vehicles with a maximum overall width not exceeding 1,300 mm, ~~above the ground~~ not less than 250 mm **above the ground**.
- For additional pairs of rear position lamps, not more than 4,000 mm above the ground.**
- 6.9.4.3. Length: At the rear of vehicle, **at least one pair of rear position lamps shall Not** not be more than 1,000 mm from the rearmost point of the vehicle.
- ~~Parts of the vehicle that extend the rearmost point of the illuminating surface of the rear position lamps by more than 1,000 mm shall be fitted with an additional rear position lamp.~~
- 6.9.5. Geometric visibility: **The single pair or the combination of all pairs of rear position lamps shall fulfil the following requirements:**
- Horizontal angle: ~~For the two rear position lamps:~~ either 45° inwards and 80° outwards, or 80° inwards and 45° outwards. The horizontal inward angle may be reduced to 30° if the shape of the bodywork makes it impossible to reach 45°.
- Vertical angle: 15° above and below the horizontal. The angle below the horizontal may be reduced to 10° if the height of the lamp above the ground is less than 1,900 mm, and to 5° if this height is less than 750 mm.
- ~~6.9.5.1. If it is impossible to observe the above position and/or visibility requirements, four rear position lamps may be fitted in accordance with the following installation specifications:~~
- ~~6.9.5.1.1. Two rear position lamps shall keep within the maximum height of 2,500 mm above the ground.~~
- ~~A distance of at least 300 mm between the interior edges of the rear position lamps shall~~

- ~~6.9.5.1.2.~~ ~~be observed, and they shall have a vertical angle of visibility above the horizontal of 15°.~~
- ~~6.9.5.1.3.~~ ~~The other two shall keep within a maximum height of 4,000 mm above the ground and shall be bound by the requirements of paragraph 6.9.4.1.~~
- 6.9.6. Orientation: Towards the rear.
- 6.9.7. Electrical connections: No individual specifications (see paragraph 5.11.).
- However, if a rear position lamp is reciprocally incorporated with a direction-indicator, the electrical connection of the rear position lamp on the relevant side of the vehicle or the reciprocally incorporated part of it may be such that it is switched OFF during the entire time (both ON and OFF cycle) of activation of the direction-indicator lamp.**
- 6.9.8. "Circuit closed" tell-tale: Mandatory. It shall be combined with that of the front position lamps."

*Paragraph 6.12.2., amend to read:*

- "6.12.2. Number: Two visible from the front and/or two visible from the rear.
- Optional: additional lamps may be fitted as follows:
- (a) Two visible from the front;
- (b) Two visible from the rear.
- The devices shall be type-approved according to the 02 or subsequent series of amendments to UN Regulation No. 7, or to the 00 or subsequent series of amendments to UN Regulation No. 148."

*Paragraph 6.14. and its sub-paragraphs, amend to read:*

- "6.14. Rear retro-reflectors, non-triangular (UN Regulation No. 3 or 150)
- 6.14.1. Presence: Mandatory on vehicles of category T. Optional on vehicles of categories R and S in addition to **paragraph 6.25.**
- 6.14.2. Number: Two, ~~or four~~ **or six** (~~see paragraph 6.14.5.1.~~), type-approved according to the requirements concerning Class IA or IB retro-reflectors in the 02 or subsequent series of amendments to UN Regulation No. 3, or in the 00 or subsequent series of amendments to UN Regulation No. 150.
- Additional retro-reflecting devices and materials (including two retro-reflectors not complying with paragraph 6.14.4. below), are permitted provided they do not impair the

		effectiveness of the mandatory lighting and light-signalling devices.
6.14.3.	Arrangement:	No individual specifications.
6.14.4.	Position	
6.14.4.1.	Width:	<p><del>Except as provided in paragraph 6.14.5.1</del> <b>For at least one pair of rear retro-reflectors, the</b> that point on the illuminating surface which is farthest from the vehicle's median longitudinal plane shall be not more than 400 mm from the extreme outer edge of the vehicle.</p> <p><b>In case one single pair of rear retro-reflectors is fitted, the distance between</b> <del>The</del> the inner edges of the <del>retro-reflectors</del> two apparent surfaces in the direction of the reference axes shall be not less than 600 mm <del>apart</del>. This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1,300 mm.</p> <p><b>In case that more than one pair of rear retro-reflectors are fitted, for at least one pair a distance of at least 300 mm between the inner edges of the two apparent surfaces in the direction of the reference axes shall be observed, and they shall have a vertical angle of visibility above the horizontal of 15°.</b></p> <p><b>If signalling panels or signalling foils are fitted, according to the requirements given in paragraph 6.26., the single pair or the combination of pairs of rear retro-reflectors do not need to comply with the location requirements set out in the first sub-paragraph.</b></p>
6.14.4.2.	Height:	<p><b>For at least one pair of rear retro-reflectors</b> <del>Except as provided in paragraph 6.14.5.1,</del> not less than 400 mm and not more than 900 mm above the ground.</p> <p>For vehicles with a maximum overall width not exceeding 1,300 mm above the ground not less than 250 mm.</p> <p>However, the upper limit may be increased to not more than <del>1,200</del> <b>1,500</b> mm if it is impossible to keep within the height of 900 mm without having to use fixing devices liable to be easily damaged or bent.</p> <p><b>For additional pairs of rear retro-reflectors, not more than 2,500 mm above the ground.</b></p> <p>When the reflectors are mounted in addition to <b>paragraph</b> 6.25., they shall keep within a height between 400 mm and 4,000 mm above the ground.</p>



- 6.14.4.3. Length: No individual specifications.
- 6.14.5. Geometric visibility: **The single pair or the combination of all pairs of rear retro-reflectors lamps shall fulfil the following requirements:**
- Horizontal angle: 30° inwards and outwards.
- Vertical angle: 15° above and below the horizontal. The vertical angle below the horizontal may be reduced to 5° if the height of the reflector is less than 750 mm.
- ~~6.14.5.1. If it is impossible to observe the above position and visibility requirements, four retro-reflectors may be fitted in accordance with the following installation specifications:~~
- ~~6.14.5.1.1. Two retro-reflectors shall keep within the maximum height of 900 mm above the ground. However, this upper limit may be increased to not more than 1,500 mm where the shape, structure, design or operational conditions of the vehicle compliance with 900 mm makes it impossible to comply with 900 mm limit, without having to use fixing devices liable to be easily damaged or bent.~~
- ~~A distance of at least 300 mm between the interior edges of the rear retro-reflectors shall be observed, and they shall have a vertical angle of visibility above the horizontal of 15°.~~
- ~~6.14.5.1.2. The other two shall keep within a maximum height of 2,500 mm above the ground and shall be bound by the requirements of paragraph 6.14.4.1.~~
- ~~6.14.5.1.3. The combination of the two pairs shall meet the requirements for geometric visibility as specified in 6.14.5. above.~~
- 6.14.6. Orientation: Towards the rear.
- 6.14.7. Other requirements: The illuminating surface of the retro-reflector may have parts in common with that of any other rear lamp."

*Paragraph 6.15. and its sub-paragraphs, amend to read:*

- "6.15. Side retro-reflectors, non-triangular (UN Regulation No. 3 or 150)
- 6.15.1. Presence: Mandatory on all vehicles the length of which exceeds 4,6 m. Optional on all other vehicles.
- Optional on all vehicles where conspicuity markings according to **paragraph 6.21.** are fitted.
- 6.15.2. Number: Such that the requirements for longitudinal positioning are complied with. These devices shall be type-approved according to the requirements concerning Class IA or IB retro-reflectors in the 02 or subsequent series of amendments to UN Regulation No. 3, or in the 00 or subsequent series of amendments to UN Regulation No. 150.

- Additional retro-reflecting devices and materials (including two retro-reflectors not complying with paragraph 6.15.4. below), are permitted provided they do not impair the effectiveness of the mandatory lighting and light-signalling devices.
- 6.15.3. Arrangement: The reflecting surface shall be mounted in a vertical plane (maximum deviation 10°) parallel to the longitudinal axis of the vehicle.
- 6.15.4. Position
- 6.15.4.1. Width: No individual specification.
- 6.15.4.2. Height: Not less than 400 mm and not more than 900 mm above the ground.
- However, the upper limit may be increased to not more than 2,500 mm if it is impossible to keep within the height of 900 mm without having to use fixing devices liable to be easily damaged or bent.
- 6.15.4.3. Length: One reflector shall be not more than 3 m from the foremost point of the vehicle, and either the same reflector or a second reflector shall be not more than 3 m from the rearmost point of the vehicle. ~~For vehicles of category R and S the distance between the rearmost side retro-reflector and the rear of the vehicle shall not exceed 1 m.~~
- The distance between two reflectors on the same side of the vehicle shall not exceed 3 m. If the structure, design or the operational use of the vehicle makes it impossible to comply with such a requirement, this distance may be increased to 4 m.
- 6.15.5. Geometric visibility: Horizontal angle: 20° forwards and rearwards.
- Vertical angle: 10° above and below the horizontal. The vertical angle below the horizontal may be reduced to 5° if the height above the ground of the reflector is less than 750 mm.
- 6.15.6. Orientation: Towards the side. Where the orientation does not change, the reflector may rotate."

*Paragraph 6.17. and its sub-paragraphs, amend to read:*

- "6.17. Front retro-reflectors, non-triangular (UN Regulation No. 3 or 150)
- 6.17.1. Presence: Optional on vehicles of category T.
- Mandatory on vehicles of categories R and S.
- Optional on vehicles where signalling panels or signalling foils according to **paragraph 6.26.** are installed.
- 6.17.2. Number: Two, ~~or~~ four **or six**, type-approved according to the requirements concerning Class IA or IB retro-reflectors in the 02 or subsequent series of amendments to UN Regulation No. 3, or in

		the 00 or subsequent series of amendments to UN Regulation No. 150.
6.17.3.	Arrangement:	No <del>special requirement</del> <b>individual specifications.</b>
6.17.4.	Position	
6.17.4.1.	Width:	<p><b>For at least one pair of front retro-reflectors, That that</b> point on the illuminating surface which is farthest from the vehicle's median longitudinal plane shall not be more than 400 mm from the extreme outer edge of the vehicle. For vehicles of category R and S this distance shall not be more than 150 mm.</p> <p><b>In case one single pair of front retro-reflectors is fitted, The the</b> distance between the inner edges of the two apparent surfaces in the direction of the reference axes shall be not less than 600 m. This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1,300 mm.</p> <p><b>In case that more than one pair of front retro-reflectors are fitted, for at least one pair a distance of at least 300 mm between the inner edges of the two apparent surfaces in the direction of the reference axes shall be observed, and they shall have a vertical angle of visibility above the horizontal of 15°.</b></p> <p><b>If signalling panels or signalling foils are fitted, according to the requirements given in paragraph 6.26., the single pair or the combination of pairs of front retro-reflectors do not need to comply with the location requirements set out in the first subparagraph.</b></p>
6.17.4.2.	Height:	<p><del>Above the ground</del> <b>In case one single pair of front retro-reflectors is fitted, not less than 300 mm nor more than 1,500 mm above the ground.</b></p> <p>If this is not possible due to the design the front reflectors shall be arranged as low as possible.</p> <p><b>In case that more than one pair of front retro-reflectors are installed, at least one pair shall be bound by the requirements set in the first sub-paragraph.</b></p> <p><b>For additional pairs of front retro-reflectors, not more than 2,500 mm above the ground.</b></p>
6.17.4.3.	Length:	At the front of the vehicle.

- 6.17.5. Geometric visibility: **The single pair or the combination of all pairs of front retro-reflectors lamps shall fulfil the following requirements:**
- Horizontal angle: 30° inwards and outwards.
- Vertical angle: 10° above and below the horizontal. The vertical angle below the horizontal may be reduced to 5° in the case of a retro-reflector less than 750 mm above the ground.
- ~~6.17.5.1. If it is impossible to observe the above position and visibility requirements, four front retro-reflectors may be fitted in accordance with the following installation specifications:~~
- ~~6.17.5.1.1. If fitted, two reflectors shall keep within the maximum height of 1,200 mm above the ground.~~
- ~~A distance of at least 300 mm between the interior edges of the front retro-reflectors shall be observed, and they shall have a vertical angle of visibility above the horizontal of 15°.~~
- ~~6.17.5.1.2. The other two shall keep within a maximum height of 2,500 mm above the ground and shall be bound by the requirements of paragraph 6.17.4.1.~~
- ~~6.17.5.1.3. The combination of the two pairs shall meet the requirements for geometric visibility as specified in paragraph 6.17.5.~~
- 6.17.6. Orientation: Towards the front.
- 6.17.7. Other requirements: The illuminating surface of the retro-reflector may have parts in common with the apparent surface of any other lamp situated at the front."

*Paragraph 6.21.4. and its sub-paragraphs, amend to read:*

- 6.21.4. Position ~~No individual specifications.~~
- 6.21.4.1. Width:**
- 6.21.4.1.1. The conspicuity marking shall be as close as practicable to the extreme outer edge of the vehicle.**
- 6.21.4.1.2. The cumulative horizontal length of the conspicuity marking elements, as mounted on the vehicle, shall equate to at least 80 % of the overall width of the vehicle, excluding any horizontal overlap of individual elements.**
- 6.21.4.1.3. However, if it is impossible to achieve the value referred to in paragraph 6.21.4.1.2., the cumulative length may be reduced to 60 %.**
- 6.21.4.2. Height:**
- 6.21.4.2.1. Line markings and contour markings lower element(s): as low as practicable compatible with the shape, structure,**

- design and operational requirements of the vehicle.
- 6.21.4.2.2. Contour markings upper element(s): as high as practicable compatible with the shape, structure, design and operational requirements of the vehicle.
- 6.21.4.3. Length:
- 6.21.4.3.1. The conspicuity marking shall be as close as practicable to the ends of the vehicle and reach to within 1,000 mm of:
- 6.21.4.3.1.1. for tractors, each end of the vehicle;
- 6.21.4.3.1.2. for trailers, each end of the vehicle (excluding the drawbar).
- 6.21.4.3.2. The cumulative horizontal length of the conspicuity marking elements, as mounted on the vehicle, excluding any horizontal overlap of individual elements, shall equate to at least 80 % of:
- 6.21.4.3.2.1. for tractors, the length of the vehicle excluding the cab;
- 6.21.4.3.2.2. for trailers, the length of the vehicle (excluding the drawbar).
- 6.21.4.3.3. However, if it is impossible to achieve the value referred to in paragraph 6.21.4.3.2., the cumulative length may be reduced to 60 %.

*Paragraph 6.25. and its sub-paragraphs, amend to read:*

- "6.25. Rear retro-reflectors, triangular (UN Regulation No. 3 or 150)
- 6.25.1. Presence: Mandatory on vehicles of categories R and S. Prohibited on vehicles of category T.
- 6.25.2. Number: Two, ~~or four or six (see paragraph 6.25.5.1.)~~, type-approved according to the requirements concerning Class IIIA or IIIB retro-reflectors in the 02 or subsequent series of amendments to UN Regulation No. 3, or in the 00 or subsequent series of amendments to UN Regulation No. 150.
- Six rear retro-reflectors may only be fitted when the overall width of the vehicle, including its tyres, exceeds 2,550 mm.**
- Additional retro-reflecting devices and materials (including two retro-reflectors not complying with paragraph 6.25.4. below), are permitted provided they do not impair the effectiveness of the mandatory lighting and light-signalling devices.**
- 6.25.3. Arrangement: The apex of the triangle shall be directed upwards.
- 6.25.4. Position

- 6.25.4.1. Width: ~~Except as provided in paragraph 6.25.5.1. For~~ **at least one pair of rear retro-reflectors**, the point on the illuminating surface which is farthest from the vehicle's median longitudinal plane shall be not more than 400 mm from the extreme outer edge of the vehicle.
- In case one single pair of rear retro-reflectors is fitted, the distance between the inner edges of the ~~retro-reflectors~~ two apparent surfaces in the direction of the reference axes shall be not less than 600 mm ~~apart~~. This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1,300 mm.**
- In case that more than one pair of rear retro-reflectors are fitted, for at least one pair a distance of at least 300 mm between the inner edges of the two apparent surfaces in the direction of the reference axes shall be observed, and they shall have a vertical angle of visibility above the horizontal of 15°.**
- If signalling panels or signalling foils are fitted, according to the requirements given in paragraph 6.26., the single pair or the combination of pairs of rear retro-reflectors do not need to comply with the location requirements set out in the first subparagraph.**
- 6.25.4.2. Height: ~~Except as provided in paragraph 6.25.5.1~~ **For at least one pair of rear retro-reflectors**, not less than 400 mm and not more than 1,500 mm above the ground.
- For vehicles with a maximum overall width not exceeding 1,300 mm not less than 250 mm above the ground.
- However, the upper limit may be increased to not more than 1,2500 mm if it is impossible to keep within the height of 900 mm without having to use fixing devices liable to be easily damaged or bent.**
- For additional pairs of rear retro-reflectors, not more than 2,500 mm above the ground.**
- 6.25.4.3. Length: No individual specifications.
- 6.25.5. Geometric visibility: **The single pair or the combination of all pairs of rear retro-reflectors lamps shall fulfil the following requirements:**
- Horizontal angle: 30° inwards and outwards.
- Vertical angle: 15° above and below the horizontal. The vertical angle below the horizontal may be reduced to 5° if the height of the reflector is less than 750 mm.

- ~~6.25.5.1.~~ If it is impossible to observe the above position and visibility requirements, four retro-reflectors may be fitted in accordance with the following installation specifications:
- ~~6.25.5.1.1.~~ Two retro-reflectors shall keep within the maximum height of 900 mm above the ground. However, this upper limit may be increased to not more than 1,2500 mm if it is impossible to keep within the height of 900 mm without having to use fixing devices liable to be easily damaged or bent.
- A distance of at least 300 mm between the interior edges of the reflectors shall be observed, and they shall have a vertical angle of visibility above the horizontal of 15°.
- ~~6.25.5.1.2.~~ The other two shall keep within a maximum height of 2,500 mm above the ground and shall be bound by the requirements of paragraph 6.25.4.1.
- 6.25.6. Alignment: Towards the rear.
- 6.25.7. Other requirements: The illuminating surface of the retro-reflector may have parts in common with that of any other rear lamp."

## II. Justification

1. This proposal includes the amendments accepted for the 03 series of amendments to UN Regulation No. 86 (ECE/TRANS/WP.29/2023/93).
2. The criteria for the geometric visibility of dipped-beam headlamps wording were better clarified to avoid diverging interpretations.
3. For the detection of the failure of direction indicator lamps of a trailer in a tractor, complementing requirements were provided to cover the case where the failure generates a low drop of intensity.
4. Requirements on the number and the location of front / rear position lamps, front / rear retro-reflectors were adapted for wide vehicles, whether it is due to the their frame or to their tyre configuration (e.g. twin tyres); this is in particular intended to guarantee the width criteria of 400 mm from the extreme outer edge of the vehicle for the main pair of these lights.
5. The distance between the rearmost side retro-reflector and the rear of the vehicle for R and S vehicles was removed to enable their combination with side-marker lamps (as allowed in paragraph 6.18.4.3. of UN Regulation No. 86).
6. Position requirements were added for conspicuity markings.
7. There are editorial errors in two references to definition numbers.