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Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

IS 15223 (2002): Automotive Vehicles - Interior Fittings
[TED 6: Automotive Body, Chassis, Accessories and Garage Equipments]
Indian Standard

AUTOMOTIVE VEHICLES — INTERIOR FITTINGS — SPECIFICATION

ICS 43.040

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002
FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Body, Chassis, Accessories and Garage Equipment Sectional Committee had been approved by the Transport Engineering Division Council.

In the preparation of this standard assistance has been derived from ECE Regulation No. 21 'Uniform provisions concerning the approval of vehicles with regard to their interior fittings'.

The purpose this standard is to ensure the safety of the passengers travelling in M 1 category of vehicles.

The regulatory authorities, may decide upon the matter concerning approval of vehicles with regard to their interior fittings, modifications of the vehicles type etc and their implementation.

The composition of the Committee responsible for formulation of this standard is given in Annex E.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.
Indian Standard

AUTOMOTIVE VEHICLES — INTERIOR FITTINGS — SPECIFICATION

1 SCOPE
This standard covers the requirement of interior fittings for M1 category of vehicles in respect of following:

   a) The interior parts of the passenger compartment other than the rear-view mirror or mirrors;
   b) The arrangement of the controls;
   c) The roof and the sliding roof; and
   d) The seat-back and the rear parts of seats.

2 REFERENCES
The following Indian Standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Title</th>
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<tbody>
<tr>
<td>13749:1993</td>
<td>Automotive vehicles — Determination of H-point — Method of test</td>
</tr>
</tbody>
</table>

3 TERMINOLOGY
The following definitions shall apply,

3.1 Vehicle Type
Vehicle type with regard to the interior fittings of the passenger compartment (other than rear view mirrors, the arrangement of controls, the roof or sliding roof, the back rest and the rear part of the seats) means power driven motor vehicles which do not differ in such essential respect as:

   a) The arrangement of controls; and
   b) The lines and constituent materials of the body work of the passenger compartment.

3.2 Reference Zone
The head impact zone as defined in Annex A except:

   a) The area bounded by the forward horizontal projection of a circle circumscribing the outer limits of the steering control, increased by a peripheral band 127 mm in width; this area is bounded below by the horizontal plane tangential to the lower edge of the steering control when the latter is in the position for driving straight ahead;
   b) The part of the surface of the instrument panel comprised between the edge of the area specified in (a) above and the nearest inner side-wall of the vehicle; this part of the surface is bounded below by the horizontal plane tangential to the lower edge of the steering control; and
   c) The windscreens side pillars.

3.3 Level of the Instrument Panel
The line defined by the points of contact of vertical tangents to the instrument panel.

3.4 Roof
The upper part of the vehicle extended from the upper edge of the windscreens to the upper edge of the rear window, bounded at the sides by the upper framework of the side-walls.

3.5 Belt Line
It is the line constituted by the transparent lower contour of the side windows of the vehicle.

3.6 Convertible Vehicle
It is a vehicle where, in certain configurations there is no rigid part of the vehicle body above the belt line with exception of the front roof supports and/or the roll-over bars and/or the safety belt anchorage points.

3.7 Vehicle with Opening Roof
It is a vehicle of which only the roof or a part of it can be folded back or be opened, or may slide, leaving the existing structural elements of the vehicle above the belt line.

3.8 Folding (Tip-up) Seat
It is an auxiliary seat intended for occasional use and is normally folded out of the way.

4 SPECIFICATION
4.1 Forward Interior Parts of the Passenger Compartment above the Level of the Instrument Panel in Front of the Front Seat H-Point, Excluding the Side Doors

4.1.1 The reference zone shall not contain any
dangerous roughness or sharp edges which may cause injury to the occupants.

4.1.2 Vehicle parts within the reference zone with the exception of those which are not part of the instrument panel and which are placed at less than 10 cm from glazed surfaces shall be energy dissipating as prescribed in Annex B. Those parts within the reference zone which satisfy both of the following conditions shall also be excluded from consideration if:

a) During a test in accordance with the requirements of Annex B, the pendulum makes contact with parts outside the reference zone; and

b) The parts to be tested are placed less than 10 cm away from the parts contacted outside the reference zone. This distance being measured on the surface of the reference zone, any metal support fittings shall have no protruding edges.

4.1.3 The lower edge of the instrument panel shall, unless it meets the requirement of point 4.1.2 above, shall be rounded to a radius of curvature of not less than 19 mm.

4.1.4 Switches, pull-knobs etc made of rigid material which measured in accordance with the method described in Annex C project from 3.2 mm to 9.5 mm from the panel, shall have a cross-sectional area of not less than 2 cm² measured 2.5 mm from the point projecting farthest, and shall have rounded edges with a radius of curvature of not less than 2.5 mm.

4.1.5 If these components project more than 9.5 mm from the surface of the instrument panel, they shall be so designed and constructed as to be able, under the effect of a longitudinal horizontal force of 37.8 daN delivered by a flat ended ram of not more than 50 mm diameter, either to retract into the surface of the panel until they do not project by more than 9.5 mm or to become detached. In the latter case, no dangerous projections of more than 9.5 mm shall remain; a cross-section not more than 6.5 mm from the point of maximum projection shall be not less than 6.5 cm² in area.

4.1.6 In the case of a projection consisting of a component made of non-rigid material of less than 50 shore A hardness mounted on a rigid support, the requirements of points 4.1.4 and 4.1.5 shall apply only to the rigid support.

4.2 Forward Interior Parts of the Passenger Compartment below the Level of the Instrument Panel and in Front of the Front Seat H-Point, Excluding the Side Doors and the Pedals

4.2.1 Except for the pedals and their fixtures and those components that cannot be contacted by the device described in Annex D and used in accordance with the procedure described there, components covered by 4.2 shall comply with the requirements of 4.1.4 to 4.1.6.

4.2.2 The handbrake control, if mounted on or under the instrument panel, shall be so placed that, when it is in the position of rest, there is no possibility of occupants of the vehicle striking against it in the event of a frontal impact. If this condition is not met, the surface of the control shall satisfy the requirements of 4.3.1 (c).

4.2.3 Shelves and other similar items shall be so designed and constructed that the supports in no case have protruding edges and they meet one or the other of the following conditions.

4.2.3.1 The part facing the vehicle shall present a surface not less than 25 mm high with edges rounded to a radius of curvature of not less than 3.2 mm. This surface shall be covered with an energy dissipating material as defined in Annex B and shall be tested accordingly. The impact being applied in a horizontal longitudinal direction.

4.2.3.2 Shelves and other similar items shall, under the effect of a forward-acting horizontal longitudinal force of 37.8 daN exerted by a cylinder of 110 mm diameter with its axis vertical, become detached; break up, be substantially distorted or retract without producing dangerous features on the rim of the shelf. The force must be directed at the strongest part of the shelves or other similar items.

4.2.4 If the items contain a part made of material less than 50 shore A hardness when fitted to a rigid support, the above requirements except for the requirements covered by Annex B relating to energy absorption, shall apply only to the rigid support.

4.3 Other Interior Fittings in the Passenger Compartment in Front of Transverse Plane Passing Through the Torso Reference Line of the Manikin Placed on the Rearmost Seats

The requirements of 4.3.1 apply to control handles, levers, knobs and to any protruding objects not referred to in 4.1 and 4.2.

4.3.1 If the items referred in 4.3 are so placed that occupants of the vehicle can contact them, they shall meet the requirements of 4.3.1 to 4.3.3. If these items can be contacted by a 165 mm diameter sphere and are above the lowest H-point of the front seats and forward of the transverse plane of the torso reference line of the manikin on the rearmost seat and outside the zones defined in 3.2 (a) and 3.2 (b), these requirements shall be considered to have been fulfilled if:
Their surface shall terminate in rounded edges, the radii of curvature being not less than 3.2 mm;

Control levers and knobs shall be so designed and constructed that, under the effect of a forward-acting longitudinal horizontal force of 37.8 daN either the projection in its most unfavourable position shall be reduced to not more than 25 mm from the surface of the panel or the said fittings shall become detached or bent. In the latter two cases, no dangerous projections shall remain. Window winders may, project 35 mm from the surface of the panel; and

c) The hand brake control, when in the released position, and the gear lever, when in any forward gear position, have, except when placed in the zones given in 3.2 (a) and 3.2 (b) and in the zones below the horizontal plane passing through the H-point of the front seats, shall have a surface area of at least 6.5 cm² measured at a cross-section normal to the longitudinal horizontal direction up to a distance of 6.5 mm from the furthest projecting part, the radius of curvature being not less than 3.2 mm.

4.3.2 The requirement in 4.3.1 (c) shall not apply to floor handbrake controls; for such controls if the height of the any part in the released position is above a horizontal plane passing through the lowest H-point (IS 13749) of the front seats, the control shall have a cross sectional area of at least 6.5 cm² measured in a horizontal plane not more than 6.5 mm from the furthest projecting part. The radius of curvature shall not be less than 3.2 mm.

4.3.3 Other items of equipment in the vehicle not covered by the preceding clauses such as seat slide rails, equipment for regulating the horizontal or vertical part of the seat, devices for rolling up safety belts etc, shall not be subject to any of these provisions if they are situated below a horizontal line passing through the H-point of each seat, even though the occupant is likely to come into contact with such items.

4.3.3.1 Components mounted on the roof but which are not part of roof structure such as grab handles, lights and sunvisors etc. shall have a radius of curvature of not less than 3.2 mm and in addition the width of the projecting parts shall not be less than the amount of their downward projection. Alternatively these components shall pass the energy dissipating test in accordance with the requirements of Annex B.

4.3.4 If the parts considered above comprise a component made of material of less than 50 shore A hardness, mounted on a rigid support, the above requirements shall apply only to the rigid support.

4.4 Roof

4.4.1 The requirements below apply to the inner face of the roof and do not apply to such parts of the roof which cannot be touched by a sphere of 165 mm diameter.

4.4.2 That part of the inner face of the roof which is situated above or forward of the occupants shall exhibit no dangerous roughness at sharp edges, directed rearwards or downwards. The width of the projecting parts shall not be less than the amount of their downward projection and the edges shall have a radius of curvature of not less than 5 mm. In particular, the rigid roof sticks or ribs with the exception of header rail of the glazed surfaces and door frames shall not project downwards more than 19 mm.

4.4.3 If the roof sticks or ribs do not meet the requirements of 4.4.2, they shall pass the energy-dissipating test as prescribed in Annex B.

4.4.4 The metal wires which stretch the lining of the roof and the frames of the sunvisors must have a maximum diameter of 5 mm or be able to absorb the energy as prescribed in Annex B. Non-rigid attachment elements of the frames of the sunvisor shall meet the requirements of 4.3.3.1.

4.5 Vehicles with an Opening Roof

4.5.1 Requirements

4.5.1.1 The following requirements and those of 4.4 above shall apply to vehicles with an opening roof when the roof is in the closed position.

4.5.1.2 In addition, the opening and operating devices shall:

   a) be so designed and constructed as to exclude as far as possible accidental operation,

   b) their surfaces shall terminate in rounded edges, the radius of curvature being not less than 5 mm.

   c) be accommodated, when in the position of rest in areas which cannot be contacted by a sphere 165 mm in diameter. If this condition cannot be met, the opening and operating devices shall, in the position of rest, either remain retracted or be so designed and constructed that, under the effect of a force of 37.8 daN applied in the direction of impact defined in Annex B as the tangent to the trajectory of the headform, either the projection as described in Annex C shall be reduced to not more than 25 mm beyond the surface on which the devices are mounted or the devices shall become detached; in the
latter case no dangerous projections shall remain.

4.6 Convertible Vehicles

4.6.1 In the case of convertible vehicles, only the underside of the top of the roll bar and the top of the wind-screen frame in all its normal utilization positions shall comply with the requirements of 4.4. The system of folding rods or links used to support a non-rigid roof shall, where they are situated above and forward of the occupants, exhibit no dangerous roughness or sharp edges, directed rearwards or downwards.

4.7 Rear Parts of Seats Anchored to the Vehicle

4.7.1 Requirements

4.7.1.1 The surface of the rear parts of seats shall exhibit no dangerous roughness or sharp edges likely to increase the risk or severity of injury to the occupants.

4.7.1.2 Except as provided in 4.7.1.3 to 4.7.1.7, that part of the back of the front seat which is in the head impact zone, defined in Annex A, shall be energy dissipating, as prescribed in Annex B. For determining the head impact zone, the front seats shall, if they are adjustable, be in the rearmost driving position with their backs inclined as near as possible to 25° unless indicated otherwise by the manufacturer.

4.7.1.3 In the case of separate front seats, the rear passengers head impact zone shall extend for 10 cm on either side of the seat central line, in the top part of the rear of the seat back.

4.7.1.4 In the case of seat fitted with head restraint, each test shall be carried out with the head restraint in the lowest position and at a point situated on the vertical line passing through the centre of the head restraint.

4.7.1.5 In the case of a seat which is designed to be fitted in several types of vehicle, the impact zone shall be determined by the vehicle whose rearmost driving seat position is of each of the types considered, the least favourable; the resultant impact zone will be adequate for the other types.

4.7.1.6 In the case of front bench seats, the impact zone shall extend between the longitudinal vertical planes 10 cm outboard of the centre line of each designated outboard seating position. The centre line of each outboard seating position of a bench seat shall be specified by the manufacturer.

4.7.1.7 In the head impact zone outside the limits prescribed in 4.7.1.3 to 4.7.1.6, the seat frame structure shall be padded to avoid direct contact of the head with it; and, in these zones, shall have a radius of curvature of at least 5 mm. These parts may alternately satisfy the energy dissipation requirements specified in Annex B.

4.7.2 These requirements shall not apply to the rearmost seats, to seats facing sideways or rearwards, to back to back or to folding seats. If the impact zones of the seats, head restraints and their supports contain parts covered with material softer than 50 shore A hardness, the above requirements, with the exception of those relating to energy dissipation described in Annex B, shall apply only to the rigid parts.

4.8 Other not Mentioned Fittings

4.8.1 The requirements of 4 shall apply to such fittings not mentioned in previous clauses as according to their location, are capable of being contacted by the occupants in accordance with the various procedures prescribe in 4.1 to 4.7. If the contactable members of such fittings are made of material of less than 50 shore A hardness mounted on a rigid support the requirements shall apply only to the rigid support.
ANNEX A  
(Clauses 3.2)

DETERMINATION OF HEAD IMPACT ZONE

A-1 The head impact zone shall comprise all the non-glazed surfaces of the interior of a vehicle which are capable of entering into static contact with spherical head 165 mm in diameter which is an integral part of a measuring apparatus whose dimensions from the pivotal point of the hip to the top of the head is continuously adjustable between 736 mm and 840 mm.

A-2 The zone must be determined by the following procedure or its graphic equivalent.

A-2.1 The pivotal point of the measuring apparatus shall be placed as follows for each seating position for which the manufacturer has made provisions:

A-2.1.1 In the Case of Sliding Seats
a) At the H-point (see IS 13749), and
b) At a point situated horizontally 127 mm forward of the H-point and either at a height resulting from the variation in the height of the H-point caused by a forward shift of 127 mm or 19 mm.

A-2.1.2 In the Case of Non-sliding Seats
At the H-point of the seat considered.

A-2.2 All points of contact situated forward of the H-point shall be determined for each dimension from the pivoted point to the top of the head capable of being measured by the measuring apparatus within the interior dimension of the vehicle.

A-2.2.1 In the case where the head form, with the arm set at minimum length, overlaps the front seat, from the rear H-point, no contact point is established for this particular operation.

A-2.3 With the measuring apparatus vertical, possible points of contact shall be determined by pivoting it forward and downward through all arcs of vertical planes as far as 90° on either side of the longitudinal vertical plane of the vehicle which passes through the H-point.

A-2.3.1 To determine the points of contact, the length of the arm of the measuring apparatus shall not be changed during any given excursion. Each excursion shall start from a vertical position.

A-3 A point of contact is a point at which the head of the apparatus contacts a part of the interior of the vehicle. The maximum downward movement shall be downward movement to a position where the head is tangential to a horizontal plane situated 25.4 mm above the H-point.

ANNEX B  
(Clauses 4.1.2, 4.2.4, 4.3.3.1, 4.4.3, 4.4.4, 4.7.1.2, 4.7.1.7 and 4.7.2)

PROCEDURE FOR TESTING ENERGY DISSIPATING MATERIALS

B-1 SETTING UP, TEST APPARATUS AND PROCEDURE

B-1.1 Setting Up

B-1.1.1 The component made of energy dissipating material shall be mounted and tested on the structural supporting member on which it is to be installed on the vehicle. The test shall preferably be carried out, where possible, directly on the body. The structural member, or the body, shall be firmly attached to the test bench so that it does not move under impact.

B-1.1.2 However, at the request of manufacturer, the component may be mounted on a fitting simulating installation on the vehicle, on condition that the assembly comprising the component and the fitting has the same geometrical arrangement and a degree of rigidity not lower and an energy dissipating capacity not higher than those of the real assembly comprising the component and structural supporting member.

B-1.2 Test Apparatus

B-1.2.1 The apparatus shall consist 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 shall consist of a rigid headform 165 mm diameter whose centre is identical with the centre of percussion of the pendulum.

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

B-1.3 Recording Instruments

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

**B-1.3.1 Acceleration**

- a) accuracy = ± 5 percent of the real value;
- b) frequency response = up to 1 000 Hz; and
- c) cross axis sensitivity = > 5 percent of the lowest point on the scale.

**B-1.3.2 Speed**

- a) accuracy = ± 2.5 percent of the real value, and
- b) sensitivity = 0.5 km/h.

**B-1.3.3 Time Recording**

- a) The instrumentation shall enable the action to be recorded throughout its duration and readings to be made to within one thousandth of a second, and
- b) The beginning of the impact at the moment of first contact between the headform and the test component shall be noted on the recordings used for analyzing the test.

B-1.4 Test Procedure

**B-1.4.1** At every point of impact on the surface to be tested, the direction of impact shall be the tangent to the trajectory of the headform of the measuring apparatus described in Annex A.

**B-1.4.1.1** For testing the parts as given in 4.3.3.1 and 4.4.3, the arm of the measuring apparatus shall be lengthened until contact is made with the part to be considered, up to a limit of 1 000 mm between the pivot point and the top of the head of the apparatus. However any roof sticks of ribs referred in 4.4.3 which cannot be contacted shall remain subject to the requirement of 4.4.2 with the exception of that relating to the height of the projection.

**B-1.4.2** Where the angle between the direction of impact and the perpendicular to the surface at the point of impact is 5° or less, the test shall be carried out in such a way that the tangent to the trajectory of the centre of percussion of the pendulum coincides with the direction of impact. The headform shall strike the test component 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.

**B-1.4.3** Where the angle between the direction of impact and perpendicular to the surface at the point of impact is more than 5°, the test may be carried out in such a way that the tangent to the trajectory of the centre of percussion of the pendulum coincides with the perpendicular to the point of impact. The test speed shall then be reduced to the value of the normal component of the speed prescribed in point B-1.4.2.

B-2 RESULTS

**B-2.1** In tests carried out according to the above procedures, the deceleration of the headform shall not exceed 80 g continuously for more than 3 milliseconds. The deceleration rate taken shall be the average of the readings of the two decelerometers.

B-3 EQUIVALENT PROCEDURES

**B-3.1** Equivalent test procedures shall be permitted, on condition that the results required in B-2 above may be obtained.

**B-3.2** Responsibility for demonstrating the equivalence of a method other than that described in B-1 shall rest with the person using such method.
ANNEX C
(Clauses 4.1.4 and 4.5.1.2)

METHOD OF MEASURING PROJECTIONS

C-1 To determine the amount by which an item projects in relation to the panel on which it is mounted, a 165 mm diameter sphere shall be moved along and be kept in contact with the component under consideration. The value of projection is the largest of all possible variations \( y \), the variation measured from the centre of sphere perpendicular to the panel.

C-1.1 If the panels and components etc, are covered with materials softer than 50 shore A hardness, the procedure for measuring the projections described above shall apply only after removal of such materials.

C-2 The projection of switches, pull-knobs, etc, situated in the reference area shall be measured by using the test apparatus and procedures described below:

C-2.1 Apparatus

C-2.1.1 The measuring apparatus for projection shall consist of a hemispherical headform 165 mm in diameter, in which there is a sliding ram of 50 mm diameter.

C-2.1.2 Relative positions of the flat end of the ram and the edge of the headform shall be shown on a graduated scale, on which a mobile index shall register the maximum measurement achieved when the apparatus is moved away from the item tested. A minimum distance of 30 mm shall be measurable; the measuring scale shall be graduated in half millimetre to make possible an indication of the extent of the projections in question.

C-2.1.3 Gauging Procedure

C-2.1.3.1 The apparatus shall be placed on a flat surface so that its axis is perpendicular to that surface. When the flat end of the ram contacts the surface, the scale shall be set at zero.

C-2.1.3.2 A 10 mm strut shall be inserted between the flat end of the ram and the retaining surface, a check shall be made to ensure that the mobile index records this measurement.

C-2.1.4 The apparatus for measuring projections is illustrated in Fig. 1.

C-2.2 Test Procedure

C-2.2.1 A cavity shall be formed in the headform by pulling back the ram and the mobile index shall be placed against the ram.

![FIG. 1 APPARATUS FOR MEASURING PROJECTIONS](image-url)
IS 15223:2002

C-2.2.2 The apparatus shall be applied to the projection to be measured so that the headform contacts the maximum surrounding surface area, with a force not exceeding 2 daN.

C-2.2.3 The ram shall be pushed forward until it makes contact with the projection to be measured and the amount of the projection shall be observed on the scale.

C-2.2.4 The headform shall be adjusted to obtain maximum projection. The amount of the projection shall be recorded.

C-2.2.5 If two or more controls are situated sufficiently close for the ram or the headform to contact them simultaneously, they shall be treated as follows:

C-2.2.5.1 Multiple controls, all of which can be contained in the headform cavity, shall be regarded as forming a single projection.

C-2.2.5.2 If other controls prevent normal testing by contacting the headform, they shall be removed and the test shall be conducted without them. They may subsequently be re-installed and tested in their turn with other controls that have been removed to facilitate the procedure.

ANNEX D

(Clause 4.2.1)

APPARATUS AND PROCEDURE FOR APPLICATION OF 4.2.1 OF SPECIFICATION

D-1 Those parts (switches, pull knobs etc.) which can be contacted by using the apparatus and procedure described below shall be considered as being likely to be contacted by the knees of an occupant. Foot-operated controls are fitted as foot pedals.

D-2 APPARATUS

D-2.1 Diagram of Apparatus

All dimensions in millimetres.

FIG. 2 APPARATUS FOR CHECKING KNEE CONTACT OF OCCUPANT
### ANNEX E

( Foreword )

**COMMITTEE COMPOSITION**

Automotive Body, Chassis Accessories and Garage Equipment Sectional Committee, TED 6

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Insert the following after 24.1 km/h:

'or, in case of components which cover an uninflated air bag, at a speed of 19.3 km/h.'