

PROPOSAL FOR DRAFT AMENDMENT TO REGULATION No. 17
VEHICLE SEATS, THEIR ANCHORAGES AND ANY HEAD RESTRAINTS

A. PROPOSAL

Section 2., is replaced by the following:

"2. DEFINITIONS

For the purposes of this Regulation

- 2.1. "Actual torso angle" means the angle measured between a vertical line through the H-point and the torso line using the back angle quadrant on the H-point machine. The actual torso angle corresponds theoretically to the design torso angle.
- 2.2. "Adjustable head restraint" means a head restraint that is capable of movement independent of the seatback between at least two positions of adjustment intended for occupant use.
- 2.3. "Adjustment system" means the device by which the seat or its parts can be adjusted to a position suited to the morphology of the seated occupant. This device may, in particular, permit:
 - 2.3.1. longitudinal displacement;
 - 2.3.2. vertical displacement;
 - 2.3.3. angular displacement;
- 2.4. "Anchorage" means the system by which the seat assembly is secured to the vehicle structure, including the affected parts of the vehicle structure.
- 2.5. "Approval of a vehicle" means the approval of a vehicle type with regard to the strength of the seats and their anchorages, the design of the rear parts of the seatbacks and the characteristics of their head restraints.
- 2.6. "Backlight" means rearward-facing window glazing located at the rear of the roof panel.
- 2.7. "Backset" means the minimum horizontal distance between the front surface of the head restraint and the rear surface of the head restraint measurement device.
- 2.8. "Backset reference point" means the reference point from which the measurement of backset is made.
- 2.9. "Bench seat" means a structure complete with trim, intended to seat more than one

adult person.

- 2.10. "Centre plane of occupant" (C/LO) means the median plane of the H-point machine positioned in each designated seating position; it is represented by the co-ordinate of the H-point on the Y-axis. For individual seats, the centre plane of the seat coincides with the centre plane of the occupant. For other seats, the centre plane of the occupant is specified by the manufacturer.
- 2.11. "Design torso angle" means the angle measured between a vertical line through the R-point and the torso line in a position which corresponds to the design position of the seat-back established by the vehicle manufacturer.
- 2.12. "Detachable head restraint" means a head restraint consisting of a component separable from the seat, designed for insertion and positive retention in the seat-back structure.
- 2.13. "Displacement system" means a device by which the seat or one of its parts can be displaced and/or rotated, without a fixed intermediate position, to permit easy access of occupants to the space behind the seat concerned.
- 2.14. "Fiducial marks" are physical points (holes, surfaces, marks or indentations) on the vehicle body as defined by the manufacturer.
- 2.15. "Folding seat" means an auxiliary seat intended for occasional use and normally folded.
- 2.16. "Front contact surface" of a head restraint means the front surface area of the head restraint which is intended to catch the head of the seated occupant in order to limit rearward displacement of the head relative to the torso during a rear impact to the vehicle.
- 2.17. "H-point" means the pivot centre of the torso and thigh of the H-point machine when installed in the vehicle. The H-point is located in the centre of the centreline of the device which is between the H-point sight buttons on either side of the H-point machine. Once determined the H-point is considered fixed in relation to the seat-cushion structure and to move with it when the seat is adjusted.
- 2.18. "Head Restraint" means, at any designated seating position, a device that limits rearward displacement of a seated occupant's head relative to the occupant's torso that has a height equal to or greater than 700 mm at any point between two vertical longitudinal planes passing at 85 mm on either side of the torso reference line, in any position of height adjustment and backset.
- 2.19. "Head Restraint Height" means the distance from the R-point, measured parallel to the torso reference line to the top of the head restraint on a plane normal to the torso reference line.
- 2.20. "Head Restraint Measurement Device" (HRMD) means a separate head shaped device used with the H-point machine, fitted with a sliding scale at the back of the headform for the purpose of measuring backset.

- 2.21. "Integrated Head Restraint" means a head restraint formed by the upper part of the seat-back. Head restraints meeting the definitions of paragraphs 2.12. or 2.30. but which can only be detached from the seat or the vehicle structure by the use of tools or by partial or complete removal of the seat covering, meet the present definition.
- 2.22. "Intended for occupant use" means, when used in reference to the adjustment of a seat and head restraint, adjustment positions used by seated occupants while the vehicle is in motion, and not those intended solely for the purpose of allowing ease of ingress and egress of occupants; access to cargo storage areas; and storage of cargo in the vehicle.
- 2.23. "Locking system" means a device ensuring that the seat and its parts are maintained in the position of use.
- 2.24. "Longitudinal plane" means a plane parallel to the median longitudinal plane of the vehicle.
- 2.25. "Partitioning system" means parts or devices which, in addition to the seat-backs, are intended to protect the occupants from displaced luggage; in particular, a partitioning system may be constituted by netting or wire mesh located above the level of the seat-backs in their upright or folded down position. Head restraints fitted as standard equipment for vehicles equipped with such parts or devices shall be considered as part of the partitioning system. However, a seat equipped with a head restraint shall not be considered as being on its own a partitioning system.
- 2.26. "R-point" or Seating Reference Point means a design point defined by the vehicle manufacturer for each designated seating position and established with respect to the three-dimensional reference system.

The R-point:

- 2.26.1. Establishes the rearmost normal design driving or riding position of each designated seating position in a vehicle;
- 2.26.2. Has coordinates established relative to the designed vehicle structure;
- 2.26.3. Simulates the position of the centre pivot of the human torso and thigh;
- 2.27. "Reference data" means one or several of the following characteristics of a seating position:
- 2.27.1. the H-point and the R-point and their relationship,
- 2.27.2. the actual torso angle and the design torso angle and their relationship.
- 2.28. "Reference line" means the line 'r' on the manikin reproduced in Annex 7, Figure 7-1 to this Regulation.
- 2.29. "Seat" means a structure which may or may not be integral with the vehicle structure complete with trim, intended to seat one adult person. The term covers both an individual seat or part of a bench seat intended to seat one person;

- 2.30. "Separate Head Restraint" means a head restraint consisting of a component separate from the seat, designed for insertion and/or positive retention in the structure of the vehicle;
- 2.31. "Three-dimensional H-point machine" (H-point machine) means the device used for the determination of "H-points" and actual torso angles.
- 2.32. "Three-dimensional reference system" means a system as described in Annex 13, Appendix 2;
- 2.33. "Top of the Head Restraint" means the point on the head restraint centreline with the greatest height.
- 2.34. "Torso-line" means the centreline of the head-room probe of the H-point machine with the probe in the fully rearward position;
- 2.35. "Transverse plane" means a vertical plane perpendicular to the median longitudinal plane of the vehicle;
- 2.36. "Vehicle measuring attitude" means the position of the vehicle as defined by the coordinates of fiducial marks in the three-dimensional reference system.
- 2.37. "Vehicle type" means a category of motor vehicles which do not differ in such essential respects as:
- 2.37.1. the structure, shape, dimensions, materials and the mass of the seats, although the seats may differ in covering and colour; differences not exceeding 5 per cent in the mass of the approved seat type shall not be considered significant;
- 2.37.2. the type and dimensions of the adjustment, displacement and locking systems of the seat-back and seats and their parts;
- 2.37.3. the type and dimensions of the seat anchorages;
- 2.37.4. the dimensions, frame, materials and padding of head restraints, although they may differ in colour and covering;
- 2.37.5. the type and dimensions of the attachments of the head restraint and the characteristics of the part of the vehicle to which the head restraint is attached, in the case of a separate head restraint;"

Paragraph 4.2:

(Series number to be checked by the secretariat.)

Paragraph 4.3 is amended to read as:

".....conforming to the model in Annex 11 to this Regulation."

Paragraph 4.4.1. footnote is amended to include:

"....., 49 for Cyprus, 50 for Malta, 51 for the Republic of Korea, 52 for Malaysia, 53 for Thailand, 54 and 55 (vacant) and 56 for Montenegro. ..."

Paragraph 4.4.3 is amended to read as:

".....conforming to the model in Annex 11 to this Regulation"

Paragraph 4.8. is amended to read as:

".....are given in Annex 12 to"

Paragraph 5.1.2. is amended to read as:

".....referred to in paragraph 2.23 shall be"

Paragraph 5.1.3. is amended to read as:

".....the requirements of Annex 14 to"

Paragraph 5.1.3.1. is amended to read as:

".....procedure specified in Annex 14 the"

Paragraphs 5.1.4.1. to 5.1.4.1.4. are renumbered as follows:

"5.1.4.1. This requirement does not apply to:

- (a) the parts of the different areas exhibiting a projection of less than 3.2 mm from the surrounding surface, which shall exhibit blunted edges, provided that the height of the projection is not more than half its width;
- (b) rearmost seats and back-to-back seats;
- (c) Rear parts of seats situated below a horizontal plane passing through the lowest R-point in each row of seats. (Where rows of seats have different heights, starting from the rear, the plane shall be turned up or down forming a vertical step passing through the R-point of the row of seats immediately in front);
- (d) parts such as "flexible wire mesh"."

Paragraph 5.1.4.2. is amended to read as:

".....prescribed in Annex 14 to"

Paragraph 5.1.4.3. is amended to read as:

".....the requirements of Annex 14, shall"

Paragraph 5.1.6. is amended to read as:

".....and in Annex 16, paragraph 2.1."

Paragraph 5.1.7, 3rd paragraph is amended to read as:

".....after testing in accordance with Annex 7, paragraph 4, no breakage....."

Paragraph 5.3.2. is amended to read as:

"..... of category M₂ and of category N₁."

Paragraph 5.4.2.1. is amended to read as:

"..... to be met if, in the tests carried out by the procedure specified in Annex 5, the deceleration"

Sections 5.5. through 5.10. are replaced by the following new Sections:

"5.5 Performance Requirements

5.5.1. Each front outboard head restraint shall conform to paragraphs 5.5.2.1. and 5.5.3. through 5.5.7. of this regulation;

Each front centre head restraint shall conform to paragraphs 5.5.2.2. and 5.5.3. through 5.5.6. of this regulation;

Each rear outboard head restraint shall conform to paragraphs 5.5.2.4. and 5.5.3. through 5.5.6. of this regulation;

Each rear centre head restraint shall conform to paragraphs 5.5.2.6. and 5.5.3. through 5.5.6. of this regulation:

5.5.2. Minimum Height:

The minimum height requirements shall be demonstrated in accordance with the provisions of Annex 1.

5.5.2.1. Front outboard designated seating positions.

The top of a head restraint located in a front outboard designated seating position shall have a height of:

(a) not less than 800 mm in at least one position of head restraint adjustment; and

(b) not less than 750 mm in any position of head restraint adjustment.

except as provided for in paragraph 5.5.2.3 of this regulation.

5.5.2.2. Front centre designated seating positions equipped with head restraints.

The top of a head restraint located in the front centre designated seating position

shall have a height not less than 750 mm in any position of adjustment, except as provided for in paragraph 5.5.2.3 of this regulation.

5.5.2.3. Exception.

The requirements of paragraphs 5.5.2.1. and 5.5.2.2 of this regulation do not apply if the interior surface of the vehicle roofline, including the headliner, physically prevents a head restraint, located in the front outboard designated seating position, from attaining the required height. In those instances in which this head restraint cannot attain the required height, when measured in accordance with Annex 1, the vertical distance between the top of the head restraint and the interior surface of the roofline, including the headliner, shall not exceed 25 mm in the lowest position of seat adjustment, or 50mm in the case of convertible vehicles; in any horizontal position of seat adjustment; and the highest position of head restraint adjustment intended for occupant use.

Notwithstanding this exception, when measured in accordance with Annex 1, the top of a head restraint located in a front outboard designated seating position shall have a height of not less than 750 mm in the lowest position of adjustment intended for occupant use.

5.5.2.4. Rear outboard designated seating positions equipped with head restraints.

Except as provided in paragraph 5.5.2.5. of this regulation, when measured in accordance with Annex 1, the top of a head restraint located in a rear outboard designated seating position shall have a height not less than 750 mm in any position of adjustment.

5.5.2.5. Exception.

The requirements of paragraph 5.5.2.4 of this regulation do not apply if the interior surface of the vehicle roofline, including the headliner, or backlight physically prevent a head restraint, located in the rear outboard designated seating position, from attaining the required height. In those instances in which this head restraint cannot attain the required height, when measured in accordance with Annex 1, the maximum vertical distance between the top of the head restraint and interior surface of the roofline, including the headliner, or the backlight shall not exceed 25 mm in the lowest position of seat adjustment, or 50mm in the case of convertible vehicles; in any horizontal position of seat adjustment; and the highest position of head restraint adjustment intended for occupant use.

5.5.2.6. When measured in accordance with Annex 1, the top of any head restraint designed to be provided in rear centre seats or seating positions shall be not less than 700 mm.

5.5.3. Minimum width.

When measured in accordance with Annex 2, the lateral width of a head restraint shall be not less than 170 mm between two vertical longitudinal planes passing at 85 mm on either side of the vertical median plane of the seat for which the head restraint is intended.

5.5.4. Gaps within head restraint.

If a head restraint has any gap greater than 60 mm, when measured in accordance with paragraph 6.7, the maximum rearward displacement shall comply with the requirements of paragraph 5.10 when the head restraint is tested at that gap in accordance with paragraph 6.4.3.

In the case of head restraints integral with the seat-back, the area to be considered is:

- above a plane perpendicular to the torso reference line at 540 mm from the R-point.
- between two vertical longitudinal planes passing at 85 mm on either side of the reference line.

5.5.5. Gaps between head restraint and the top of the seat back.

When measured in accordance with Annex 4, there shall not be a gap greater than 60 mm between the bottom of the head restraint and the top of the seat back if the head restraint is not adjustable vertically between in-use positions.

When measured in accordance with Annex 4, there shall not be a gap greater than 25 mm between the bottom of a vertically adjustable head restraint and the top of the seat back, with the head restraint adjusted to its lowest height position.

5.5.6. Minimum backset for front outboard designated seating positions.

5.5.6.1. Active or reactive head restraints which, in the case of a rear impact (actually occurring or about to occur) deploy in such a way that the risk of injury caused by rearward displacement of the head is reduced to a minimum, are not required to comply with the requirements of this paragraph.

5.5.6.2. For adjustable head restraints, the requirements of this regulation shall be met with the top of the head restraint in all height positions of adjustment between 750 mm and 800 mm, inclusive. If the top of the head restraint, in its lowest position of adjustment, is above 800 mm, the requirements of this regulation shall be met at that position only.

5.5.6.3. At the choice of the manufacturer, the backset shall be measured using either the H-point or the R-point as the backset reference point.

5.5.6.4. The backset, when measured as specified in Annex 3, shall not be more than 45 mm, when using the R-point as the backset reference point, or 55mm when using the H-point as the backset reference point.

5.5.6.5. If the front outboard head restraint is not attached to the seat back, the head restraint cannot be adjusted such that the backset is more than required in paragraph 5.5.6.4 when the seat back inclination is positioned closer to vertical than the position specified in Annex 3.

5.5.7. When measured in accordance with Annex 1 the height of the front contact surface

of a head restraint shall be not less than 100 mm.

5.6. In the case of a seat capable of being fitted with a head restraint, the provisions of paragraphs 5.1.3. and 5.4.2. above shall be verified.

5.7. Static performance requirements.

Each head restraint shall conform with the following static requirements.

5.7.1. Energy absorption.

When the front surface of the head restraint is impacted in accordance with Annex 5, the deceleration of the headform shall not exceed 785 m/s^2 (80 g) continuously for more than 3 milliseconds.

5.7.2. Displacement and Backset Retention.

If a front outboard head restraint has a fixed backset then the head restraint shall conform to paragraph 5.7.2.1.

If a front outboard head restraint has an adjustable backset the head restraint shall conform to paragraph 5.7.2.2.

5.7.2.1. Displacement.

When the head restraint is tested in accordance with Annex 7, the headform shall not be displaced more than 102 mm perpendicularly and rearward of the displaced extended torso reference line, 'r₁', during the application of a $373 \pm 7.5 \text{ Nm}$ moment about the R-point.

5.7.2.2. Displacement and Backset Retention.

When the head restraint is tested in any position of backset adjustment in accordance with Annex 7, the headform shall:

- (a) Not be displaced more than 25 mm during the application of the initial reference moment of $37 \pm 0.7 \text{ Nm}$;
- (b) Not be displaced more than 102 mm perpendicularly and rearward of the displaced extended torso reference line, 'r₁', during the application of a $373 \pm 7.5 \text{ Nm}$ moment about the R-point; and
- (c) Return to within 13 mm of its initial reference position after the following sequence occurs: application of a $373 \pm 7.5 \text{ Nm}$ moment about the R-point; reduction of the moment to 0 Nm; and by re-application of the initial reference load $37 \pm 0.7 \text{ Nm}$.

5.7.3. Head restraint strength.

When the head restraint is tested in accordance with Annex 7, the load applied to the head restraint shall reach $890 \text{ N} \pm 5 \text{ N}$ and remain at this load for a minimum period of 5 seconds unless any breakage of the seat or head restraint occurs.

5.7.4. Adjustable head restraint height retention.

When tested in accordance with Annex 6, the mechanism of the adjustable head restraint shall not fail in such a way as to allow downward movement of the head restraint by more than 25 mm.

5.8. Non-use positions.

5.8.1. A driver head restraint shall not have a non-use position.

5.8.2. A front outboard passenger head restraint may be adjusted to a position at which its height does not comply with the requirements of paragraph 5.5.2.1. of this regulation. However, in any such position, the front outboard passenger head restraint shall meet paragraph 5.8.4.1 of this regulation.

5.8.3. All rear head restraints and any front centre head restraint may be adjusted to a position at which its height does not comply with the requirements of paragraphs 5.5.2.2., 5.5.2.4. or 5.5.2.6. of this regulation. However, in any such position, the head restraint shall also meet one additional requirement from a set of several alternative test requirements.

The set of alternative test requirements may be, at the choice of the manufacturer, either paragraph 5.8.4.1 or paragraph 5.8.4.2 or paragraph 5.8.4.3 or paragraph 5.8.4.4. or paragraph 5.8.4.5 of this regulation.

5.8.4. Alternative Requirements for head restraints capable of a non-use position.

All of the items described in paragraphs 5.8.4.1 through 5.8.4.5 are permitted as additional features.

5.8.4.1. In all designated seating positions equipped with head restraints, except the driver's designated seating position, the head restraint shall automatically return from a non-use position to a position in which its minimum height is not less than that specified in paragraph 5.5.2. of this regulation when a 5th percentile female Hybrid III test dummy is positioned in the seat in accordance with Annex 9. At the option of the manufacturer, instead of using a 5th percentile female Hybrid-III test dummy, human surrogates may be used as specified in Annex 9.

5.8.4.2. In all rear and front centre designated seating positions equipped with head restraints, the head restraint shall, when tested in accordance with Annex 9, be capable of manually rotating either forward or rearward by not less than 60 degrees from any position of adjustment intended for occupant use in which its minimum height is not less than that specified in paragraph 5.5.2. of this regulation.

- 5.8.4.3. When measured in accordance with Annex 9, the height of the lower edge of the head restraint (H_{LE}) shall be not more than 400 mm, but not less than 250 mm from the R-Point and the thickness (S) shall not be less than 40 mm.
- 5.8.4.4. When tested in accordance with Annex 9, the head restraint shall cause the torso reference line angle to be at least 10 degrees closer to vertical than when the head restraint is in any position of adjustment in which its height is not less than that specified in paragraph 5.5.2. of this regulation and its backset is not more than that specified in paragraph 5.5.6.4. of this regulation.
- 5.8.4.5. The head restraint shall be marked with a label in the form of a pictogram which may include explanatory text. The label shall either provide an indication when the head restraint is in a non-use position or provide information to enable an occupant to determine whether the head restraint is in a non-use position. The label shall be durably affixed and located such that it is clearly visible by an occupant when entering the vehicle to the designated seating position. Examples of possible designs are shown in Figure 1.

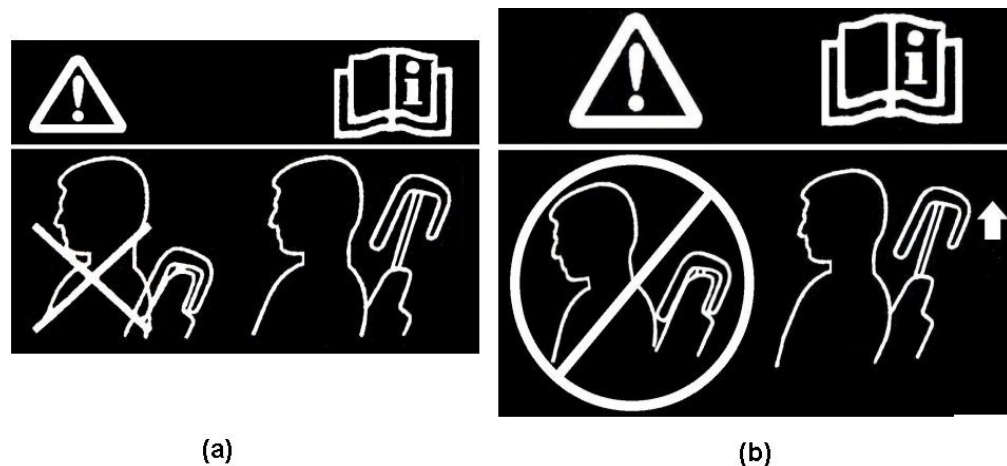


Figure 1

5.9. Dynamic performance requirements

[Reserved for future use when dummy and criteria are agreed]"

Sections 5.11 through 5.15 are renumbered as 5.10 through 5.14 respectively:

Paragraph 5.11 is amended to read as follows:

".....the load specified in Annex 7, paragraph 4."

Paragraph 5.12 is amended to read as follows:

".....raise it beyond the maximum operational height, or remove it, except....."

Paragraph 5.13 is amended to read as follows:

".....in accordance with Annex 7, paragraph 4,in paragraph 6.2. below

without breakage."

Paragraph 5.14.1 is amended to read as follows:

1st paragraph: ".....the test described in Annex 16, the seat-backs"

4th paragraph: "During the test described in Annex 16, the test blocks"

Paragraph 5.14.2 is amended to read as follows:

1st paragraph: ".....test described in Annex 16 may be"

2nd paragraph: "..... according to paragraph 2.2. of Annex 16."

4th paragraph: "..... one defined in paragraph 5.14.1. All measurements"

Paragraph 5.14.3 is amended to read as follows:

".....mentioned in paragraphs 5.14.1. and 5.14.2..... described in paragraphs 5.14.1. and 5.14.2."

Paragraph 6.1.1 is amended to read as follows:

".....the torso reference line, 'r', of the manikin described in Annex 7, unless"

Paragraph 6.2.1 is amended to read as follows:

".....manikin shown in Annex 13, Appendix 1, to this Regulation."

Paragraph 6.3.1 is amended to read as follows:

".....the requirements of Annex 15, paragraph 1..... pulse described in Annex 16, Appendix 1,"

Paragraph 6.3.5 is amended to read as follows:

".....laid down in paragraph 2. of Annex 15 to"

Paragraph 6.4.3. is amended to read as follows:

"6.4.3. Test for determining rearward displacement for head restraint

The procedures for testing rearward displacement and strength are as specified in Annex 7."

Paragraphs 6.4.3.1 to 6.4.3.6. inclusive are deleted:

New paragraph 6.4.4. is inserted to read as follows:

"Demonstrate compliance with paragraphs 5.5. through 5.8. of this regulation with any adjustable lumbar support adjusted to its most rearward nominal design position.

If the seat cushion adjusts independently of the seat back, position the seat cushion such that the lowest H-point position is achieved with respect to the seat back. These conditions, however, may be superseded by the detailed test procedures described in the Annexes."

Paragraph 6.5.1 is amended to read as follows:

"6.5.1. The height of any restraint is determined in accordance with Annex 1."

Paragraphs 6.5.2 to 6.5.4. are deleted.

Paragraph 6.6 is amended to read as follows:

"The width of the head restraint is determined in accordance with Annex 2."

Paragraphs 6.6.1 to 6.6.3. are deleted.

Paragraph 6.7. is amended to read as follows:

"6.7. Determination of distance "a" of head restraint gaps

See Annex 4 to this Regulation for the method to be followed.

Paragraphs 6.7.1. to 6.7.3. inclusive are deleted:

Paragraph 6.8.1.3.1. is amended to read as follows:

"..... defined in paragraph 5.1.4.1.(c) above,"

Paragraph 6. 9. is amended to read as follows:

".....and Annex 14 is used,"

Paragraph 7.1. is amended to read as follows:

".....as defined in paragraphs 2.12. and 2.30 above,"

Paragraph 8.2. is amended to read as follows:

".....to the model in Annex 11 to this Regulation."

Paragraph 9.3. is amended to read as follows:

".....to the model in Annex 11 to this Regulation."

Paragraph 10.1. is amended to read as follows:

".....the model in Annex 11 to this Regulation."

Section 13 is replaced by the following (secretariat to check series numbers):

"13. TRANSITIONAL PROVISIONS

- 13.1 As from the official date of entry into force of the [07] series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approvals under this Regulation as amended by the [07] series of amendments.
- 13.2 As from [1 October 2010], Contracting Parties applying this Regulation shall grant ECE approvals only if the requirements of this Regulation, as amended by the [07] series of amendments, are satisfied.
- 13.3 As from [1 October 2012], Contracting Parties applying this Regulation may refuse to recognize approvals which were not granted in accordance with the [07] series of amendments to this Regulation.
- 13.4 As from the official date of entry into force of the [08] series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approvals under this Regulation as amended by the [08] series of amendments.
- 13.5 As from [24] months after the date of entry into force of the [08] series of amendments, Contracting Parties applying this Regulation shall grant ECE approval only if the vehicle type to be approved complies with the requirements of this Regulation as amended by the [08] series of amendments.
- 13.6 As from [48] months after the date of entry into force of the [08] series of amendments, existing approvals to this Regulation shall cease to be valid, except in the case of vehicle types which comply with the requirements of this Regulation as amended by the [08] series of amendments."

New Annexes 1 through 10 are inserted to read as follows:

"Annex 1

MINIMUM HEIGHT MEASUREMENT TEST PROCEDURE

1. Purpose

The purpose of this test procedure is to demonstrate compliance with the minimum height requirements described in paragraph 5.5.2. of this regulation.

2. Procedure for height measurement.

Compliance with the requirements of paragraph 5.5.2. of this regulation shall be demonstrated by using the height measurement apparatus defined in paragraph 2.2. below.

The seat shall be adjusted such that its H-point coincides with the R-point; if the seat back is adjustable, it is set at the design seat back angle; both these adjustments shall be in accordance with the requirements of paragraph 2.1. below. The height of the head restraint shall be the distance between point A and the intersection of lines AE and FG.

2.1 Relationship between the H-point and the R-point

When the seat is positioned in accordance to the manufacturer's specifications, the H-point, as defined by its co-ordinates, shall lie within a square of 50 mm side length with horizontal and vertical sides whose diagonals intersect at the R-point, and the actual torso angle shall be within 5 degree of the design torso angle.

2.1.1. If these conditions are met, the R-point and the design torso angle shall be used to determine the height of the head restraints in accordance with this Annex.

2.1.2. If the H-point or the actual torso angle does not satisfy the requirements of paragraph 2.1., the H-point and the actual torso angle shall be determined twice more (three times in all). If the results of two of these three operations satisfy the requirements, the conditions of paragraph 2.1.1. shall apply.

2.1.3. If the results of at least two of the three operations described in paragraph 2.1.2. do not satisfy the requirements of paragraph 2.1., the centroid of the three measured points or the average of the three measured angles shall be used and be regarded as applicable in all cases where the R-point or the design torso angle is referred to in this annex.

2.2. Height measuring apparatus

The height measurement apparatus consists of (see Figure 1-1):

2.2.1. A straight edge AE. The lower point A is placed at the R point location in accordance with paragraph 2.1 of this Annex. The line AE shall be parallel to the design torso angle.

2.2.2. A straight edge FG, perpendicular to the line AE and in contact with the top of the head restraint. The height of the head restraint shall be the distance between point A and the intersection of the lines AE and FG.

2.3. Height measurement for front outboard head restraints

2.3.1. If adjustable, adjust the top of the head restraint to the highest position and measure the height.

If adjustable, adjust the top of the head restraint to the lowest position intended for normal use, other than any non-use position described in paragraph 5.8 of this regulation, and measure the height.

2.3.2. For front outboard head restraints that are prevented by the interior surface of the vehicle roofline from meeting the required height as specified in paragraph 5.5.2.2. of this regulation, the requirements of paragraph 5.5.2.3. of this regulation shall be assessed by the following procedure:

2.3.2.1. Adjust the head restraint to its maximum height and measure the clearance between the top of the head restraint and the interior surface of the roofline or the rear backlight, by attempting to pass a 25 mm sphere between them. In the case of convertibles, the diameter of the sphere shall be 50 mm.

2.3.2.2. Adjust the top of the head restraint to the lowest position of adjustment intended for normal use, other than any non-use position described in paragraph 5.8 of this regulation, and measure the height.

2.4. Height measurement for front centre and rear outboard head restraints

2.4.1. If adjustable, adjust the top of the head restraint to the lowest position of adjustment intended for normal use, other than any non-use position described in paragraph 5.8 of this regulation and measure the height.

2.4.2. For head restraints that are prevented by the interior surface of the vehicle roofline or rear backlight from meeting the required height as specified in paragraphs 5.5.2.2. or 5.5.2.4. of this regulation, the requirements of paragraphs 5.5.2.3 and 5.5.2.5 shall be assessed by the following procedure:

2.4.2.1. If adjustable, adjust the head restraint to its maximum height and measure the clearance between the top of the head restraint or the seat back at all seat back angles for intended use and the interior surface of the roofline or the rear backlight, by attempting to pass a 25 mm sphere between them. In the case of convertibles, the diameter of the sphere shall be 50 mm.

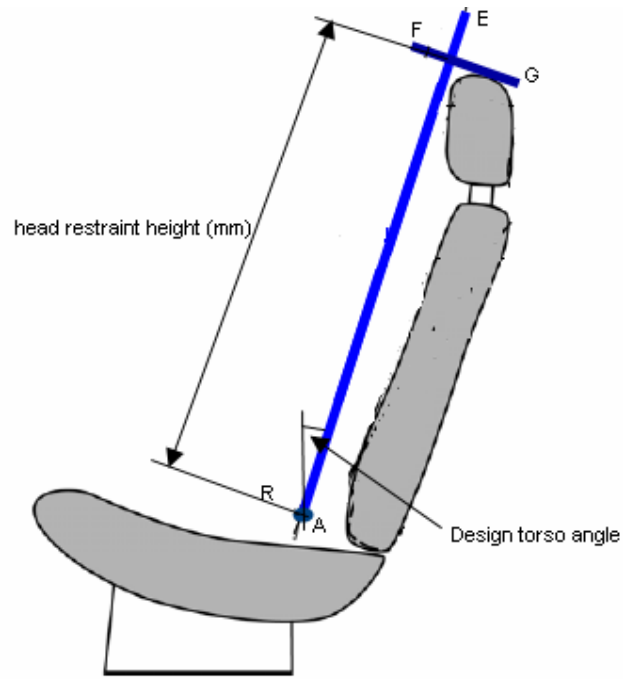


Figure 1-1

Annex 2

MINIMUM WIDTH MEASUREMENT TEST PROCEDURE

1. Purpose

The purpose of this test procedure is to demonstrate compliance with the minimum width requirements described in paragraph 5.5.4. of this regulation.

2. Procedure for width measurement

2.1. The seat shall be adjusted such that its H-point coincides with the R-point; if the seat back is adjustable, it is set at the design seat back angle; both these adjustments shall be in accordance with the requirements of paragraph 2.1. of Annex 1.

2.2. The plane S1 is a plane perpendicular to the reference line and situated 65 ± 3 mm below the top of the head restraint.

2.3. Planes P and P' are vertical longitudinal planes, tangent to each side of the head restraint to be measured.

2.4. The width of the head restraint to be taken into consideration is the distance L, measured in the plane S1 between the vertical longitudinal planes P and P'.

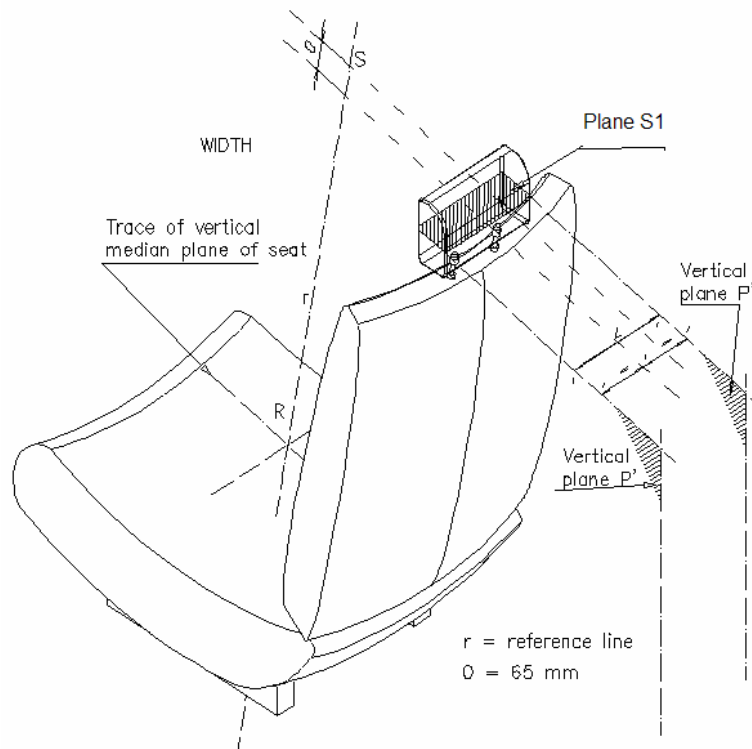


Figure 2-1

Annex 3

BACKSET MEASUREMENT PROCEDURE

1. Purpose

Demonstrate compliance with paragraph 5.5.7 by measurement of the backset.

Two methods are available in accordance with paragraph 5.5.7.2.:

- using the H-point as the backset reference point (See paragraph 2 below).

or

- using the R-point as the backset reference point (See paragraph 3 below).

2. Backset measurement using the H-point as backset reference point.

Demonstrate compliance with paragraph 5.5.7.3. by measuring the backset of the head restraint using the three-dimensional H-point machine, defined in Annex 13, Appendix 1, and the HRMD (See Annex 10). This procedure uses the H-point as the initial backset reference point.

2.1. The test vehicle shall be levelled using the door sill (front to rear level) and centre luggage compartment (side to side level) as reference points.

2.2. The test vehicle shall be preconditioned at a temperature of $20\text{ °C} \pm 10\text{ °C}$ to ensure that the seat material reaches room temperature.

2.3. Remove the head-room probe from the three-dimensional H-point machine and install the two washers (supplied with the HRMD) in the spaces remaining on the H point pivot.

2.4. Set up the seat as described in Annex 13, paragraph 3.3. If the seat back is adjustable, it is set at an initial inclination position closest to design angle as measured by the three-dimensional H-point machine. If there is more than one inclination position closest to design angle, set the seat back inclination to the position closest to and rearward of the design angle.

2.5. Set up the H-point machine as described in Annex 13, paragraphs 3.4. through 3.10.

2.6. Confirm the H-point assembly is level, facing directly forward and located in the centreline of the vehicle seat. As necessary reposition the seat pan.

2.7. Install the right and left buttock weights. Install four of the torso weights used in Annex 13, paragraph 3.11., and the two larger HRMD chest weights; alternating left to right. The HRMD torso weights shall be installed last and with the flat side down. Maintain H-point machine level.

2.8. Confirm the actual torso angle is $\pm 1^\circ$ of the design torso angle by placing an inclinometer on the lower brace of the torso weight hangers. If the measured angle is

outside this range, if possible adjust the seat back angle to be $\pm 1^\circ$ of the design seat back angle. If an adjustment is made, remove the buttock and torso weights and repeat the steps contained in paragraphs 3.9. through 3.10. of Annex 13, along with steps as described in paragraph 2.6. and 2.7. of this annex until the actual torso angle is $\pm 1^\circ$ of the design seat back angle.

- 2.9. Perform the steps contained in paragraph 3.12. of Annex 13.
- 2.10. Attach the HRMD to the three-dimensional H-point machine.
- 2.11. Confirm the actual torso angle remained $\pm 1^\circ$ of the design seat back angle by placing an inclinometer on the lower brace of the torso weight hangers. If the actual torso angle is outside this range, if possible carefully adjust the seat back angle to be $\pm 1^\circ$ of the design seat back angle. If the legs and seat pan of the three-dimensional H-point machine move during this procedure, remove the HRMD, the buttock and torso weights, and repeat the steps contained in paragraphs 3.9. through 3.11. of Annex 13, along with steps as described in paragraph 2.6. through 2.10. of this annex until the actual torso angle is $\pm 1^\circ$ of the design seat back angle.
- 2.12. Level the HRMD and extend the sliding scale on the back of the head until it contacts the head restraint. Confirm that the scale is positioned laterally within 15 mm of the head restraint centreline and take the backset measurement.
3. Backset measurement using the R-point as backset reference point.
 - 3.1. Backset measuring apparatus

The backset measurement apparatus consists of (see Figure 3-1):

 - 3.1.1. A straight edge (lower arm) AB. The lower point A is placed at the R point location. Point B is located at a distance of 504.5 mm from the R point. The line AB shall be 2.6 degrees forward to the design torso angle.
 - 3.1.2. A straight edge (upper arm) BC. Point C is located at a distance of 203 mm vertically up from point B.
 - 3.2. Adjust the seat such that its H-point coincides with the R-point, in accordance with the following requirements.
 - 3.2.1. Relationship between the H-point and the R-point

When the seat is positioned in accordance to the manufacturer's specifications, the H-point, as defined by its co-ordinates, shall lie within a square of 50 mm side length with horizontal and vertical sides whose diagonals intersect at the R-point, and the actual torso angle shall be within 5 degree of the design torso angle.
 - 3.2.2. If these conditions are met, the R-point and the design torso angle shall be used to demonstrate compliance with the provisions of paragraph 5.5.7 of this regulation.
 - 3.2.3. If the H-point or the actual torso angle does not satisfy the requirements of paragraph 3.2.1. , the H-point and the actual torso angle shall be determined twice more (three

times in all). If the results of two of these three operations satisfy the requirements, the conditions of paragraph 3.2.2. shall apply.

- 3.2.4. If the results of at least two of the three operations described in paragraph 3.2.3. do not satisfy the requirements of paragraph 3.2.1., the centroid of the three measured points or the average of the three measured angles shall be used and be regarded as applicable in all cases where the R-point or the design torso angle is referred to in this annex.
- 3.3. Adjust the seat back to its design angle.
- 3.4. Adjust the front head restraint so that its top is at any height between and inclusive of 750 mm and 800 mm. If the lowest position of adjustment is above 800mm, adjust the head restraint to that lowest position of adjustment.
- 3.5. In the case of head restraint with adjustable backset, adjust the head restraint at the most rearward position, such that the backset is in the maximum position.
- 3.6. Establish point D on the head restraint, point D being the intersection of a line drawn from point C horizontally in the X direction, with the front surface of the head restraint.
- 3.7. Measure the distance CD. The backset shall be the measured distance CD minus 71 mm.

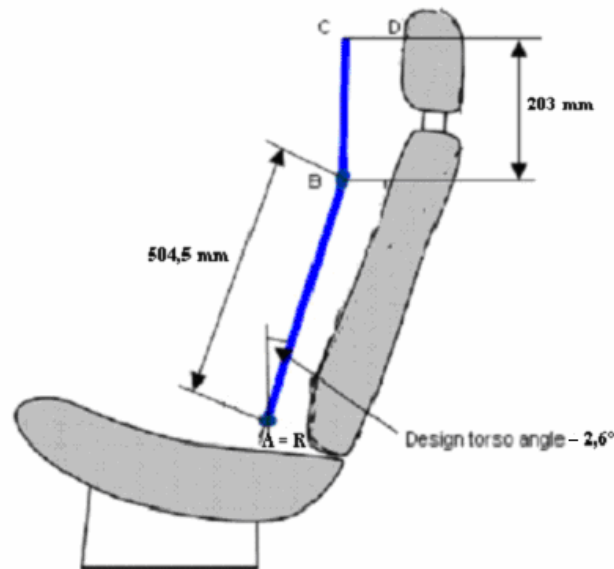


Figure 3-1

Annex 4

GAP MEASUREMENT PROCEDURES

1. Purpose

The purpose of this test procedure is to evaluate any gaps within head restraints as well as gaps between the bottom of the head restraint and the top of the seat back, in accordance with the requirements of paragraphs 5.5.5 and 5.5.6 of this regulation.

Any gaps within the head restraint shall be measured using the sphere procedure described in paragraph 2 below.

Gaps between the bottom of the head restraint and the top of the seat back shall be measured using the sphere procedure described in paragraph 2 below or, at the option of the manufacturer, using the linear procedure described in paragraph 3 below.

2. Gap measurement using a sphere.

2.1. The seat shall be adjusted such that its H-point coincides with the R-point; if the seat back is adjustable, it is set at the design seat back angle; both these adjustments shall be in accordance with the requirements of paragraph 2.1. of Annex 1.

2.2. The head restraint shall be adjusted to its lowest height position and any backset position intended for occupant use.

2.3. The area of measurement is anywhere on the front surface of the head restraint between two vertical longitudinal planes passing at 85 mm on either side of the torso line.

2.4. Applying a load of no more than 5 N against the area of measurement specified in paragraph 2.2 above, place a 165 ± 2 mm diameter spherical headform against any gap such that at least two points of contact are made within the area. The surface roughness of the headform is less than 1.6 μm , root mean square.

2.5. Determine the gap dimension by measuring the straight line distance between the inner edges of the two furthest contact points, as shown in Figures 4-1 and 4-2.

2.6. For gaps within the head restraint, not exceeding 60 mm, no further measurements shall be made.

2.7. For gaps within the head restraint, exceeding 60 mm, in order to demonstrate compliance with the requirements of paragraph 5.5.5 of this regulation, the seat back displacement test procedure described in Annex 7 shall be performed, by applying to each gap, using a sphere of 165 mm in diameter, a force passing through the centre of gravity of the smallest of the sections of the gap, along transversal planes parallel to the torso line, and reproducing a moment of 373 Nm about the R-point.

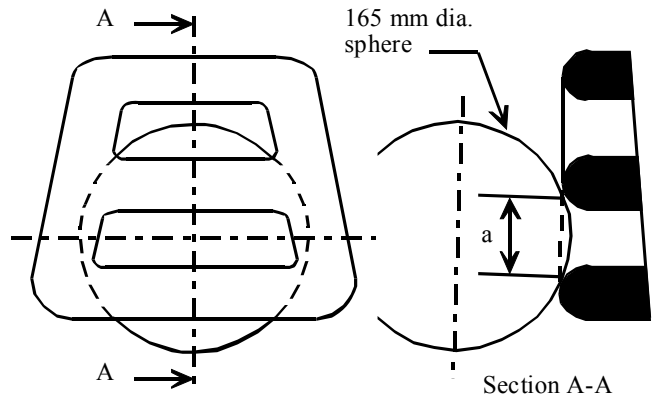


Figure 4-1 - Measurement of a vertical gap "a".

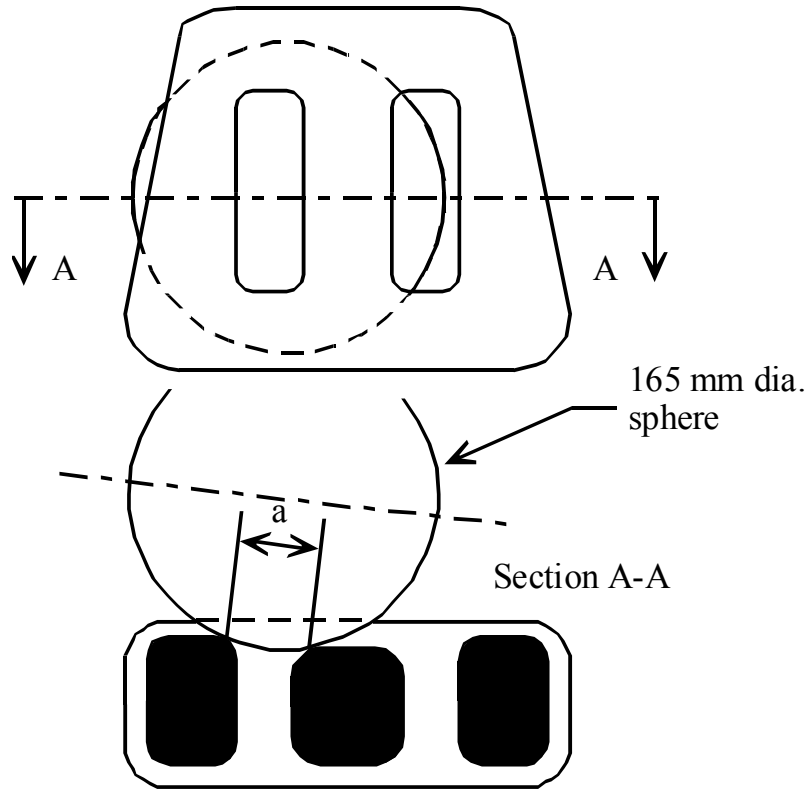


Figure 4-2 - Measurement of a horizontal gap "a".

- 3. Vertical measurement of gap between seat back and head restraint.
 - 3.1. The seat shall be adjusted such that its H-point coincides with the R-point; if the seat back is adjustable, it is set at the design seat back angle; both these adjustments shall be in accordance with the requirements of paragraph 2.1. of Annex 1.

- 3.2. The head restraint shall be adjusted to its lowest height for normal occupant use and any backset position intended for occupant use.
- 3.3. Measure the gap between the bottom of the head restraint and the top of the seat back using the scale incorporated into the manikin specified in Annex 13 or an equivalent scale, which is positioned laterally within 15 mm of the head restraint centreline.
- 3.4. Alternatively, at the choice of the manufacturer, the gap shall be measured as the perpendicular distance between two parallel planes, described as follows (see Figure 4-3)
 - Each plane shall be perpendicular to the design torso line
 - one of the planes shall be tangent to the bottom of the head restraint
 - the other plane shall be tangent to the top of the seat back

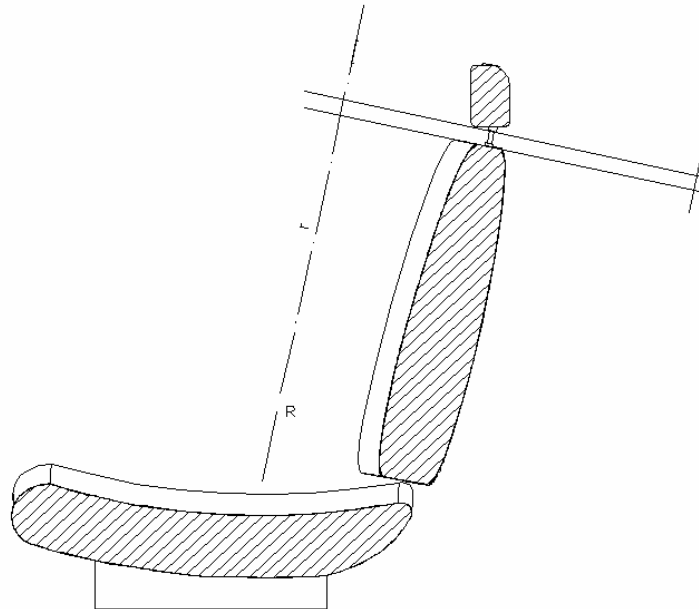


Figure 4-3

Annex 5

ENERGY ABSORPTION TEST PROCEDURE FOR HEAD RESTRAINT

1. Purpose:

Evaluate the energy absorption ability of the head restraint by demonstrating compliance with paragraph 5.8.1. of this regulation in accordance with this Annex.

2. Seat set-up:

The seat shall be either mounted in the vehicle or firmly secured to the test bench, as mounted in the vehicle with the attachment parts provided by the manufacturer, so as to remain stationary when the impact is applied. The seat back is adjusted as specified in paragraph 6.1.1. The head restraint shall be mounted on the seat-back as in the vehicle. Where the head restraint is separate, it shall be secured to the part of the vehicle structure to which it is normally attached.

3. Procedures for energy absorption.

Adjustable head restraints shall be measured in any height and backset position of adjustment.

3.1. Test equipment

3.1.1. Use an impactor with a semispherical headform of a 165 ± 2 mm diameter and a surface roughness of less than $1.6 \mu\text{m}$, root mean square for the impacting part of the impactor. The headform and associated base have a combined mass such that at a speed of 24.1 ± 0.5 km/h at the time of impact an energy of 152 ± 6 Joule will be reached.

3.1.2. Instrument the impactor with an acceleration sensing device whose output is recorded in a data channel that conforms to the requirements for a 600 Hz channel class filter as specified in ISO Standard 6487 (2002); The axis of the acceleration-sensing device coincides with the geometric center of the head form and the direction of impact. As an alternative the impactor can be equipped with 2 accelerometers sensing in the direction of impact and placed symmetrically in comparison to the geometric centre of the spherical head form. In this case the deceleration rate shall be taken as the simultaneous average of the readings on the two accelerometers.

3.2. Accuracy of the test equipment.

The recording instruments used shall be such that measurements can be made with the following degrees of accuracy:

3.2.1. Acceleration:

Accuracy = ± 5 % of the actual value;

Cross-axis sensitivity = < 5 % of the lowest point on the scale.

3.2.2. Speed:

Accuracy: $\pm 2.5\%$ of the actual value;

Sensitivity: 0.5 km/h.

3.2.3. Time recording:

The instrumentation shall enable the action to be recorded throughout its duration and readings to be made to within one one-thousandth of a second;

The beginning of the impact at the moment of first contact between the headform and the item being tested shall be detected on the recordings used for analyzing the test.

3.3. Test procedure

3.3.1. Propel the impactor toward the head restraint. At the time of impact the impactor speed shall be $24,1 \pm 0.5$ km/h.

3.3.2. Impact the front contact surface of the seat or head restraint at any point with a height greater than 635 mm from the R-point and within a distance of 70 mm from the head restraint vertical centreline and measure the deceleration.

3.3.2.1. For the front face of the head restraint, the direction of impact from the front towards the rear shall be within ± 2 degrees of being horizontal and parallel to the vehicle longitudinal axis.

3.3.2.2. For the rear face, the direction of impact from the rear towards the front shall be in a longitudinal plane at an angle of 45° downwards from the vertical.

3.3.3. The front and rear zones are respectively bounded by the horizontal plane tangential to the top of the head restraint as determined in paragraph 6.5. of this Regulation.

Annex 6

HEIGHT RETENTION TEST PROCEDURE

1. Purpose.

Demonstrate compliance with paragraph 5.8.2 of this regulation in accordance with this annex.
2. Procedures for test.
 - 2.1. Seat set-up.

Adjust the adjustable head restraint so that its top is at any of the following height positions at any backset position:

 - 2.1.1. For front outboard designated seating positions:
 - 2.1.1.1. The highest position; and
 - 2.1.1.2. Not less than, but closest to, 800 mm;
 - 2.1.2. For rear outboard and front centre designated seating positions
 - 2.1.2.1. The highest position; and
 - 2.1.2.2. Not less than, but closest to 750 mm.
 - 2.1.3. For rear centre designated seating positions
 - 2.1.3.1. The highest position; and
 - 2.1.3.2. Not less than, but closest to 700 mm.
 - 2.2. Orient a cylindrical test device having a 165 ± 2 mm diameter in plane view (perpendicular to the axis of revolution), and a 152 mm length in profile (through the axis of revolution) with a surface roughness of less than $1.6 \mu\text{m}$, root mean square, such that the axis of the revolution is horizontal and in the longitudinal vertical plane through the longitudinal centreline of the head restraint. Position the midpoint of the bottom surface of the cylinder in contact with the head restraint.
 - 2.3. Mark an initial reference position for the head restraint.
 - 2.4. Measure the vertical distance between the lowest point on the underside of the head restraint and the top of the seat back.(see paragraph 2.9)
 - 2.5. Increase the load at the rate of 250 ± 50 N/minute to at least 500 N and maintain this load for not less than 5 seconds.
 - 2.6. Reduce the load to 0 N and determine the position of the cylindrical device with respect to its initial reference position.

- 2.7. Repeat the measurement of the vertical distance between the lowest point on the underside of the head restraint and the top of the seat back.(see paragraph 2.9)
- 2.8. Compare the measurements from paragraphs 2.4 and 2.7. The difference is the measurement required to comply with paragraph 5.7.4 of the regulation.
- 2.9. If the design of the head restraint is such that it is not possible to measure to the top of the seat then the vertical measurement shall be taken by marking a horizontal line across the front of the seat back at least 25 mm below the lowest point of the head restraint and the measurement shall be taken from this line to the underside of the head restraint.

Annex 7

DISPLACEMENT, BACKSET RETENTION AND STRENGTH TEST PROCEDURES

1. Purpose.

To demonstrate compliance with the requirements of paragraphs 5.7.2. and 5.7.3 of this regulation.

2. Procedures for displacement.

The load vectors that generate moment on the head restraint are initially contained in a vertical plane parallel to the vehicle longitudinal centreline.

2.1. Seat set-up.

If the seat back is adjustable, it is adjusted to a position specified by the vehicle manufacturer. If there is more than one inclination position closest to the position specified by the manufacturer, set the seat back inclination to the position closest to and rearward of the manufacturer specified position. If the head restraint position is independent of the seat back inclination position, compliance is determined at a seat back inclination position specified by the manufacturer. Adjust the head restraint to the highest position of vertical adjustment intended for occupant use. Adjust the head restraint to the rearmost (relative to the seat) position of horizontal adjustment backset position.

2.2. In the seat, place a test device having, when viewed laterally, the back pan dimensions and torso reference line (vertical centre line) of the three dimensional H-point machine, as specified in Annex 13, with the head room probe in the full back position.

2.3. Establish the displaced torso reference line 'r' by creating a rearward moment of 373 ± 7.5 Nm about the R-point by applying a force to the seat back through the back pan at the rate of 2.5 Nm/second to 37.3 Nm/second. The initial location on the back pan of the moment generating force vector has a height of $290 \text{ mm} \pm 13 \text{ mm}$. Apply the force vector normal to the torso reference line and maintain it within 2 degrees of a vertical plane parallel to the vehicle longitudinal centreline. Constrain the back pan to rotate about the R-point. Rotate the force vector direction with the back pan. (see Figure 7-1)

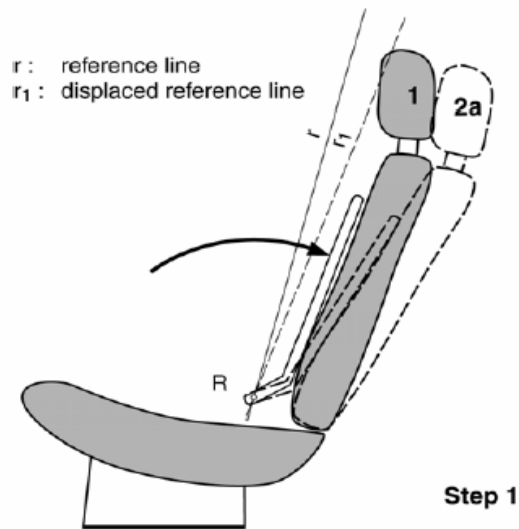


Figure 7-1.

Notes

- (1) Position 1. Original unloaded position.
- (2) Position 2a. Displaced position by applying to the manikin's back a moment of 373 Nm about the R-point, defining the position of the displaced torso reference line 'r₁'.

2.4. Maintain the position of the back pan as established in paragraph 2.3. of this annex. Using a 165 ± 2 mm diameter spherical head form with a surface roughness of less than $1.6 \mu\text{m}$, root mean square, establish the head form initial reference position by applying, perpendicular to the displaced torso line, a rearward initial load at the seat centreline at a height 65 ± 3 mm below the top of the head restraint that will produce a 36.5 ± 0.5 Nm moment about the R-point. When determining the rearward displacement for head restraints at a gap greater than 60 mm in accordance with paragraph 5.5.4 of this regulation, the above load shall be applied through the centre of gravity if the smallest of the sections of the gap, along transversal planes parallel to the torso line. (see Figure 7-2)

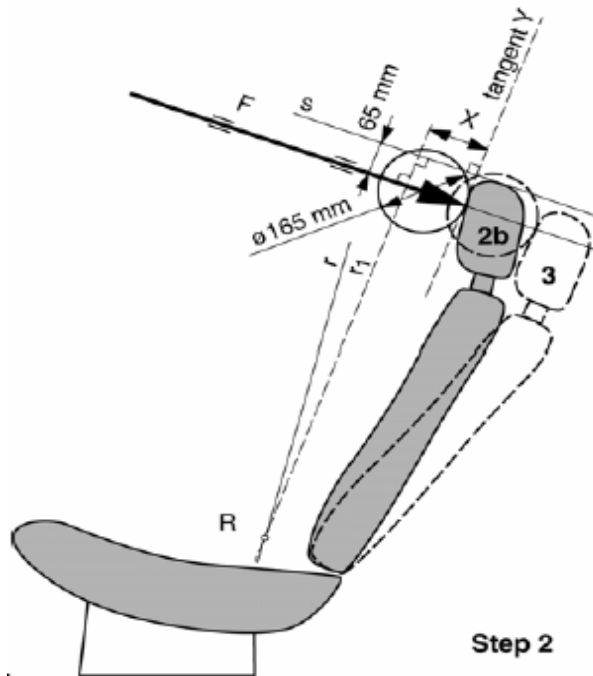


Figure 7-2.

- (3) Position 2b. Displaced position by applying to the 165 mm sphere a force F producing a moment of 373 Nm about the R-point, keeping the displaced torso reference line 'r1' in place.
 - (4) Position 3. Position after displacement by the force F increased to 890 N.
- 2.5. If the presence of gaps prevents the application of the force, as described in paragraph 2.4 of this Annex at $65 \pm 3 \text{ mm}$ from the top of the head restraint, the distance may be reduced so that the axis of the force passes through the centre line of the frame element nearest to the gap.
 - 2.6. Increase the initial load at the rate between 2.5 Nm/second and 37.3 Nm/second until a $373 \pm 7.5 \text{ Nm}$ moment about the R-point is produced. Maintain the load level producing that moment for not less than 5 seconds and then measure the rearward displacement of the headform relative to the displaced torso reference line.
 3. Procedure for backset retention and displacement.
 - 3.1. Adjust the head restraint to the highest position of vertical adjustment intended for occupant use.
 - 3.2. Adjust the head restraint to any backset position.
 - 3.3. In the seat, place a test device having the back pan dimensions and torso line (vertical centre line), when viewed laterally, with the head-room probe in the full back position, of the three-dimensional H-point machine;

- 3.4. Establish the displaced torso line by creating a posterior moment of 373 ± 7.5 Nm about the R-point by applying a force to the seat back through the back pan at the rate between 2.5 Nm/second and 37.3 Nm/second. The initial location on the back pan of the moment generating force vector has a height of $290 \text{ mm} \pm 13 \text{ mm}$. Apply the force vector normal to the torso line and maintain it within 2 degrees of a vertical plane parallel to the vehicle longitudinal centreline. Constrain the back pan to rotate about the R-point. Rotate the force vector direction with the back pan.
- 3.5. Maintain the position of the back pan as established in paragraph 3.4. of this annex. Using a 165 ± 2 mm diameter spherical head form with a surface roughness of less than $1.6 \text{ }\mu\text{m}$, root mean square, establish the head form initial reference position by applying, perpendicular to the displaced torso line, a rearward initial load at the seat centreline at a height 65 ± 3 mm below the top of the head restraint that will produce a 36.5 ± 0.5 Nm moment about the R-point. Measure the rearward displacement of the head form during the application of the load.
- 3.6. If the presence of gaps prevents the application of the force, as described in paragraph 3.5. of this annex at 65 ± 3 mm from the top of the head restraint, the distance may be reduced so that the axis of the force passes through the centre line of the frame element nearest to the gap.
- 3.7. Increase the initial load at the rate of 2.5 Nm/second to 37.3 Nm/second until a 373 ± 7.5 Nm moment about the R-point is produced. Maintain the load level producing that moment for not less than 5 seconds and then measure the rearward displacement of the head form relative to the displaced torso line.
- 3.8. Reduce the load at the rate of 2.5 Nm/second to 37.3 Nm/second until 0 Nm. Wait 10 minutes. Re-load to 37 ± 0.7 Nm about the R-point. While maintaining the load level producing that moment, measure the rearward displacement of the head form position with respect to its initial reference position.
4. Strength.
 - 4.1. Increase the load specified in paragraph 3.8. of this Annex at a rate between 5 N/second and 200 N/second to $890 \text{ N} \pm 5 \text{ N}$ and maintain the applied load for not less than 5 seconds without any breakage of the seat or head restraint.

Annex 8

DYNAMIC PERFORMANCE TEST PROCEDURE

[For future use when specifications will be provided with the development of a suitable dummy]

Annex 9

NON-USE POSITION TEST PROCEDURE

1. Purpose.

Procedures for folding or retracting head restraints in all designated seating positions equipped with head restraints, except the driver's designated seating position.

2. Procedures to test automatic return head restraints and demonstrate compliance with paragraph 5.8.

The procedure is completed with the ignition switched "on", and using a 5th percentile female Hybrid III test dummy in accordance with paragraph 2.1. of this Annex, or a human surrogate in accordance with paragraph 2.2. of this Annex. Compliance shall be determined at a temperature of 21°C to 22°C.

2.1. Use of 5th percentile Hybrid III Dummy.

2.1.1. Position the test dummy in the seat such that the dummy's mid-sagittal plane is aligned within the 15 mm of the seating position centreline and is parallel to a vertical plane parallel to the vehicle longitudinal centreline.

2.1.2. Hold the dummy's thighs down and push rearward on the upper torso to maximize the dummy's pelvic angle.

2.1.3. Place the legs as close as possible to 90 degrees to the thighs. Push rearward on the dummy's knees to force the pelvis into the seat so there is no gap between the pelvis and the seat back or until contact occurs between the back of the dummy's calves and the front of the seat cushion such that the angle between the dummy's thighs and legs begins to change.

2.1.4. Note the position of the head restraint. Remove the dummy from the seat. If the head restraint returns to a retracted position upon removal of the dummy, manually place it in the noted position. Determine compliance with the height requirements of paragraph 5.5.2. by using the test procedures of Annex 1.

2.2. Human surrogate.

A human being who weighs between 47 and 51 kg, and who is between 140 and 150 cm tall may be used. The human surrogate shall be dressed in a cotton T-shirt, full length cotton trousers, and sneakers. Specified weights and heights include clothing.

2.2.1. Position the human in the centre of the seat with the pelvis touching the seat back and the back against the seat back.

2.2.2. Verify the human's mid-sagittal plane is vertical and within ± 15 mm of the seating position centreline.

- 2.2.3. Verify the transverse distance between the centres of the front of the knees is 160 to 170 mm. Centre the knee separation with respect to the seat centreline.
- 2.2.4. If needed, extend the legs until the feet do not contact the floor pan. The thighs are resting on the seat cushion.
- 2.2.5. If the human contacts the interior move the seat rearward until a maximum clearance of 5 mm is achieved or the seat is in the closest detent position which does not cause human contact.
- 2.2.6. Passenger foot positioning.
 - 2.2.6.1. Place feet flat on the toe board, or
 - 2.2.6.2. If the feet cannot be placed flat on the toe board, the feet are perpendicular to the lower leg, and the heel is as far forward as possible and resting on the floor pan, or
 - 2.2.6.3. If the heels do not touch the floor pan, the legs are vertical and the feet parallel to the floor pan.
- 2.2.7. Passenger arm/hand positioning.
 - 2.2.7.1. Place the human's upper arms adjacent to the torso with the arm centrelines as close to a vertical longitudinal plane as possible.
 - 2.2.7.2. Place the palms of the human in contact with the outer part of the thighs.
 - 2.2.7.3. Place the little fingers in contact with the seat cushion.
- 2.8. Start the vehicle engine or place the ignition in the "on" position, whichever will turn on the suppression system, and close all vehicle doors. Wait 10 seconds, and then check whether the air bag is suppressed.
- 2.9. Return the ignition switch to the "off" position.
- 3. 60° Rotation evaluation.

Procedures for the rear and front centre designated seating positions to demonstrate compliance with paragraph 5.8.4.2.

- 3.1. Place the head restraint in any position meeting the requirements of paragraph 5.5.2.2. or paragraph 5.5.2.4;
 - 3.1.1. Mark a line on the head restraint with one end at the point of rotation. Measure the angle or range of angles of the head restraint reference line as projected onto a vertical longitudinal vehicle plane;
 - 3.1.2. Fold or retract the head restraint to a position in which its minimum height is less than that specified in paragraph 5.5.2.2. or paragraph 5.5.2.4;

3.1.3. Determine the minimum change in the head restraint reference line angle as projected onto a vertical longitudinal vehicle plane from the angle or range of angles measured in paragraph 3.1.1. of this Annex.

4. Discomfort Metric.

Procedures for the rear and front centre designated seating positions to demonstrate compliance with paragraph 5.8.4.3. of this regulation.

4.1. The H_{LE} and S dimensions are defined in Figure 9-1. which shows a vertical fore-aft plane passing through the R-point (i.e. at the mid point of the designated seating position) intersecting the seat cushion, seat back and the head restraint.

4.2. Adjust the head restraint to the non-use position.

4.2.1. H_{LE} is the distance from the R-point to the lower edge of the head restraint measured along the torso line.

4.2.2. S is the maximum thickness of the lower edge of the head restraint (within 25mm of the head restraint lower edge) measured perpendicular to the torso line between T_H and T_S from line P .

4.2.3. P is a line parallel to the torso line which intersects the head restraint at T_S

4.2.4. T_H is the line perpendicular to the torso line and tangent to the lower edge of the head restraint.

4.2.5. T_S is the line parallel to and 25 mm from T_H .

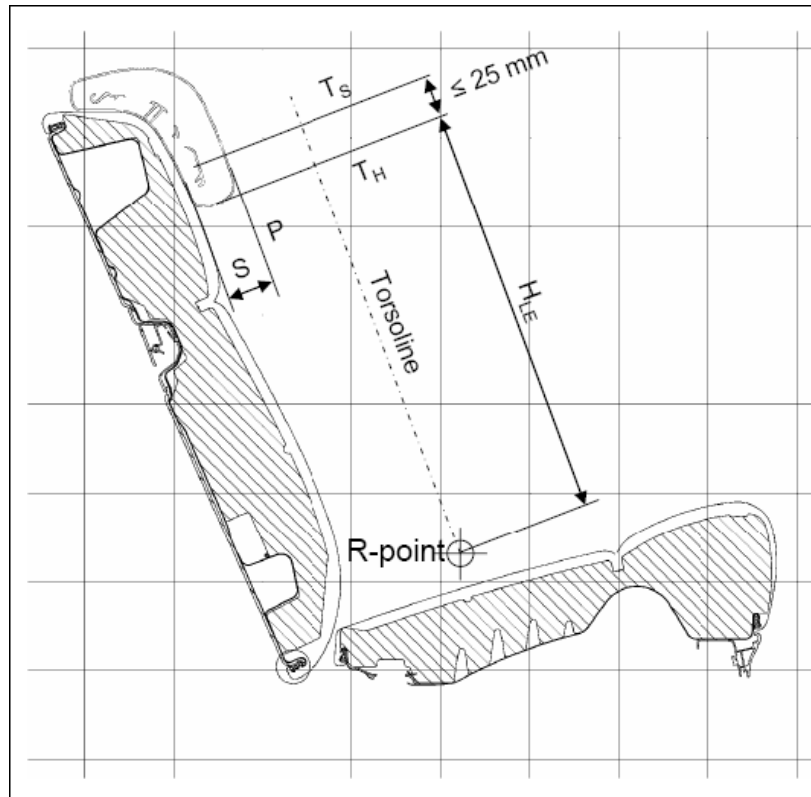


Figure 9-1.

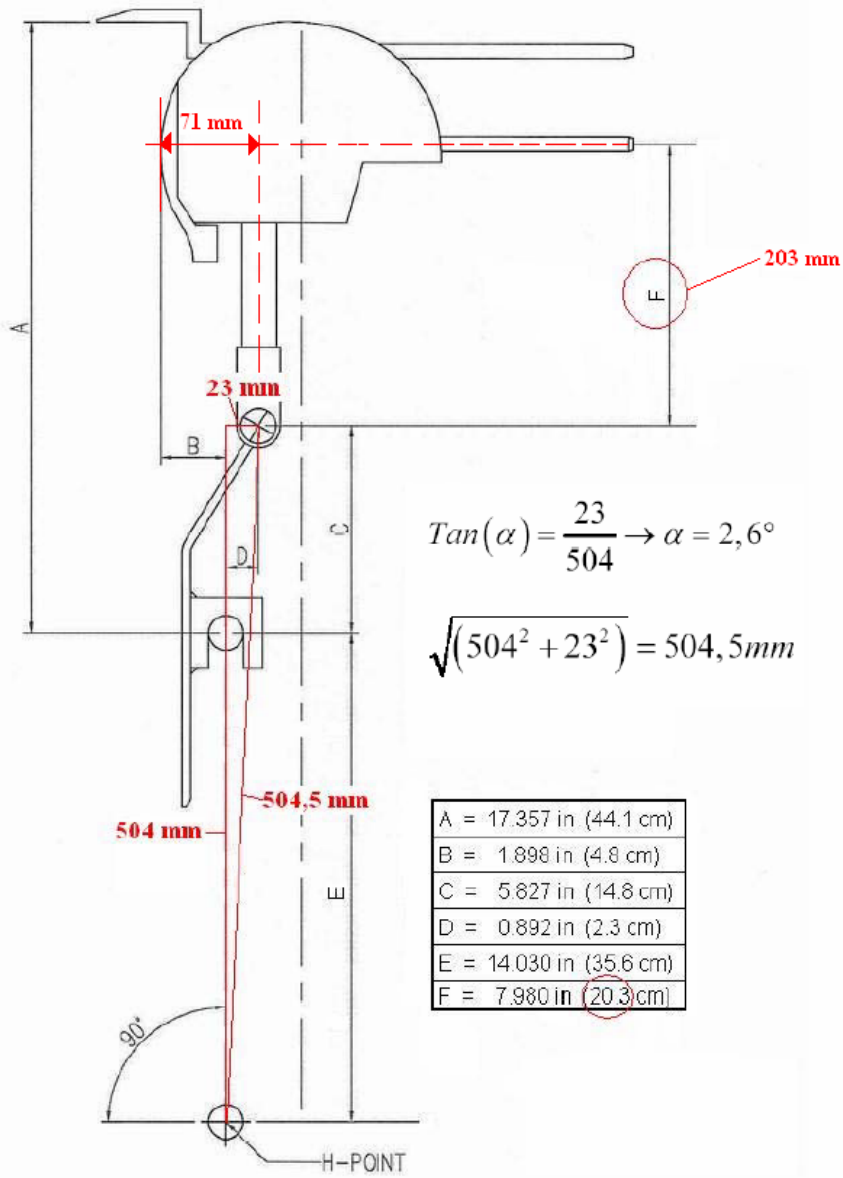
5. 10° Torso Reference Line Change.

Procedures for the rear and front centre designated seating positions to demonstrate compliance with paragraph 5.8.4.4.

- 5.1. Place the head restraint into any position meeting the requirements of paragraph 5.5.1. of this regulation;
- 5.2. Measure the torso reference line angle with the three-dimensional H-point machine defined in Annex 13;
- 5.3. Fold or retract the head restraint to any position in which its minimum height is less than that specified in paragraph 5.5.1. of this regulation or in which its backset is more than that specified in paragraph 5.5.6 of this regulation; and
- 5.4. Again measure the torso reference line angle.

Annex 10

HEAD RESTRAINT MEASURING DEVICE (HRMD)



| "

Existing Annexes 1, 2 and 3 are renumbered as Annexes 11, 12 and 13 respectively:

The Note to renumbered Annex 11 is amended to read as follows:

"Note: In the case of seats fitted with head restraints as defined in paragraphs 2.12. and 2.30. of this Regulation, the head restraint shall be shown on all drawings, diagrams and photographs."

In renumbered Annex 12 all references to series 07 of amendments shall be replaced by reference to 08 series (to be checked by the secretariat), - six instances in the text and four instances in the diagrams.

In renumbered Annex 13 all references to '3-D H-machine' are changed to read as 'H-point machine'

Renumbered Annex 13, Section 2 is deleted and Sections 3 and 4 renumbered as Sections 2 and 3 respectively.

Renumbered Annex 13, Paragraph 2.1.3 of Annex 13 is amended to read as:

".....set out in paragraph 3.3. below."

Renumbered Annex 13, Paragraph 2.2.1 of Annex 13 is amended to read as:

".....procedure set out in paragraph 3. below"

Renumbered Annex 13, Paragraph 2.2.4. is amended to read as:

".....requirements of paragraph 2.2.2. above, conditions of paragraph 2.2.3. above shall apply."

Renumbered Annex 13, Paragraph 2.2.5. is amended to read as:

".....described in paragraph 2.2.4. above do not satisfy the requirements of paragraph 2.2.2. above, or"

Renumbered Annex 13, Paragraph 3.2. is amended to read as:

"3.2. The vehicle shall be in the vehicle measuring attitude."

Paragraph 3.7.2. is reformatted to read as:

"3.7.2. Designated seating position: outboard rear.

3.7.2.1. For rear seats"

Paragraph 3.7.3. is amended to read as:

"3.7.3. Other designated seating positions:

The general procedure indicated in paragraph 3.7.1. above shall be followed except....."

Renumbered Annex 13, Paragraph 3.10. is amended to read as:

1st paragraph: "Apply a 100 ± 10 N load to"

Renumbered Annex 13, Paragraph 3.12. is amended to read as:

1st paragraph: ".....side to side through a 10 degrees arc"

Paragraph 3.13 (b) is amended to read as:

".....re-level, and repeat the procedure from paragraph 3.12."

Existing Annexes 4, 5 and 6 are deleted.

New Annex 14 is inserted as follows:

"Annex 14

TEST PROCEDURE FOR CHECKING ENERGY DISSIPATION OF SEAT BACK

1. Installation, test apparatus, recording instruments and procedure

1.1. Setting up

The seat, as mounted in the vehicle, shall be firmly secured to the test bench with the attachment parts provided by the manufacturer, so as to remain stationary when the impact is applied.

The seat-back, if adjustable, shall be locked in the position specified in paragraph 6.1.1. of this Regulation.

If the seat is fitted with a head restraint, the head restraint shall be mounted on the seat-back as in the vehicle.

1.2. Test apparatus

1.2.1. This apparatus consists of a pendulum whose pivot is supported by ball-bearings and whose reduced mass (*) at its centre of percussion is 6.8 kg. The lower extremity of the pendulum consists of a rigid headform 165 mm in diameter whose centre is identical with the centre of percussion of the pendulum.

1.2.2. The headform shall be fitted with two accelerometers and a speed-measuring device, all capable of measuring values in the direction of impact.

1.3. Recording instruments

The recording instruments used shall be such that measurements can be made with the following degrees of accuracy:

1.3.1. Acceleration:

accuracy = ± 5 % of the actual value;
frequency class of data channel: class 600 corresponding to ISO Standard 6487 (1980);
cross-axis sensitivity = < 5 % of the lowest point on the scale.

1.3.2. Speed:

accuracy: ± 2.5 % of the actual value;
sensitivity: 0.5 km/h.

1.3.3. Time recording:

* The relationship of the reduced mass "m_r" of the pendulum to the total mass "m" of the pendulum at a distance "a" between the centre of percussion and the axis of rotation and at a distance "l" between the centre of gravity and the axis of rotation is given by the formula: $m_r = m \cdot l / a$

the instrumentation shall enable the action to be recorded throughout its duration and readings to be made to within one one-thousandth of a second;

the beginning of the impact at the moment of first contact between the headform and the item being tested shall be detected on the recordings used for analysing the test.

1.4. Test procedure

1.4.1. Tests on the seat-back

With the seat installed as indicated in paragraph 1.1. of this annex, the direction of impact from the rear towards the front shall be on a longitudinal plane at a downwards angle of 45° from the vertical.

The impact points shall be selected by the test laboratory in area 1 as defined in paragraph 6.8.1.1. of this Regulation, or if necessary in area 2 as defined in paragraph 6.8.1.2. of this Regulation, on surfaces exhibiting radii of curvature less than 5 mm.

1.4.2. The headform shall strike the test point at a speed of 24.1 km/h: this speed shall be achieved either by the mere energy of propulsion or by using an additional impelling device.

2. Results

The deceleration rate shall be taken as the average of the readings on the two decelerometers.

3. Equivalent procedures (see paragraph 6.9. of this Regulation)."

Existing Annex 7 is renumbered as Annex 15.

Annex 15, Paragraph 1.4 is amended to read as:

".....in the sense of paragraph 2.37. of this Regulation, the tests"

Annex 15, Paragraph 2.1 is amended to read as:

".....plywood boards 19 ± 1 mm thick. At"

Existing Annex 8 is deleted.

Existing Annex 9 is renumbered as Annex 16.

References to diagrams and title numbers of the diagrams in Annex 16 are changed to read 'Figure 16-1' and 'Figure 16-2' respectively.

Annex 16, Paragraph 3.1 is amended to read as follows:

".....shall be accelerated, as shown in the Appendix, so that"

B. JUSTIFICATION

The development of a Global Technical Regulation(gtr) on the subject of vehicle head restraints is now a proposal which is expected to be adopted by WP.29 in March of next year.

Under the terms of the 1998 Agreement a Contracting Party that votes in favour of establishing a Global Technical Regulation under Article 6 of the Agreement is obligated to submit the technical Regulation to the process used by that Contracting Party to adopt such a technical Regulation into its own laws or regulations and shall seek to make a final decision expeditiously.

It is the intention of the European Commission to propose that the existing Regulation No.17 be amended to reflect the requirements of the gtr and thus allow its 'transposition' into the UN/ECE type-approval system as soon as it becomes a reality.

The proposed amendment provides updates to all requirements under the present Regulation No. 17 with respect to head restraints on the basis of the present proposal for a Global Technical Regulation on the subject.

Members of GRSP are invited to adopt the proposed amendments and allow transmission of the proposal to WP.29
