CD/K/021:2008
ICS 43.040.50

EAST AFRICAN STANDARD

Motor vehicle safety — Steering mechanism of motor vehicles (Category M_1 only) — Behaviour on impact

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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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East African Community

P O Box 1096

Arusha

Tanzania

Tel: 255 27 2504253/8

Fax: 255-27-2504481/2504255

E-Mail: eac@eachq.org

Web: www.each.int

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Contents

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Motor vehicle safety — Steering mechanism of motor vehicles (Category M_1 only) — Behaviour on impact

1 Scope

This specification covers the behaviour of the steering mechanism of Category M_1 motor vehicles as defined in CD/K/045:2008 (other than forward control vehicles), when it is subjected to the following two types of force:

a) Forces produced by a frontal collision which may cause rearward displacement of the steering column.

b) Forces due to the inertia of the mass of the driver in the event of impact against the steering column in a frontal collision.

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.

UNECE R 21, *Interior fittings*

CD/K/045:2008, *Road vehicles — Types — Terms and definitions*

CD/K/046:2008, *Road vehicles — Dimensions of motor vehicles and towed vehicles — Terms and definitions*

3 Definitions

For the purposes of this specification

3.1
'Behaviour of the steering mechanism in the event of an impact'
shall mean the behaviour of this mechanism under the effect of two types of force, i.e:

3.1.1
those resulting from a frontal collision which may produce displacement towards the rear of the steering column,

3.1.2
those due to the inertia of the mass of the driver in the event of an impact against the steering column in a frontal collision.

3.2
'Vehicle type'
means a category of motor vehicles which do not differ in such essential respects as:

3.2.1
the structure, dimensions, lines and constituent materials of that part of the vehicle forward of the steering control;

3.2.2
the maximum permissible mass of the vehicle.

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3.3
'Steering control'
means the steering device, usually the steering wheel, which is actuated by the driver.

3.4
'Steering column'
means the housing enclosing the steering shaft.

3.5
'Steering shaft'
means the component which transmits to the steering gear the torque applied to the steering control.

3.6
'Steering mechanism'
means the aggregate comprising the steering control, the steering column, the assembly accessories, the steering shaft, the steering gear housing, and all other components such as those designed to contribute to the absorption of energy in the event of impact against the steering wheel.

3.7
'Forward control'
means a configuration in which more than half of the engine length is rearward of the foremost point of the windshield base and the steering wheel hub is in the forward quarter of the vehicle length.

4 Requirements

4.1 When the unladen vehicle without a dummy is collision-tested against a barrier at a speed of 48.3 km/h, the top of the steering column and its shaft shall not move backwards, horizontally and parallel to the longitudinal axis of the vehicle, by more than 127 mm in relation to a point of the vehicle not affected by the impact, the distance being determined by dynamic measurement.

4.2 When the steering control is struck by a body block released against this control at a relative speed of at least 24.1 km/h, the force exerted on the 'chest' of the body block by the steering control shall not exceed 11.11 kN.

4.2.1 The steering control shall be so designed, constructed and fitted as not to comprise either any dangerous roughness or sharp edges likely to increase the danger or severity of injuries to the driver in the event of impact.

4.2.2 The steering control shall be so designed, constructed and fitted as not to embody components or accessories, including the horn control and assembly accessories, capable of catching in the driver's clothing or jewellery in normal driving movements.

5 Tests

Compliance with the requirements of Clause 4 shall be checked in accordance with the methods set out in Annexes A and B.

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Annex A

Frontal impact test against a barrier

A.1 Purpose

The purpose of this test is to verify whether the vehicle satisfies the requirements set forth in 4.1.

A.2 Installations, procedures and measuring instruments

A.2.1 Testing site

The test area shall be large enough to accommodate the run-up track, barrier and technical installations necessary for the test. The last part of the track, for at least 5 m before the barrier shall be horizontal, flat and stabilized.

A.2.2 Barrier

The barrier shall consist of a block of reinforced concrete at least 3 m wide, at least 1.5 m high and at least 0.6 m thick. The collision wall shall be perpendicular to the last part of the run-up track and be covered with plywood 20 mm thick. At least 90 metric tons of earth shall be banked up behind the concrete block. The concrete and earth barrier may be replaced by obstacles, having the same frontal area and producing equivalent results.

A.2.3 Propulsion of vehicle

At the moment of impact the vehicle shall be moving freely as a result of its propulsion. It shall reach the obstacle on a course perpendicular to the collision wall; the maximum lateral disalignment tolerated between the vertical median line of the front of the vehicle and the vertical median line of the collision wall shall be ± 300 mm.

A.2.4 State of vehicle

During the test, the vehicle shall be fitted with all its normal parts and equipment. In addition, objects in the passenger compartment shall he prevented from accidentally striking the steering wheel (tip-up driver's seat, rear seat cushion, etc.).

A.2.5 Speed

The speed at the time of impact shall be between 48.3 km/h and 53.1 km/h.

A.2.6 Measuring instruments

A.2.6.1 The instrument used to record the measurements referred to in A.3.1 shall have the following degrees of accuracy:

A.2.6.1.1 speed of vehicle: within 1 %

A.2.6.1.2 time recording: within 1 ms

A.2.6.1.3 the beginning of the impact (zero point) at the moment of first contact of the vehicle with the obstacle shall be reproduced on the recordings and films used for evaluating the test.

A.2.6.2 The distance referred to in Item 3.1 shall be measured to within ± 5 mm.

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A.3 Results

A.3.1 To determine the rearward movement of the steering control, a recording shall be made [1)] during the collision, of the variation in the distance — measured horizontally and parallel to the longitudinal axis of the vehicle — between the top of the steering column (and shaft) and a point on the vehicle that is not affected by the impact. If the speed measured is higher than the nominal speed of 48.3 km/h, this displacement shall be reduced to the corrected value appropriate to the nominal speed by multiplying it by the square of the ratio between this nominal speed and the speed measured.

A.3.2 After the test, the damage sustained by the vehicle shall be described in a written report; at least one photograph shall be taken of each of the following views of the vehicle:

A.3.2.1 sides (right and left),

A.3.2.2 front,

A.3.2.3 bottom,

A.3.2.4 affected area inside the passenger compartment.

A.4 Equivalent test methods

Equivalent non-destructive test methods are permitted, provided that the results referred to in Item 3 can be obtained either entirely by means of the substitute test, or by calculation from the results of the substitute test. If a method other than that described in A.2 and A.3 is used, its equivalence shall be demonstrated.

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[1)] This recording may be replaced by maximum and minimum measurements.

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Standard

Annex B

Test for energy absorption capacity in the event of impact against the steering control

B.1 Purpose

The purpose of this test is to verify whether the vehicle meets the requirements set forth in 4.2.

B.2 Installations, procedures and measuring instruments

B.2.1 Mounting of the steering control

B.2.1.1 The control shall be mounted on the front section of the vehicle obtained by cutting the body transversely at the level of the front seats, and possibly eliminating the roof, windscreen and doors. This section shall be fixed rigidly to the test bench, so that it does not move under the impact of the body block.

B.2.1.2 However, at the request of the manufacturer, the steering control may be mounted on a framework simulating the mounting of the steering mechanism, provided that, as compared with the actual 'front body section and steering' of the vehicle, the 'framework and steering' assembly has

B.2.1.2.1 the same geometrical lay-out,

B.2.1.2.2 a greater rigidity.

B.2.2 During the first test, the steering control shall be turned so that its most rigid spoke is perpendicular to the point of contact with the body block; if the steering control is a steering wheel, the test shall be repeated with the most flexible part of the steering wheel perpendicular to this point of contact. In the case of an adjustable steering control, both tests shall be made with the wheel adjusted to the middle position.

B.2.3 Body block

The body block shall have the shape, dimensions, mass and characteristics shown in Figure 1.

B.2.4 Measurement of forces

B.2.4.1 Measurements shall be made of the maximum force, acting horizontally and parallel to the longitudinal axis of the vehicle, applied to the body block as a result of impact against the steering control.

B.2.4.2 This force may be measured directly or indirectly, or may be calculated from values measured during the test.

B.2.5 Propulsion of the body block

Any method of propulsion may be used, provided that when the body block strikes the steering control, the body black is free from all connection with the propelling device. The body block shall strike this control after an approximately straight trajectory, parallel to the longitudinal axis of the front section of the vehicle, The initial contact of the body block with the steering control shall take place at the point where contact will normally occur when a man of mass 75.3 kg and having a height of 1.73 m, occupying the driver's seat of the vehicle (set at the most on forward position), is thrown forward, parallel to the longitudinal axis of the vehicle, until he touches the steering wheel.

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B.2.6 Speed

The body block shall strike the steering control at a speed of at least 24.1 km/h and as near to this speed as possible.

B.2.7 Measuring instruments

B.2.7.1 The instrument used to record the measurements referred to in B.3.2 below shall have the following degrees of accuracy:

B.B.2.7.1.1 speed of body block: within 2 %

B.2.7.1.2 time recording: within 1 ms

B.2.7.1.3 the beginning of the impact (zero point) at the moment of first contact of the body block with the steering control shall be reproduced on the recordings and films used for evaluating the test,

B.2.7.1.4 measurement of force: the measuring range shall be 33.2 kN The force shall be recorded without distortion for phenomena having frequencies up to 1 kHz with an accuracy of 2.5 % of the maximum measuring range or ± 5 % of the real value,

B.2.7.1.5 transverse sensitivity: below 5 % of the measuring range.

B.3 Results

B.3.1 After the test, the damage sustained by the steering mechanism shall be ascertained and described in a written report; at least one side view and one front view of the 'steering control/steering column/instrument panel' area shall be photographed.

B.3.2 A recording shall be made, during the collision, of the total forces applied to the chest of the body block by the steering control, measured as described in B.2.7.

B.4 Equivalent test methods

Equivalent non-destructive test methods are permitted, provided that the results referred to in Item 3 can be obtained either entirely by means of the substitute test, or by calculation from the results of the substitute test. If a method other than that described in B.2 and B.3 is used, its equivalence shall be demonstrated.

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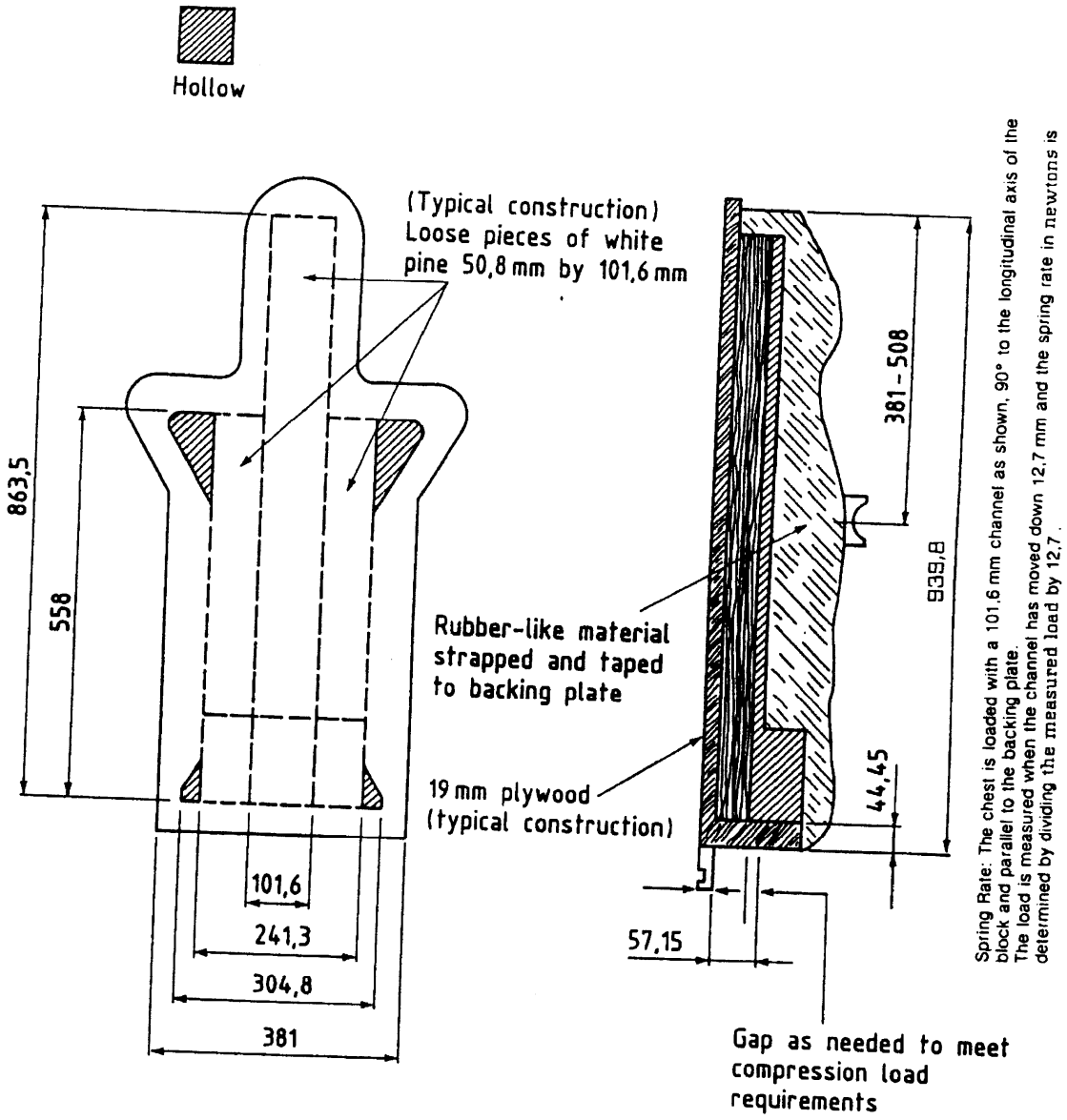

Body block, 34-36.3 kg. 50th percentile torso shape block, spring rate: 105 – 140 N/mm.

Dimensions in millimeters

Figure 1 — Body Black

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