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**Economic Commission for Europe****Inland Transport Committee****World Forum for Harmonization of Vehicle Regulations****Working Party on Passive Safety****Fifty-fifth session**

Geneva, 19–23 May 2014

Item 3(b) of the provisional agenda

**Global technical regulation****No. 9 (Pedestrian safety) – Proposal for amendments to Phase 1 and draft Phase 2****Proposal for amendment to Phase 1 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 clarify provisions on the headform tests of UN GTR No. 9. It is based on a document without symbol (GRSP-54-07-Rev.1) distributed during the fifty-fourth session of the Working Party on Passive Safety (GRSP) (see ECE/TRANS/WP.29/GRSP/54, para. 9). The modifications to the current text of UN GTR No. 9 Phase 1 (ECE/TRANS/180/Add.9 and Amend. 1) 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 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, 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."**

*Insert a new paragraph 3.8., to read:*

"3.8. **"Bonnet top test area"** is composed of the child headform test area and the adult headform test area as defined in paragraphs 3.1. and 3.13. respectively."

*Paragraphs 3.8. and 3.9. (former), renumber as paragraphs 3.9. and 3.10.*

*Paragraph 3.10. (former), renumber as paragraph 3.11. and amend to read:*

"3.11. **"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 3.11. (former), renumber as paragraph 3.12.*

*Paragraph 3.12. (former), renumber as paragraph 3.13. and amend to read:*

"3.13. **"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."

Paragraphs 3.13. to 3.18. (former), renumber as paragraphs 3.14. to 3.19.

Paragraph 3.19. (former), shall be deleted

Insert new paragraphs 3.20. to 3.20.2., to read:

**"3.20. "Measuring point"**

The measuring point is may also be referred to as "test point" or "impact point". In all cases, the result of the test shall be attributed to this point, independent of where the first contact occurs.

**3.20.1. "Measuring point" for the headform test means a point on the vehicle's outer surface selected for assessment. The measuring point is where the headform's profile contacts the vehicle's outer surface cross section in a vertical longitudinal plane through the center of gravity of the headform (see Figure 6A).**

**3.20.2. "Measuring point" for the lower legform to bumper test and the upper legform to bumper test is located in the vertical longitudinal plane through the central axis of the impactor (see Figure 6B)."**

Paragraphs 3.20. to 3.24. (former), renumber as paragraphs 3.21. to 3.25.

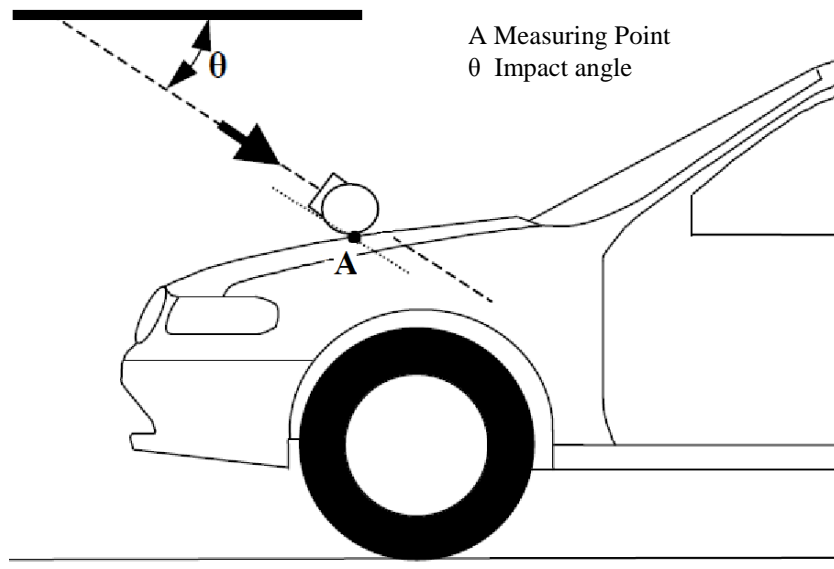
Paragraph 3.25. (former), shall be deleted.

Figure 6, shall be deleted

Insert new Figures 6A and 6B, to read:

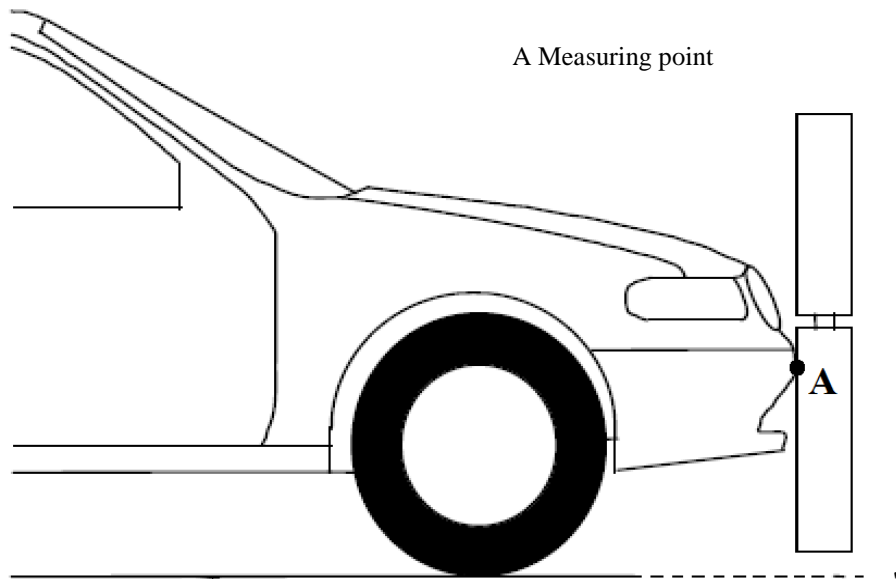
"Figure 6A

**Measuring point in the vertical longitudinal plane through the centre of the headform impactor (see paragraph 3.20.1.)<sup>2</sup>**



<sup>2</sup> Note: due to the spatial geometry of the bonnet top, the first contact may not occur in the same vertical longitudinal or transverse plane which contains measuring point A.

Figure 6B  
**Measuring point in the vertical longitudinal plane through the central axis of the legform impactor (see paragraph 3.20.2.)**



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:

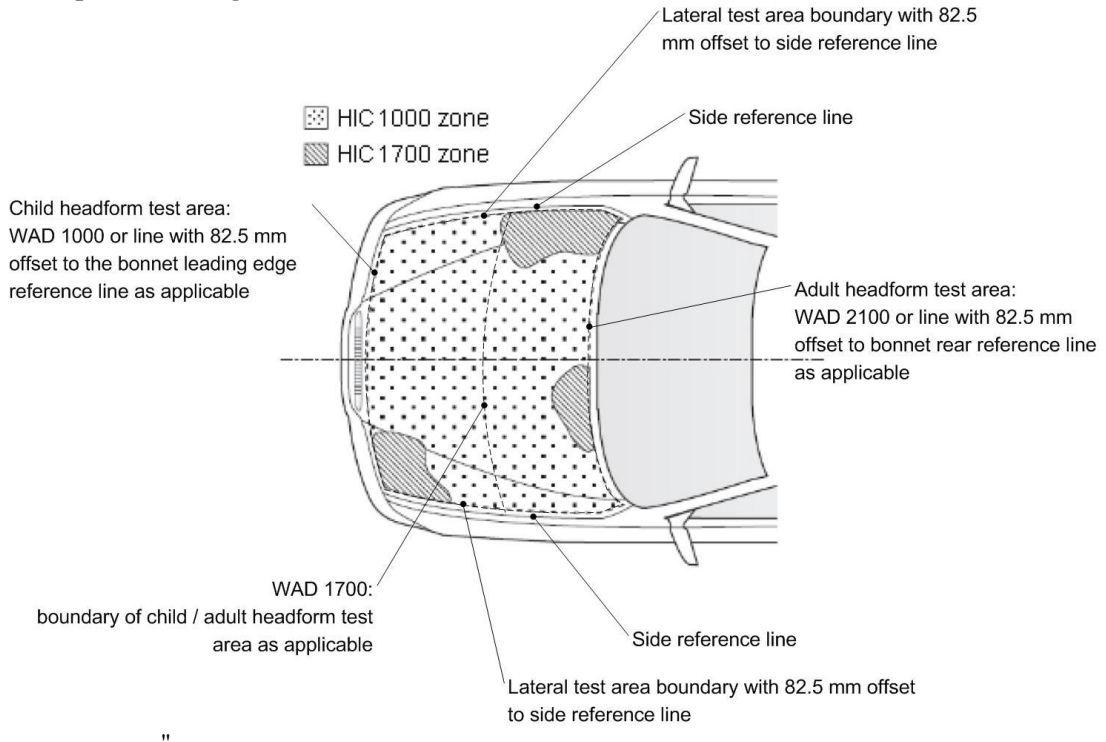
"5.2.4.1. The manufacturer shall identify the zones of the bonnet top **test area** where the HIC must not exceed 1,000 (HIC1000 Zone) or 1,700 (HIC1700 Zone) (see Figure 11)."

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.**"

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 **as defined in paragraph 3.11.**"

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 the lower legform 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 3.11."

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  $\pm 2^\circ$ .

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 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 paragraph 3.13.**

(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 point of first contact of the headform impactor shall be within a  $\pm 10$  mm tolerance to the selected impact point. For the child headform testing, a longitudinal and transversal impact tolerance of  $\pm 10$  mm shall apply. This tolerance is measured along the surface of the bonnet.~~"

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 paragraph 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 point of first contact of the headform impactor shall be within a  $\pm 10$  mm tolerance to the selected impact point. For the adult headform testing, a longitudinal and transversal impact tolerance of  $\pm 10$  mm shall apply. This tolerance is measured along the surface of the bonnet.~~"

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  $35 \pm 10$  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  $40 \pm 30$  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  $40 \pm 30$  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  $35 \pm 10$  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  $40 \pm 30$  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  $40 \pm 30$  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. Experts from GRSP have raised concerns about document ECE/TRANS/WP.29/AC.3/31 during the past three sessions of GRSP.
  2. This proposal 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.
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