50-1 Head restraint：Effective date from 2013/1/1

Refer to: R17 08-S3, R25 04-S1

50-1.1 Effective date and Scope:

50-1.1.1 Effective date from 2013/1/1, the category symbols M1, N1 and M2 having a certified gross vehicle weight less than 3.5 tons, which their outboard front-seat shall equip with head restraint. The others seats may also be able to equip with head restraint.

50-1.1.2 Effective date from 2013/01/01, the following head restraint should comply with this regulation:

50-1.1.2.1 As for the category M1, N1 and M2 having a certified gross vehicle weight less than 3.5 tons, the new type of head restraint fitted in outboard front-seat.

50-1.1.2.2 As for the category M1 and M2 having a certified gross vehicle weight less than 3.5 tons, the new type of head restraint fitted in rear-seat.

50-1.1.3 Effective date from 2015/01/01, the category symbols M1 and M2 having a certified gross vehicle weight less than 3.5 tons, each type of head restraint fitted in rear-seat shall comply with this regulation. The head restraint fitted in rear-seat, which were conformed to “50 head restraint”, regard as conform to this regulation. Effective date from 2017/04/01, the category symbols N1, all types of head restraint fitted in rear-seat shall comply with this regulation.

50-1.1.4 This regulation doesn’t apply to folding, side-facing or rearward-facing seats, or to any head restraint fitted to these seats.

50-1.1.5 The applicants applying for low volume safety approval or vehicle-by-vehicle low volume safety approval could exempt from regulation of “head restraint” except large passenger vehicle and child-only vehicle.

50-1.2 Definitions:

50-1.2.1 Head restraint: means a device whose function is to limit the rearward displacement of an adult occupant's head in relation to his torso in order to reduce the danger of injury to the cervical vertebrae of that occupant in the event of an accident.

50-1.2.1.1 Integrated head restraint: means a head restraint constituted by the upper part of the seat-back. Head restraints

corresponding to the definitions of paragraphs 50-1.2.1.2 and 50-1.2.1.3 below, but which cannot be detached from the seat or the vehicle structure except by the use of tools or following the partial or total removal of the seat furnishings, correspond to this definition.

50-1.2.1.2 Removable head restraint means: a head restraint constituted by a component separable from the seat, designed for insertion and positive retention in the seat-back structure.

50-1.2.1.3 Separate head restraint means a head restraint constituted by a separate component of the seat, designed for insertion and/or positive retention in the structure of the vehicle.

50-1.2.2 Reference line means: a straight line which, either on a test manikin having the weight and dimensions of a fiftieth percentile adult male or on a test manikin having identical characteristics, passes through the joint of the leg with the pelvis and the joint of the neck with the thorax.

50-1.2.3 Head line: means a straight line passing through the center of gravity of the head and through the joint of the neck with the thorax. When the head is at rest the head line is situated in the extension of the reference line.

50-1.2.4 "Folding seat" means an auxiliary seat intended for occasional use and normally folded.

50-1.3 Head restraint shall according to suitable types and range of principle as below：the dimensions, frame, materials and padding of head restraints, although they may differ in colour and covering;

50-1.4 Test method:

50-1.4.1 The Height of the head restraint

50-1.4.1.1 All lines (including the projections of reference line) shall be drawn in the plane of symmetry of the seat considered, the intersection of which plane with the seat determines the contour of the head restraint and of the seat-back. (Indicated in Fig 1.)

50-1.4.1.2 The manikin corresponding to a fiftieth percentile adult male or the manikin shall be placed in a normal position on the seat.

The seat back, if inclinable, shall be locked in a position corresponding to a rearward inclination of the reference line of the manikin's torso of as nearly as possible 25 degrees from the vertical or the angle declared by the manufacturer.

50-1.4.1.3 The projection of the reference line of the manikin shall in the case of the seat considered be drawn in the plane specified in paragraph 50-1.4.1.1 above. The tangent S to the top of the head restraint shall be drawn perpendicular to the reference line.

50-1.4.1.4 The distance h from R point to the tangent S is defined as the height of head restraint.

50-1.4.2 The width of the head restraint (indicated in Fig 2)

50-1.4.2.1 The plane S1, perpendicular to the reference line and situated 65-mm below the tangent S, defines a section in the head restraint bounded by the outline C.

50-1.4.2.2 The width of the head restraint is the distance "L" separating the traces of planes P and P' in plane S1.

50-1.4.2.3 The width of the head restraint shall, if necessary, also be determined 635 mm above the R point of the seat, this distance being measured along the reference line.

50-1.4.3 Effectiveness of the device

50-1.4.3.1 Test preparation

50-1.4.3.1.1 If the head restraint is adjustable, it shall be set in the most unfavorable position (generally, the highest position).

50-1.4.3.1.2 In the case of a bench seat, where part or all of the supporting frame (including that of the head restraints) is common to more than one seating position, the test shall be conducted simultaneously for all seating positions.

50-1.4.3.1.3 If the seat or the seat-back is adjustable relative to a head restraint anchored to the vehicle structure, it shall be placed in the most unfavorable position.

50-1.4.3.2 Test

50-1.4.3.2.1 All lines shall be drawn on the seat (see Fig 3).

50-1.4.3.2.2 A projection of the reference line r shall be drawn in the plane referred to in paragraph 50-1.4.3.2.1 above.

50-1.4.3.2.3 The displaced reference line r1 shall be determined by applying to the part simulating the back in the manikin an initial force producing a rearward moment of 373 N-m about the R point.

50-1.4.3.2.4 By means of a spherical head 165 mm in diameter an initial force producing a moment of 373 N-m about the R point shall be applied at right angles to the displaced reference line r1 at a distance of 65 mm below the top of the head restraint, the reference line being retained in its displaced position as determined in accordance with the requirements of paragraph 50-1.4.3.2.3 above.

50-1.4.3.2.4.1 If the presence of gaps prevents the application of the force at 65 mm from the top of the head restraint, the distance may be reduced so that the axis of the force passes through the centerline of the frame element nearest to the gap.

50-1.4.3.2.4.2 In the cases that the any gap of head restraint and any gap between head restraint's bottom and seat-back's top is more than 60 mm, the test shall be repeated by applying to each gap, using a sphere of 165 mm in diameter, a force passing through the center of gravity of the smallest of the sections of the gap, along transversal planes parallel to the reference line, and producing a moment of 373 N-m about the R point.

50-1.4.3.2.5 The tangent Y to the spherical head, parallel to the displaced reference line, shall be determined.

50-1.4.3.2.6 The distance X between the tangent Y and the displaced reference line r1 shall be measured.

50-1.4.3.2.7 In cases where the force prescribed in paragraph 50-1.4.3.2.4 is applied at a distance of 65 mm or less below the top of the head restraint, and only in such cases, it shall be increased to 89 daN unless breakage of the seat or its back occurs earlier.

50-1.4.4 Determination of distance "a" of head restraint gaps (shown in Fig 4)

50-1.4.4.1 The distance "a" shall be determined for each gap and in relation to the front face of the head restraint, by means of a sphere having a diameter of 165 mm.

50-1.4.4.2 The sphere shall be put into contact with the gap in a point of the gap area which allows the maximum sphere intrusion, considering no load to be applied.

50-1.4.4.3 The distance between the two points of contact of the sphere with the gap will constitute the distance "a".

50-1.4.5 Tests for checking energy dissipation on the head restraint:

50-1.4.5.1 Using a rigid headform 165 m in diameter and 6.8 kg to impact at a speed of 24.1 km/h, the impact zone is:

50-1.4.5.1.1 The impact zone is bounded laterally by two vertical longitudinal planes, one on each side of and each 70 mm distant from the plane of symmetry of the seat considered.

50-1.4.5.1.2 The impact zone is limited in height to the part of the head restraint situated above the plane perpendicular to the reference line r and 635 mm distant from the H-point.

50-1.4.5.1.3 The requirements concerning the energy dissipation, defined in paragraph 50-1.4.5.1.1 and 50-1.4.5.1.2 above shall not apply to the rear faces of head restraints for seats behind which there are no other seats.

50-1.4.5.2 On the rear surface, the direction of impact from the rear towards the front in a longitudinal plane shall be at an angle of 45° to the vertical.

50-1.4.5.3 On the front surface, the direction of impact from the front towards the rear in a longitudinal plane shall be horizontal.

50-1.5 Requirements:

50-1.5.1 The presence of the head restraint shall not be an additional cause of danger to occupants of the vehicle. In particular, it shall not in any position of use exhibit any dangerous roughness or sharp edge liable to increase the risk or seriousness of injury to the occupants. In tests carried out by the procedure for checking the energy dissipation, the deceleration（acceleration） of the headform shall not exceed 80 g continuously for more than 3 ms.

50-1.5.1.1 Parts of the front and rear faces of head restraints situated in area 1 as defined in paragraph 49.4.2.2.1.3 of “49 Seats”, shall be so padded as to prevent any direct contact of the head with the components of the structure and shall meet the requirements of

paragraph 49.4.2.2 of “49 Seats”.

50-1.5.1.2 Parts of the front and rear faces of head restraints situated in area 2, as defined in paragraph 49.4.2.2.2 of “49 Seats”, shall be so padded as to prevent any direct contact of the head with the components of the structure and shall meet the requirements of paragraph 49.4.2.2 of “49 Seats”.

In the case of head restraints integrated with the seat back, the front face of the head restraint is considered as the area located above a plane perpendicular to the reference line at 540 mm from the R point and between two vertical longitudinal planes at 85 mm on either side of the reference line.

50-1.5.2 Parts of the front and rear faces of the head restraint (excluding parts of the rear faces of head restraints designed to be installed in seats behind which no other seating positions are provided.), which are situated outward of the longitudinal vertical planes defined above shall be so padded as to prevent any direct contact of the head with the components of the structure, which shall, in those areas which can be contacted by a 165 mm-diameter sphere, have a radius of curvature of not less than 5 mm. Alternatively, these components may be considered satisfactory if they pass the energy-dissipation test. If the above-mentioned parts of the head restraints and their supports are covered with material softer than 50 Shore (A) hardness, the requirements of this paragraph, with the exception of those relating to energy-dissipation, shall apply only to the rigid parts.

50-1.5.3 The head restraint shall be anchored to the seat or, where appropriate, to the vehicle structure, in such a way that no rigid and dangerous part projects from the padding of the head restraint, from the anchorage or from the seat back as a result of the pressure exerted by the head during the test.

50-1.5.4 The head restraint’s height shall conform to the following specifications:

50-1.5.4.1 For head restraints not adjustable for height, the height shall be not less than 700 mm in the case of front seats and 650 mm in the case of other seats.

50-1.5.4.2 For head restraints adjustable for height:

50-1.5.4.2.1 the height shall be not less than 700 mm in the case of front seats and 650 mm in the case of other seats; this value shall be obtained in a position between the highest and lowest positions to which adjustment is possible;

50-1.5.4.2.2 there shall be no "use position" resulting in a height of less than 650 mm;

50-1.5.4.2.3 in the case of seats other than the front seats the head restraints may be such that they can be displaced to a position resulting in a height of less than 650 mm, provided that such position is clearly recognizable to the occupant as not being included for the use of the head restraint;

50-1.5.4.2.4 in the case of front seats head restraints may be such that they can be automatically displaced when the seat is not occupied, to a position resulting in a height of less than 650 mm, provided that they automatically return to the position of use when the seat is occupied.

50-1.5.4.3 The dimensions mentioned in paragraphs 50-1.5.4.1 and 50-1.5.4.2.1 above, may be less than 700 mm in the case of front seats and 650 mm in the case of other seats to leave adequate clearance between the head restraint and the interior surface of the roof, the windows or any part of the vehicle structure; however, the clearance shall not exceed 25 mm. In the case of seats fitted with displacement and/or adjustment systems, this shall apply to all seat positions. Furthermore, by derogation to paragraph 50-1.5.4.2.2 above, there shall not be any "use position" resulting in a height lower than 600 mm.

50-1.5.4.4 By derogation to the height requirements mentioned in paragraphs 50-1.5.4.1 and 50-1.5.4.2.1 above, the height of any head restraint designed to be provided in rear centre seats or seating positions shall be not less than 600 mm.

50-1.5.5 The height of the head rests device, measured as prescribed in paragraph 50-1.4.1 above, for the head rest of adjustable height, the height of the head rest itself shall be not less than 100 mm.

50-1.5.6 The gap between the seatback and the head restraint shall conform to as follows:

50-1.5.6.1 In the case of a head restraint not adjustable for height, the area to be considered is above a plane perpendicular to the reference line at 540 mm from the R point and between two vertical longitudinal planes passing at 85 mm on either side of

the reference line. There shall be no gap of head restraint and any gap between head restraint's bottom and seat-back's top more than 60 mm In this area. One or more gaps of more than 60 mm are permitted provided that the requirements of paragraph 50-1.5.8 below are still met.

50-1.5.6.2 If the head restraint is adjustable for height it shall, in its lowest position, be not more than 25 mm from the top of the seat back. One or more gaps of more than 60 mm are permitted on the part of the device serving as the head restraint provided that the requirements of paragraph 50-1.5.8 below are still met.

50-1.5.7 The width of the head restraint shall be such as to provide suitable support for the head of a person normally seated. In the plane of measurement of width defined in paragraph 50-1.4.2 above, the head restraint shall cover an area extending not less than 85 mm to each side of the plane of symmetry of the seat for which the head restraint is intended.

50-1.5.8 The head restraint and its anchorage shall be such that the maximum backward displacement of the head permitted by the head restraint and measured in conformity with the test procedure of Effectiveness of the device prescribed in paragraph 50-1.4.3 above is less than 102 mm.

50-1.5.9 The head restraint and its anchorage shall be strong enough to bear without failure the load prescribed in paragraph 50-1.4.3.2.7.

50-1.5.10 If the head restraint is adjustable, it must not be possible to exceed the maximum prescribed height for use without voluntary action by the user in addition to adjusting operation.

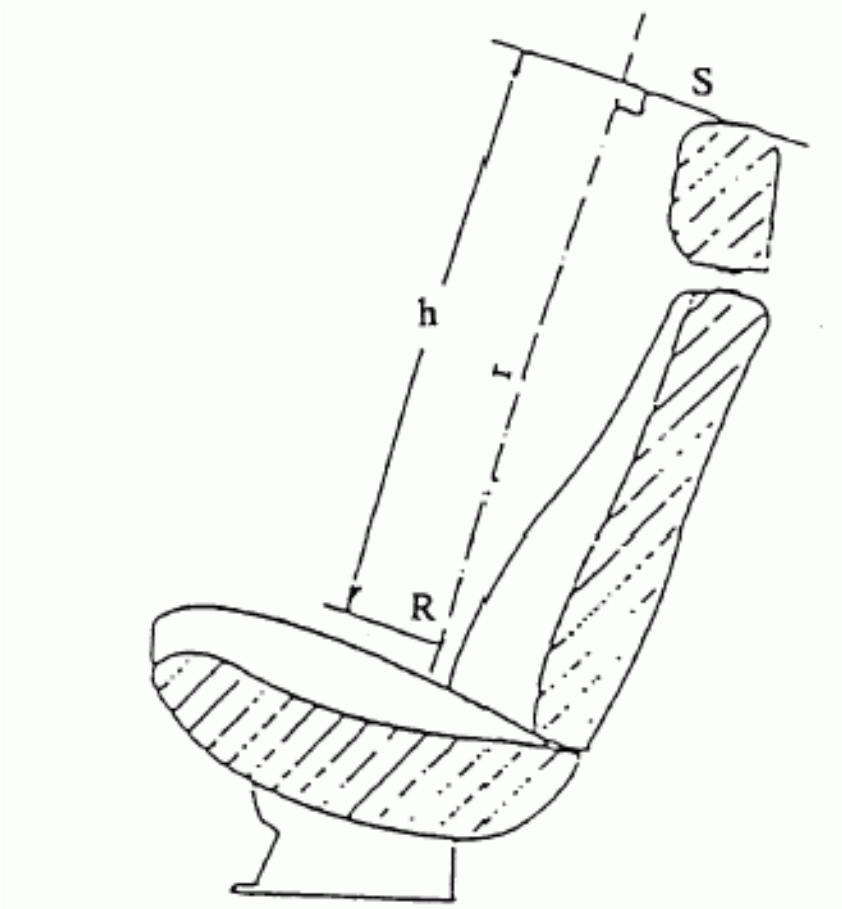


Fig. 1 Determination of height of head restraint

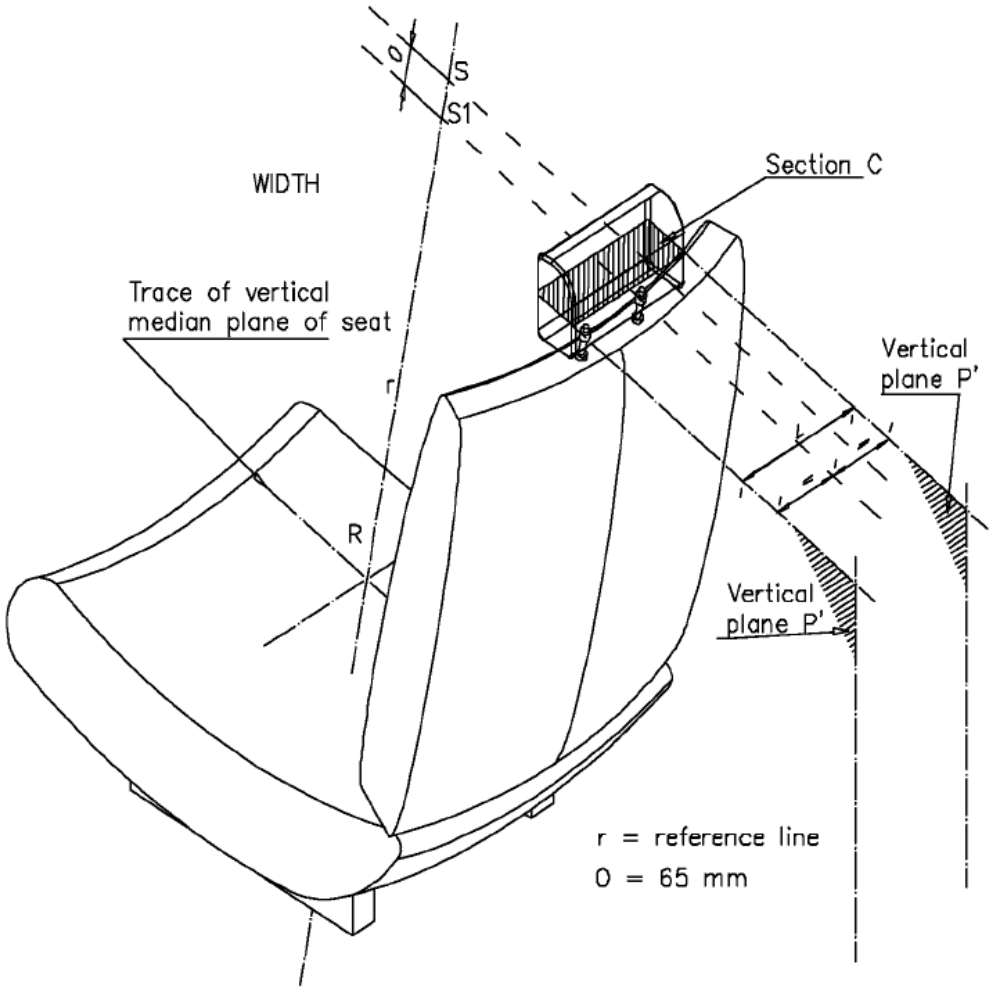


Fig 2. Determination of width of head restraint

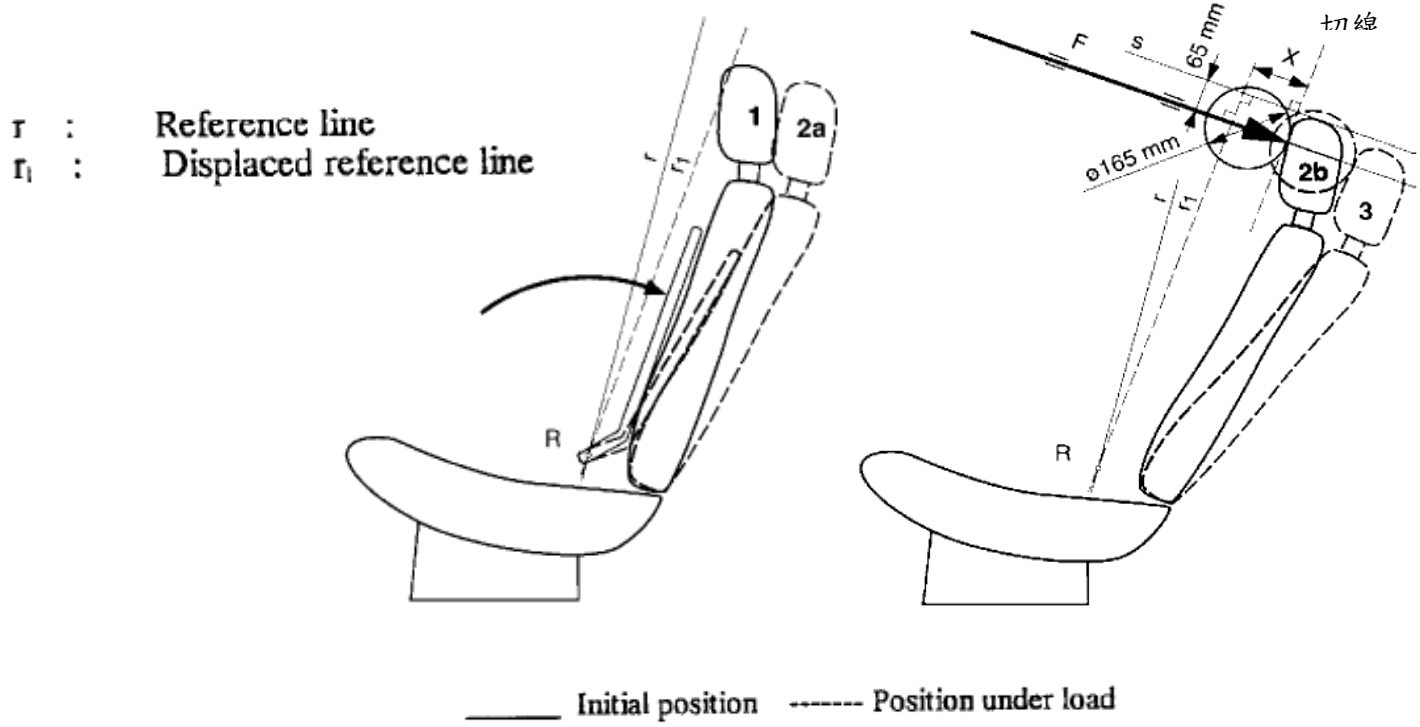


Fig. 3 Details of lines drawn and measurements taken during tests

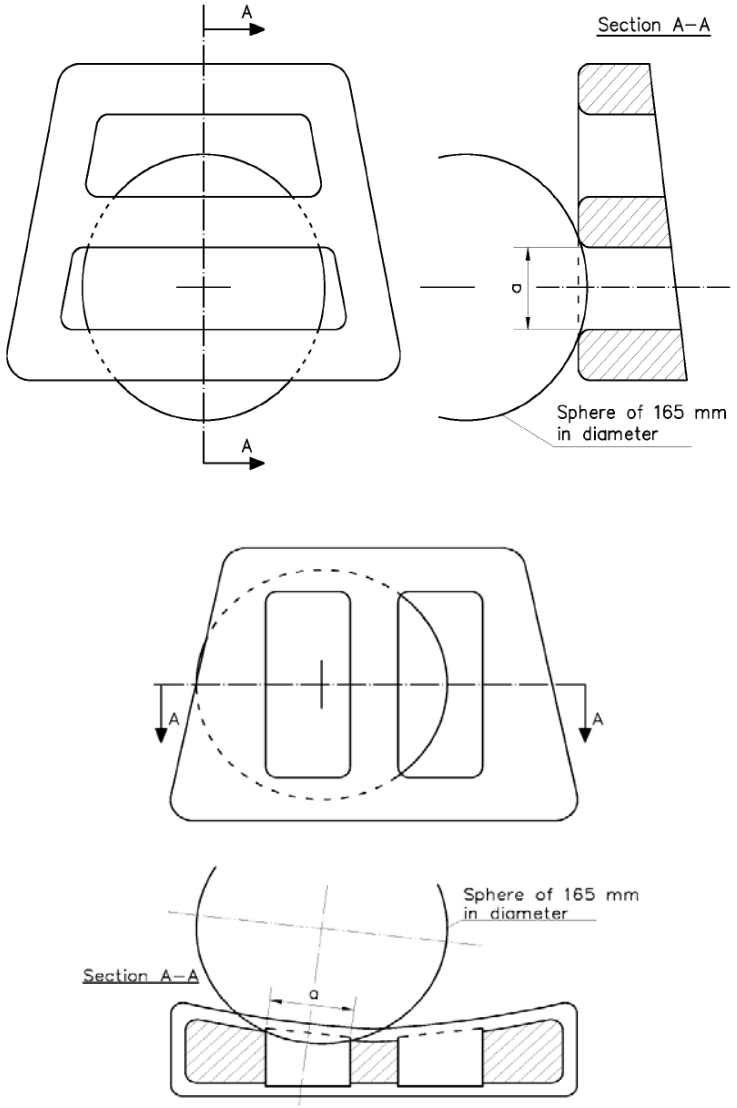


Fig. 4 Determination of head restraint Gaps