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EAST AFRICAN STANDARD

**Motor vehicle safety — Head restraints (passenger cars) —
Specification**

EAST AFRICAN COMMUNITY

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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Motor vehicle safety — Head restraints (passenger cars) — Specification

1 Scope

This specification applies to head restraints (head rests):

- forming an integral part of the seatback, or
- designed to be installed on the seat,

of motor vehicles as defined in item 3.9 and intended for separate use, i.e. as individual equipment by adult occupants of forward-facing seats.

2 Normative references

The following referenced documents are indispensable for the application of this East African Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EAS 465:2007, *Anchorage for automobile seat belts — Specification*

3 Definitions

3.1

vehicle type with regard to head restraints

vehicles which do not differ in such essential respects as:

3.1.1

the lines and internal dimensions of the bodywork constituting the passenger compartment; and

3.1.2

the types and dimensions of the seats

3.2

head restraint

a device whose purpose is to limit the rearward displacement of the occupant's head in relation to his torso in order to reduce the danger of injury to the cervical vertebrae in the event of an accident. This device may or may not form an integral part of the seatback.

3.3

type of seat

seats which do not differ in their dimensions, in their framework or in their padding, although they may differ in finish or colour

3.4

type of head restraint

head restraints which do not differ in their dimensions, in their framework or in their padding, although they may differ in finish, colour or covering

3.5 H point

As defined in EAS 465.

3.6

R point or seating reference point

As defined in EAS 465.

3.7

Reference line *r*

Reference line *r* means a straight line which either on a test manikin having the mass and dimensions of an average 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. On the manikin referred to in EAS 465 the reference line is that shown in Figure 1 of that specification.

3.8

Head line

Head line means a straight line passing through the centre 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.

3.9

vehicle

any Category M₁ motor vehicle (i.e. a vehicle used for the conveyance of passengers and containing not more than eight seats, including the driver's seat) intended for use on the road and having a maximum design speed exceeding 25 km/h

4 General requirements

4.1 The presence of the head restraint in a vehicle 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. Parts of the head restraint which are situated in the impact zone defined below shall be capable of dissipating energy in the manner specified in Annex D to this specification.

4.1.1 The impact zone shall be 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 concerned.

4.1.2 The impact zone shall be 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 *R* point.

4.2 Parts of the front and rear faces of the head restraint which are situated outward of the said vertical longitudinal planes shall be so padded as to prevent any direct contact of the head with the structural components, which shall in those areas have a radius of curvature of not less than 5 mm.

4.3 The head restraint shall be anchored to the seat in such a way that no rigid and dangerous part projects from the padding of the head restraint, from the anchorage or from the seatback as a result of the pressure exerted by the head during the test.

4.4 The height of the head restraint, measured as described in 5.2, shall not be less than 700 mm above the seating reference point *R*.

4.5 The height of the device on which the head rests, measured as described in 5.2, shall, in the case of a head restraint adjustable for height, not be less than 100 mm.

4.6 There shall be no gap of more than 50 mm between the seatback and the head restraint in the case of a device not adjustable for height. If the head restraint is adjustable for height, it shall, when in the low position, be no more than 25 mm from the top of the seatback.

4.7 The width of the head restraint shall be such as to provide suitable support for the head of a person seated normally. In the plane of measurement of width defined in 5.3, 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, that distance being measured in accordance with 5.3.

4.8 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 static procedure laid down in 5.4 is less than 102 mm.

4.9 The head restraint and its anchorage shall be strong enough to bear without failure the load specified in 5.4.3.7.

5 Tests

5.1 Verification of the R point of the seat in which the head restraint is to be incorporated

This point is verified in accordance with the requirements of Annex A.

5.2 Determination of the height of the head restraint

5.2.1 All lines shall be drawn in the plane of symmetry of the seat concerned, the intersection of which plane with the seat determines the contour of the head restraint and of the seatback (see Annex B, Figure 1).

5.2.2 The corresponding to an average adult male or the manikin referred to in EAS 465 shall be placed in a normal position on the seat. The seatback, if inclinable is locked in a position corresponding to a rearward inclination of the reference line of the manikin's torso of as nearly as possible 25° from the vertical, unless otherwise specified by the manufacturer.

5.2.3 The projection of the reference line of the manikin referred to in EAS 465 is then, in the case of the seat concerned, drawn in the plane specified in 5.2.1. The tangent S to the top of the head restraint is drawn perpendicular to the reference line.

5.2.4 The distance h from the R point to the tangent S is the height to be taken into consideration in implementing the requirement of 4.4.

5.3 Determination of the width of the head restraint

(See Annex B, Figure 2).

5.3.1 The plane S_1 perpendicular to the reference line and situated 65 mm below the tangent S defined in 5.2.3 defines a section in the head restraint bounded by the outline C. The direction of the straight lines tangential to C representing the intersection of the plane S_1 and the vertical planes (P and P_1 parallel to the plane of symmetry of the seat concerned, are drawn in the plane S_1 .

5.3.2 The width of the head restraint to be taken into consideration in implementing the requirements of 6.7 is the distance L separating the projections of planes P and P_1 in plane S_1 .

5.3.3 The width of the head restraint shall, if necessary, also be determined 635 mm above the seating reference point, this distance being measured along the reference line.

5.4 Determination of the effectiveness of the device

5.4.1 The effectiveness of the head restraint is to be checked by the static test described below.

5.4.2 Preparation for the test

5.4.2.1 If the head restraint is not an integral part of the seat, it shall be set in the highest position.

5.4.3 Testing

5.4.3.1 All lines shall be drawn in the vertical plane of symmetry of the seat concerned (see Annex C).

5.4.3.2 A projection of the reference line r is drawn in the plane referred to in 5.4.3.1.

5.4.3.3 The displaced reference line r_1 is determined by applying to the part simulating the back in the manikin referred to in EAS 465 an initial force producing a rearward moment of 373 N.m about the R point.

5.4.3.4 By means of a spherical head 165 mm in diameter an initial force producing a moment of 373 N.m about the R point is applied at right angles to the displaced reference line r_1 , at a distance of 65 mm below the top of the head restraint.

5.4.3.5 The tangent Y to the spherical head, parallel to the displaced reference line r_1 is determined.

5.4.3.6 The distance X between the tangent Y and the displaced reference line r_1 is measured. The requirement of 4.8 is deemed to be met if the distance X is less than 102 mm.

5.4.3.7 The initial load used in 5.4.3.4 is increased to 890 N unless breakage of the seat or the seat-back occurs earlier.

6 Instructions

With each type of head restraint, the manufacturer shall supply particulars of the types and characteristics of the seats for which the head restraint is approved and, where appropriate, the directions to the user of the head restraint on how to fit it correctly to the seats concerned.

NOTE This information is not required when the vehicle manufacturer supplies head restraints already installed in the vehicle.

7 Inspection

Visually examine each unit in the sample for compliance with all the relevant requirements of the specification for which tests to assess compliance are not given in 5.1 – 5.4 (inclusive).

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Annex A

Procedures for determining the 'H¹' point and the actual seatback angle and for verifying the relative positions of the R and H points and the relationship between the design seatback angle and the actual seatback angle

The relevant procedure given in EAS 465 shall apply.

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Annex B

Determination of height and width of head restraint

Standard

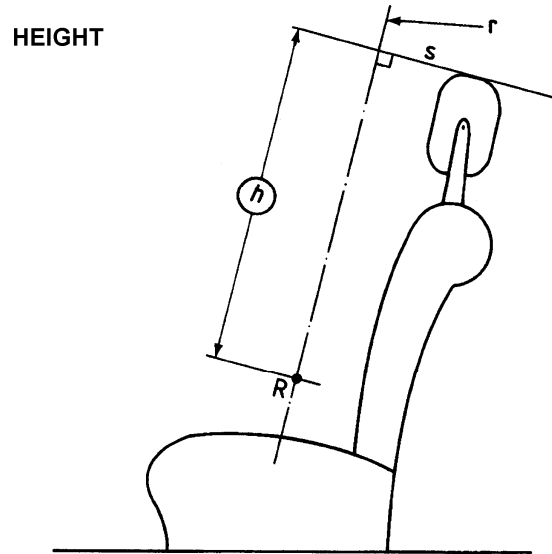


Figure 1 — Determination of height

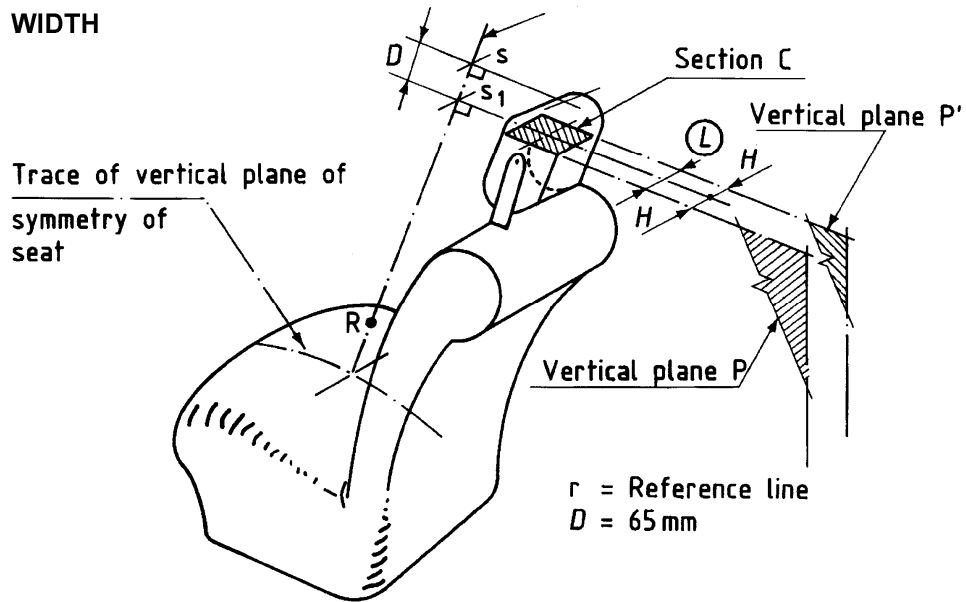


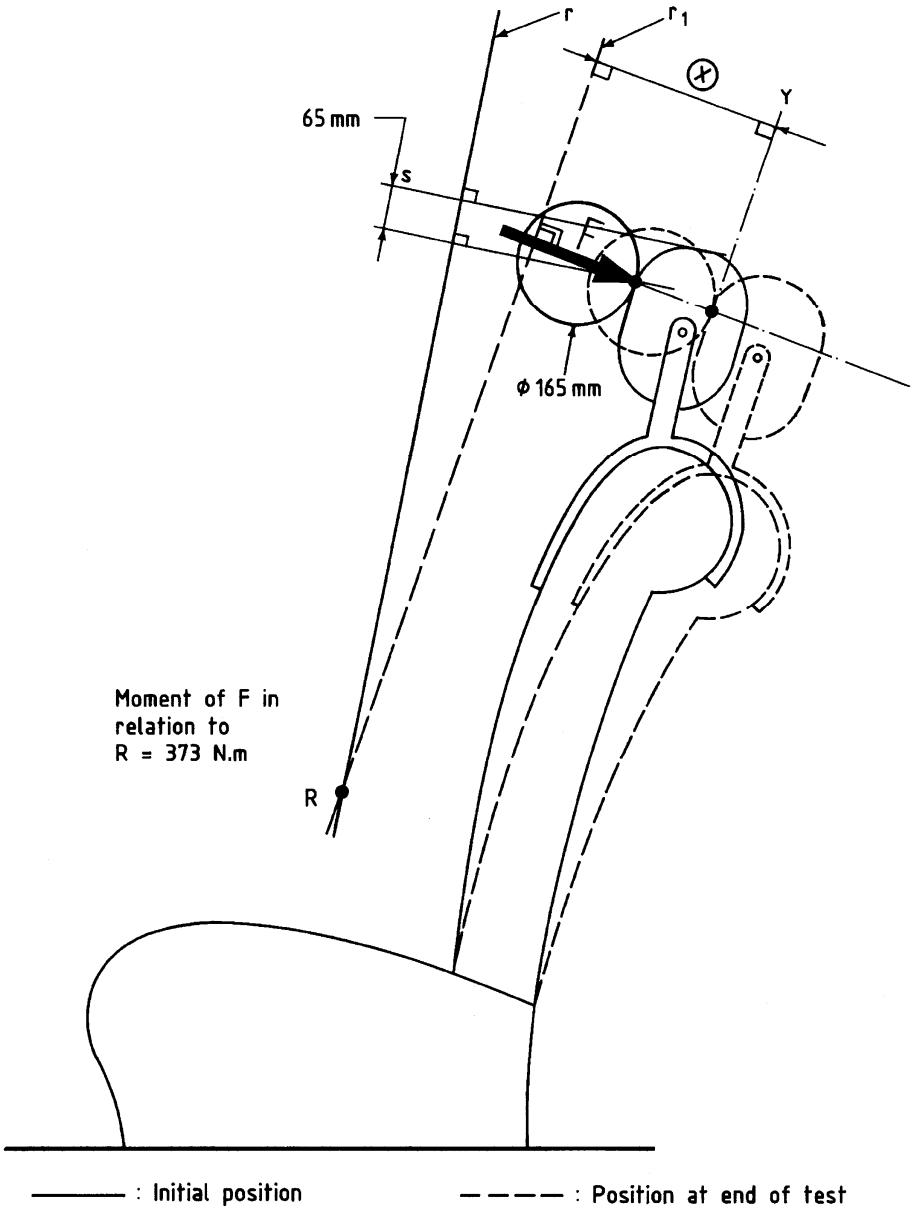
Figure 2 — Determination of width

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Annex C

Details of lines drawn and measurements taken during test



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Annex D

Test procedure for checking energy dissipation

D.1 Setting up, test apparatus, recording instruments and procedure

D.1.1 Setting up

The head restraint shall be fitted and tested on the seat of the vehicle for which it is intended. The seat shall be firmly secured to the test bench so that it does not move under impact.

D.1.2 Test apparatus

D.1.2.1 This apparatus consists of a pendulum whose pivot is supported by ball-bearings and whose reduced mass¹⁾ 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.

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

D.1.3 Recording instruments

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

D.1.3.1 Acceleration

- accuracy: ± 5 % of the real value,
- frequency response: up to 1000 Hz,
- cross-axis sensitivity: < 5 % of the lowest point on the scale.

D.1.3.2 Speed

- accuracy: ± 2.5 % of the real value,
- sensitivity: 0.5 km/h.

1.3.3 Time recording

- the instrumentation shall enable the action to be recorded throughout its duration and readings to be made to within one thousandth of a second,
- the beginning of the impact at the moment of first contact between the headform and the head restraint being tested is noted on the recordings used for analysing the test.

D.1.4 Test procedure

D.1.4.1 The surface to be tested shall be so placed that the pendulum will strike the surface perpendicular to the point concerned.

¹⁾ The relationship of the reduced mass "m_r" of the pendulum to the total mass '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:

$$m_r = m \frac{l}{a}$$

D.1.4.2 The headform shall strike the test item at a speed of 24.1 km/h this speed being achieved either by the mere energy of propulsion or by using an additional propelling device.

D.2 Results

In tests carried out by the above procedure, the deceleration of the headform shall not exceed 785 m/s^2 continuously for more than three milliseconds. The deceleration rate is taken as the average of the readings on the two decelerometers.

D.3 Equivalent procedures

D.3.1 Equivalent test procedures are permitted on condition that the results required in D.2 can be obtained.

D.3.2 Responsibility for demonstrating the equivalence of a method other than that described in D.1 rests with the person using such a method.

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