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World Forum for Harmonization of Vehicle Regulations**Working Party on Passive Safety****Fifty-second session**

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Item 4(b) of the provisional agenda

Global technical regulation No. 9 (Pedestrian safety) – Proposal for Amendment 2**Proposal for Amendment 2 to global technical regulation
No. 9 (Pedestrian safety)****Submitted by the expert from the European Commission***

The text reproduced below was prepared by the expert from the European Commission to amend the test requirements of UN GTR No. 9. It is based on ECE/TRANS/WP.29/AC.3/31 and on a document without symbol (GRSP-51-33-Rev.2) distributed during the fifty-first session of the Working Party on Passive Safety (GRSP) (see ECE/TRANS/WP.29/GRSP/51, para. 11). The modifications to the current text of UN GTR No. 9 are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106 and ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

In the text of the regulation (part B),

Paragraph 2.1., the reference to footnote 2 and footnote 2, correct as footnote 1

Paragraph 3.1., amend to read:

"3.1. ~~"Adult headform test area" is an area on the outer surfaces of the front structure. The area is bounded, in the front, by a wrap around distance (WAD) of 1,700 mm and, at the rear, by the rear reference line for adult headform and, at each side, by the side reference line.~~

(a) **in the front, by a wrap around distance (WAD) of 1,700 or a line 82.5 mm rearward of the bonnet leading edge reference line, whichever is most rearward at a given lateral position,**

(b) **at the rear, by a WAD 2,100 or a line 82.5 mm forward of the bonnet rear reference line, whichever is most forward at a given lateral position, and**

(c) **at each side, by a line 82.5 mm inside the side reference line.**

The distance of 82.5 mm is to be set with a flexible tape held tautly along the outer surface of the vehicle."

Paragraph 3.10., amend to read:

"3.10. ~~"Bumper test area" means the frontal surface of the bumper limited by two longitudinal vertical planes intersecting the corners of the bumper and moved 66 mm parallel and inboard of the corners of the bumpers points 66 mm~~ **inside the defined corners of the bumper. This distance is to be set with a flexible tape held tautly along the outer surface of the vehicle."**

Paragraph 3.12., amend to read:

"3.12. ~~"Child headform test area" is an area on the outer surfaces of the front structure. The area is bounded, in the front, by the front reference line for child headform, and, at the rear, by the WAD1700 line, and by the side reference lines.:~~

(a) **in the front, by a WAD 1,000 or a line 82.5 mm rearward of the bonnet leading edge reference line, whichever is most rearward at a given lateral position,**

(b) **at the rear, by a WAD 1,700 or a line 82.5 mm forward of the bonnet rear reference line, whichever is most forward at a given lateral position, and**

(c) **at each side, by a line 82.5 mm inside the side reference line.**

The distance of 82.5 mm is to be set with a flexible tape held tautly along the outer surface of the vehicle."

Paragraph 3.19., amend to read:

"3.19. ~~"Impact~~ **First contact point**" means the point on the vehicle where initial contact by the test impactor occurs. The proximity of this point to the target point is dependent upon both the angle of travel by the test impactor and the contour of the vehicle surface (see point **C B** in Figure 6B and Figure 6C)."

{The first contact point is sometimes also referred to as "impact point" in respective regular texts for pedestrian protection.}

Paragraph 3.25., amend to read:

"3.25. **Target point**" means the intersection of the projection of the headform longitudinal axis with the front surface of the vehicle (see point A in Figure 6A)."

{The target point is sometimes also referred to as "aiming point" in respective regular texts for pedestrian protection.}

Insert new paragraphs 3.30. to 3.31., to read:

"3.30. **Measuring point**"

3.30.1. **"Measuring point" for the headform test means a point on the vehicle's outer surface selected for testing. The central axis of the impactor and the measuring point are in a plane parallel to the vertical longitudinal median plane of the vehicle (see Figure 6A). The measuring point is located in a [two-dimensional] plane parallel to the vertical longitudinal median plane of the vehicle at the location where the cross sections of the headform and bonnet top test area touch. The first contact point may differ from the measuring point as a result of the three-dimensional geometry of the bonnet top (see Figure 6B).**

The measuring point is sometimes referred to as "test point" or "selected impact point" in respective regulatory texts for pedestrian protection.

3.30.2. **"Measuring point" for the lower legform to bumper test and upper legform to bumper test means a point on the vehicle's outer surface selected to be tested. The central axis of the impactor and the measuring point are in a plane parallel to the vertical longitudinal median plane of the vehicle. The measuring point is located in a [two-dimensional] plane parallel to the vertical longitudinal median plane of the vehicle at the location where the cross sections of the legform and bumper test area touch. The first contact point may differ from the measuring point as a result of the three-dimensional geometry of the vehicle front (see Figure 6C)."**

3.31. **"Bonnet top test area" is composed of the child headform test area and the adult headform test area as defined in paras. 3.12. and 3.1. respectively."**

Figure 6, shall be deleted

Insert new Figures 6A to 6C, to read:

"Figure 6A

Measuring and target point in the vertical longitudinal plane through the center of the impactor (see paragraphs 3.30.1. and 3.25.)²

Measuring and target point

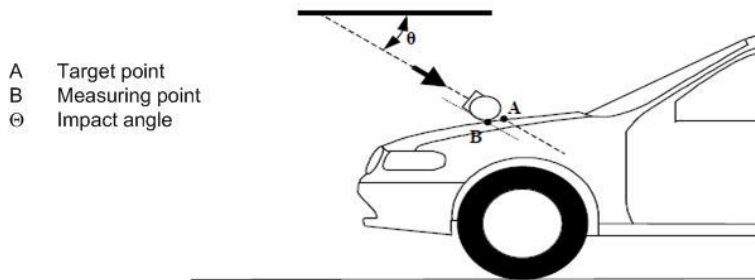
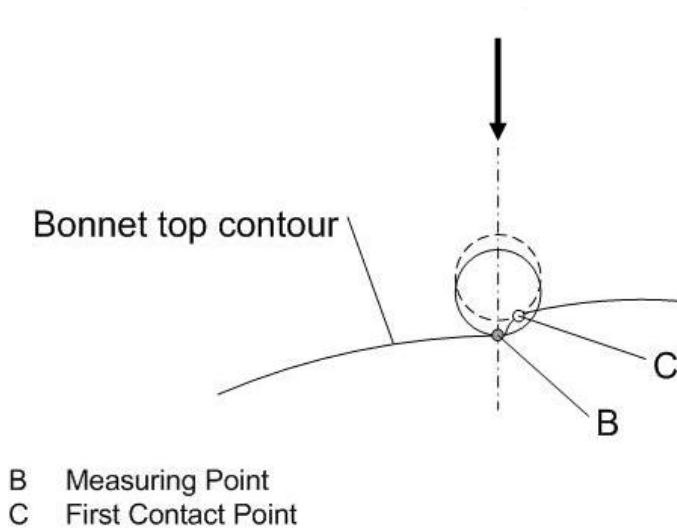


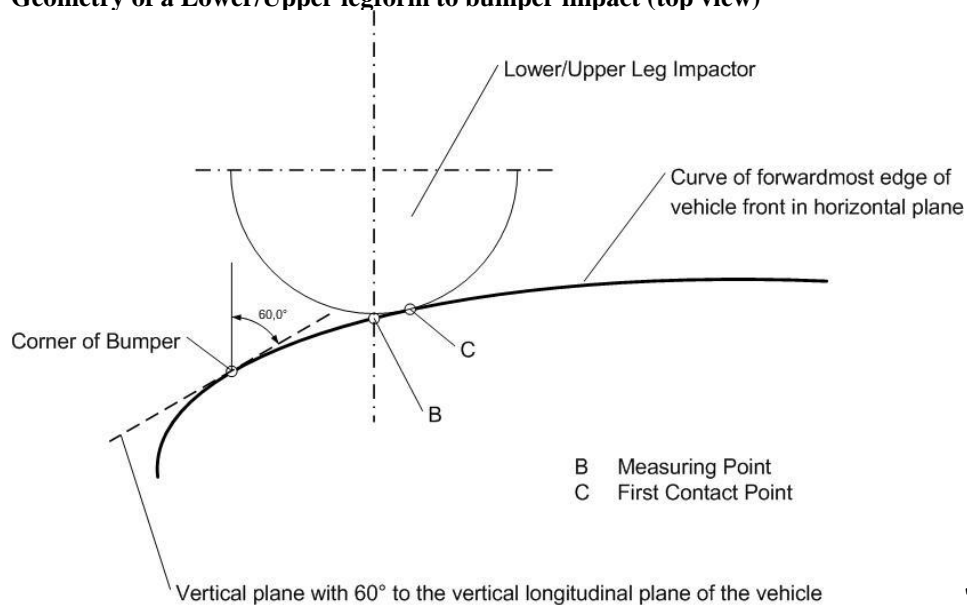
Figure 6B

Measuring and first contact point (see paragraphs 3.30.1. and 3.19.)²
(schematic front view)



² Remark: due to the spatial geometry of the bonnet top, the first contact point C does, in most cases, not lie in the same vertical longitudinal or transverse plane which contains measuring point B.

Figure 6C
Measuring and first contact point (see paragraphs 3.30.2. and 3.19.)
Geometry of a Lower/Upper legform to bumper impact (top view)



Paragraph 4.1., amend to read:

"4.1. *Legform test to bumper*

For vehicles with a lower bumper height **at the test position** of less than 425 mm, the requirements of paragraph 4.1.1. shall be applied.

For vehicles with a lower bumper height **at the test position** which is greater than or equal to 425 mm and less than 500 mm, the requirements of either paragraph 4.1.1. or 4.1.2., at the choice of the manufacturer, shall be applied.

For vehicles with a lower bumper height **at the test position** of greater than, or equal to 500 mm, the requirements of paragraph 4.1.2. shall be applied."

Paragraph 5.2.3., amend to read:

"5.2.3. The HIC recorded shall not exceed 1,000 over a minimum of one half of the child headform test area and 1,000 over two thirds of the **bonnet top test area** ~~combined child and adult headform test areas~~. The HIC for the remaining areas shall not exceed 1,700 for both headforms.

In case there is only a child headform test area, the HIC recorded shall not exceed 1,000 over two thirds of the test area. For the remaining area the HIC shall not exceed 1,700."

Paragraph 5.2.4.1., amend to read:

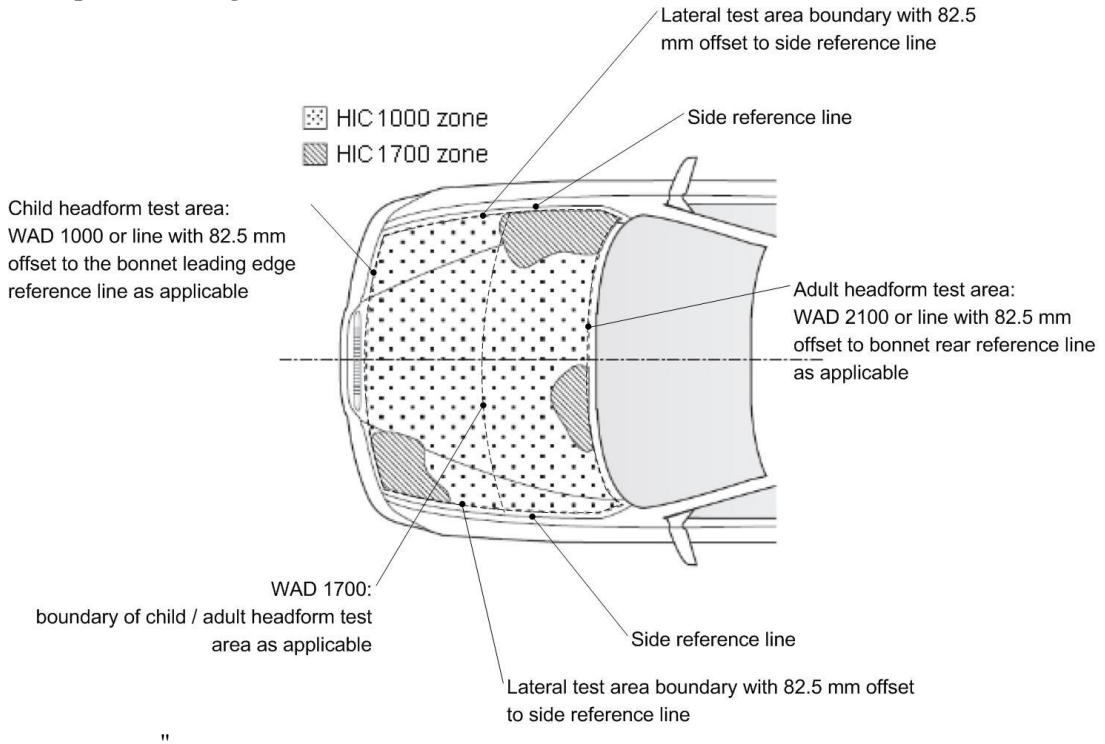
"5.2.4.1. The manufacturer shall identify the zones of the bonnet top **test area** where the HIC must not exceed 1,000 (HIC1000 Zone) or 1,700 (HIC1700 Zone) (see Figure 11)"

Figure 11(former), shall be deleted

Insert new Figure 11, to read:

"Figure 11

Example of marking of HIC1000 zone and HIC1700 zone



Paragraph 5.2.4.3., amend to read:

"5.2.4.3. The areas of "HIC1000 zone" and "HIC1700 zone" may consist of several parts, with the number of these parts not being limited. **The determination of the impacted zone is done by the measuring point, independent of the first contact point of the headform inside or outside of the "HIC 1000 and HIC 1700 zones".**"

Paragraph 5.2.4.4., amend to read:

"5.2.4.4. The calculation of the surface of the **bonnet top test impact** area as well as the surface areas of "HIC1000 zone" and "HIC1700 zone" shall be done on the basis of a projected bonnet when viewed from a horizontal plane parallel to the horizontal zero plane above the vehicle, on the basis of the drawing data supplied by the manufacturer."

Paragraph 6.3.1.1.5., amend to read:

"6.3.1.1.5. The test impactor or at least the foam flesh shall be stored during a period of at least four hours in a controlled storage area with a stabilized humidity of 35 percent \pm 15 percent and a stabilized temperature of 20 \pm 4°C prior to impactor removal for ~~calibration~~ **certification**. After removal from the storage the impactor shall not be subjected to conditions other than those pertaining in the test area."

Paragraph 6.3.1.2.8., amend to read:

"6.3.1.2.8. The test impactor or at least the foam flesh shall be stored during a period of at least four hours in a controlled storage area with a stabilized humidity of 35 percent \pm 15 percent and a stabilized temperature of 20 \pm 4 °C prior to impactor removal for ~~calibration~~ **certification**. After removal from the storage the impactor shall not be subjected to conditions other than those pertaining in the test area."

Paragraph 7.1.1.1., amend to read:

"7.1.1.1. The selected **measuring target** points shall be in the bumper test area."

Paragraph 7.1.1.3.3., amend to read:

"7.1.1.3.3. ~~At the time of first contact the centre line of the impactor shall be within a \pm 10 mm tolerance to the selected impact location.~~ **For lower leg testing, a horizontal and vertical impact tolerance of \pm 10 mm shall apply.**"

Paragraphs 7.1.2.1. and 7.1.2.2., amend to read:

"7.1.2.1. The selected **measuring target** points shall be in the bumper test area as defined in paragraph 3.10."

7.1.2.2. The direction of impact shall be parallel to the longitudinal axis of the vehicle, with the axis of the upper legform vertical at the time of first contact. The tolerance to this direction is \pm 2°.

At the time of first contact the impactor centre line shall be vertically midway between the upper bumper reference line and the lower bumper reference line with a \pm 10 mm tolerance and the impactor vertical centre line shall be positioned laterally ~~with the selected impact location~~ with a tolerance of \pm 10 mm."

Paragraph 7.2.3., amend to read:

"7.2.3. Recording

The acceleration time histories shall be recorded, and HIC shall be calculated. The ~~first~~ **measuring** point of contact on the front structure of the vehicle shall be recorded. Recording of test results shall be in accordance with ISO 6487:2002."

Paragraphs 7.3.2. and 7.3.3., amend to read:

"7.3.2. No **measuring impact** point shall be located so that the impactor will impact the test area with a glancing blow resulting in a more severe second impact outside the test area.

The selected **measuring impact** points on the bonnet for the child headform impactor shall be ~~at the time of first contact:~~ **within the child headform test area as defined in para. 3.12.**

- ~~(a) — A minimum of 82.5 mm inside the defined side reference lines, and;~~
- ~~(b) — Forward of the WAD1700 line or a minimum of 82.5 mm forward of the bonnet rear reference line, whichever is most forward at the point of measurement, and~~
- ~~(c) — Rearward of the WAD1000 line, or a minimum of 82.5 mm rearward of the bonnet leading edge reference line, whichever is most rearward at the point of measurement.~~

~~These minimum distances are to be set with a flexible tape held tautly along the outer surface of the vehicle.~~

- 7.3.3. The **actual point or points** of first contact of the **child** headform impactor **during the test** shall be within [$a \pm 10$ mm] **of (at least one of) the corresponding anticipated point(s) of first contact as determined by moving the child headform along the prescribed trajectory for the impact test, thus with the central axis of the impactor in the same vertical longitudinal plane in which the measuring point is located, until such contact occurs.** ~~tolerance to the selected impact point."~~

Paragraphs 7.4.2. and 7.4.3., amend to read:

- "7.4.2. No **measuring impact** point shall be located so that the impactor will impact the test area with a glancing blow resulting in a more severe second impact outside the test area.

The selected **measuring impact** points on the bonnet for the adult headform impactor shall be ~~at the time of first contact:~~ **within the adult headform test area as defined in para. 3.1.**

- ~~(a) A minimum of 82.5 mm inside the defined side reference lines, and;~~
- ~~(b) Forward of the WAD1700 line or a minimum of 82.5 mm forward of the bonnet rear reference line, whichever is most forward at the point of measurement, and~~
- ~~(c) Rearward of the WAD1000 line, or a minimum of 82.5 mm rearward of the bonnet leading edge reference line, whichever is most rearward at the point of measurement.~~

~~These minimum distances are to be set with a flexible tape held tautly along the outer surface of the vehicle."~~

- 7.4.3. The **actual point or points** of first contact of the **adult** headform impactor **during the test** shall be within [$a \pm 10$ mm] **of (at least one of) the corresponding anticipated point(s) of first contact as determined by moving the adult headform along the prescribed trajectory for the impact test, thus with the central axis of the impactor in the same vertical longitudinal plane in which the measuring point is located, until such contact occurs.** ~~tolerance to the selected impact point."~~

Paragraphs 8.1.2.2 to 8.1.2.2.4., amend to read:

"8.1.2.2. **Calibration Certification**

- 8.1.2.2.1. The foam flesh for the test impactor shall be stored during a period of at least four hours in a controlled storage area with a stabilized humidity of 35 ± 10 per cent and a stabilized temperature of $20 \pm 2^\circ\text{C}$ prior to impactor removal for **calibration certification**. The test impactor itself shall have a temperature of $20^\circ \pm 2^\circ\text{C}$ at the time of impact. The temperature tolerances for the test impactor shall apply at a relative humidity of 40 ± 30 per cent after a soak period of at least four hours prior to their application in a test.
- 8.1.2.2.2. The test facility used for the **calibration certification** test shall have a stabilized humidity of 40 ± 30 per cent and a stabilized temperature of $20 \pm 4^\circ\text{C}$ during **calibration certification**.

- 8.1.2.2.3. Each ~~calibration certification~~ shall be completed within two hours of when the impactor to be ~~calibrated certified~~ is removed from the controlled storage area.
- 8.1.2.2.4. Relative humidity and temperature of the ~~calibration certification~~ area shall be measured at the time of ~~calibration certification~~ and recorded in a ~~calibration certification~~ report."

Paragraphs 8.2.2.to 8.2.2.4., amend to read:

- "8.2.2. **Calibration Certification**
- 8.2.2.1. The foam flesh for the test impactor shall be stored during a period of at least four hours in a controlled storage area with a stabilized humidity of 35 ± 10 per cent and a stabilized temperature of $20^\circ \pm 2^\circ\text{C}$ prior to impactor removal for ~~calibration certification~~. The test impactor itself shall have a temperature of $20^\circ \pm 2^\circ\text{C}$ at the time of impact. The temperature tolerances for the test impactor shall apply at a relative humidity of 40 ± 30 per cent after a soak period of at least four hours prior to their application in a test.
- 8.2.2.2. The test facility used for the ~~calibration certification~~ test shall have a stabilized humidity of 40 ± 30 per cent and a stabilized temperature of $20^\circ \pm 4^\circ\text{C}$ during ~~calibration certification~~.
- 8.2.2.3. Each ~~calibration certification~~ shall be completed within two hours of when the impactor to be ~~calibrated certified~~ is removed from the controlled storage area.
- 8.2.2.4. Relative humidity and temperature of the ~~calibration certification~~ area shall be measured at the time of ~~calibration certification~~, and recorded in a ~~calibration certification~~ report."

II. Justification

1. The expert from the European Commission (EC) had raised concerns about document ECE/TRANS/WP.29/AC.3/31 during the fiftieth session of GRSP, with further discussions during the fifty-first session.
2. The proposal in this document aims to amend ECE/TRANS/WP.29/AC.3/31 and to reflect the outcome of discussions with the experts from EC, Japan, the Netherlands, the Republic of Korea, United States of America and OICA.