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IS 15139 (2002): Automotive Vehicles -- Safety Belt  
Anchorage - [TED 6: Automotive Body, Chassis, Accessories  
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भारतीय मानक  
स्वचल वाहन — सुरक्षा पेटी स्थिरक — विशिष्टि

*Indian Standard*  
AUTOMOTIVE VEHICLES — SAFETY BELT  
ANCHORAGES — SPECIFICATION

ICS 43.040.60

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**BUREAU OF INDIAN STANDARDS**  
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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 considerable assistance has been taken from AIS O15.2000 AUTOMOTIVE VEHICLES: SAFETY BELT ANCHORAGES — SPECIFICATIONS, prepared by Automotive Industry Standards Committee set up by the Ministry of Road Transport and Highways, Government of India. AIS O15.2000 is further based on ECE Regulation 14.02 'Uniform Provisions Concerning the Approval of Vehicles with Regard to Safety Belt Anchorages' and EEC Directive 76/115/EEC as amended by 96/38/EEC 'Motor Vehicle Safety Belt Anchorages'.

Seats, safety belts, safety belt anchorages, etc, are safety critical items for the passengers in case of sudden deceleration and accidents. Further, seats and their design, mounting, etc, constitute substantially to the riding comforts of the vehicle users. Safety belts have become mandatory fitments on frontseats of *M* and *N* categories of vehicles from April 1994 in India. Safety belts without a proper anchorage does not serve any purpose. Hence, it is necessary to have a standard for safety belt anchorages to supplement the safety belts standard IS 15140 : 2002 'Automotive vehicles-safety belt assembly — Specification'.

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

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 — SAFETY BELT ANCHORAGES — SPECIFICATION

### 1 SCOPE

**1.1** This standard specifies the requirements of safety belt anchorages namely, minimum numbers, their locations, static strength to reduce the possibility of their failure during accidental crashes for effective occupant restraint and the test procedures.

**1.2** This standard applies to the anchorages of safety belts for adult occupants of forward-facing or rearward facing seats in vehicles of categories *M* and *N* as defined in IS 14272 (Part 1).

### 2 REFERENCES

**2.1** The following 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:

<i>IS No.</i>	<i>Title</i>
13749 : 1993	Automotive vehicles — Determination of H-Point — Method of Test
14272 (Part 1) : 1995	Automotive vehicles — Types — Terminology : Part 1 Three and four wheelers

### 3 TERMINOLOGY

For the purposes of this standard, the following terms and definitions shall apply.

**3.1 Approval of a Vehicle** — The approval of a vehicle type with anchorages for given types of safety-belts.

**3.2 Vehicle Type** -- A category of power-driven vehicles which do not differ in such essential respects as the dimensions, lines and materials of components of the vehicle structure or seat structure to which the anchorages are attached.

**3.3 Belt Anchorage** — The parts of the vehicle structure or the seat structure or any other part of the vehicle to which the safety belt assemblies are to be secured.

**3.4 Safety Belt/Seat Belt/Belt** — An arrangement of straps with a securing buckle, adjusting devices and attachments which is capable of being anchored to a vehicle and designed to diminish the risk of injury to

its wearer, in the event of collision or abrupt vehicle deceleration by limiting the mobility of the body of wearer. Such an arrangement is referred to as a 'belt assembly', a term also embracing any device for energy absorption or belt retraction.

**3.5 Strap Guide** — A device which alters the lie of the strap in relation to the wearer of the belt assembly.

**3.6 Effective Belt Anchorage** — The point used to determine conventionally as specified in 4.4, the angle of each part of the safety belt in relation to the wearer that is the point to which a strap would need to be attached to provide the same lie as the intended lie of the belt when worn, and which may or may not be the actual belt anchorage depending on the configuration of the safety belt hardware at its attachment to the belt anchorage.

**3.6.1** Where a safety belt incorporates a rigid part which is attached to a lower belt anchorage, either fixed or free to swivel, the effective belt anchorage for all positions of seat adjustment is the point where the strap is attached to that rigid part.

**3.6.2** Where a strap guide is used on the vehicle or seat structure, the middle point of the guide at the place where the strap leaves the guide on the belt of wearer side, shall be considered as the effective belt anchorage.

**3.6.3** Where the belt runs directly from the wearer to a retractor attached to the vehicle or seat structure without an intervening strap guide, the effective belt anchorage shall be considered as being the intersections of the axis of the reel for storing the strap with the plane passing through the centre line of the strap on the reel.

**3.7 Floor** — The lower part of the vehicle body-work connecting the vehicle side walls. In this context, this includes ribs, swages and possibly other reinforcements, even if they are below the floor, such as longitudinal and transverse members.

**3.8 Seat** — 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.

**3.9 Front Passenger Seat** — Any seat where the 'H point measured in the foremost position' of the seat in question is in or in front of the vehicle transverse

plane through the driver *R*-point.

**3.10 Group of Seats** — A bench-type seat, or seats which are separate but side by side (that is, with the foremost anchorages of one seat in line with or forward of the rearmost anchorages and in line with or behind the foremost anchorages of another seat) and accommodate one or more seated adult persons.

**3.11 Bench Seat** — A structure complete with trim, intended to seat more than one adult person.

**3.12 Folding Seat** — An auxiliary seat intended for occasional use which is normally folded.

**3.13 Seat Type** — A category of seats which do not differ in parameters such as :

- a) The shape, dimensions and materials of the seat structure;
- b) The type and dimensions of the adjustment systems and all locking systems; and
- c) The type and dimensions of the belt anchorages on the seat, of the seat anchorage and of the affected parts of the vehicle structure.

**3.14 Normal Seating Position** — The seating position to which the seat is designed to sit as defined by the vehicle manufacturer.

**3.15 Outboard Seat** — The forward facing seat next to the side doors/side walls of body shell.

**3.16 Outboard Seating Position** — The seating position near to the side doors/side walls of the shell of the vehicle in case of bench seat.

**3.17 Seat Anchorage** — The system by which the seat assembly is secured to the vehicle structure including the affected parts of the vehicle structure.

**3.18 Adjustment System** — 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 permit:

- a) longitudinal displacement;
- b) vertical displacement; and
- c) angular displacement.

**3.19 Displacement System** — A device enabling the seat or one of its parts to be displaced or rotated without a fixed intermediate position, to permit easy access to the space behind the seat concerned.

**3.20 Locking System** — A device ensuring that the seat and its parts are maintained in any position of use and the seat relative to the vehicle.

**3.21 *H* Point** — It represents the pivot centre of torso and the occupant in the seated position in the passenger compartment. It is measured with the manikin as described in IS 13749.

**3.22 *R* Point or the Seating Reference Point** — It is the design point defined by the manufacturer which has co-ordinates determined in relation to the vehicle structure and corresponds to the theoretical positions of the point of torso/legs rotation for the lowest and the rearmost normal driving position or position of use given to each seat provided by the vehicle manufacturer (see Fig. 1).

**3.23 Torso Angle** — It is the inclination of the seat back in relation to the vertical.

**3.24 Actual Torso Angle** — It is the angle formed by the vertical through the *H* point with reference to the torso line of the human body represented by the manikin described in IS 13749.

**3.25 Design Torso Angle** — It is the angle prescribed by the manufacturer which determines the seat back angle for the lowest and most rearward normal driving position or position of use given to each seat by the vehicle manufacturer.

**3.26 Torso Reference Line of the Manikin** — It is a straight line passing through the joint between the leg and the pelvis and the theoretical joint between the neck and thorax (see Fig. 1).

**3.27 Reference Zone** — It is the space between two vertical longitudinal planes, 400 mm and symmetrical with respect to the *H* Point and defined by rotation from the vertical to the horizontal position of the head form apparatus. This consists of a spherical head, 165 mm in diameter and an arrangement by which the dimensions from the pivotal point of the hip to the top of head sphere is continuously adjustable between 736 mm and 840 mm. This shall be set to a maximum length of 840 mm and positioned for each seating position for which the manufacturer has made provision as given below:

- a) In the case of sliding seats :
  - 1) At the *H* Point; and
  - 2) 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 of 19 mm.
- b) In the case of non-sliding seats:

At the *H* Point of the seat considered.

## 4 REQUIREMENTS

### 4.1 General

Anchorage for safety belt shall be so designed, made and situated as to:

- a) Enable the installation of a suitable safety belt.

The belt anchorages of the front outboard positions shall be suitable for safety belts incorporating a retractor and pulley, taking into consideration in particular the strength characteristics of the belt anchorages, unless the manufacturer supplies the vehicle equipped with other type of safety belts which incorporate retractors. If the anchorages are suitable only for particular types of safety belts, it should be clearly indicated;

- b) Reduce to a minimum the risk of the slipping of the belt when worn correctly;
- c) Reduce to a minimum the risk of strap damage due to contact with sharp rigid parts of the vehicle or seat structures;
- d) Enable the vehicle, in normal use, to comply with the provisions of this standard; and
- e) For anchorages which take up different positions to, allow persons to enter the vehicle and to restrain the occupants, the requirements shall apply to the anchorages in the effective restraint position.

**4.2** The vehicle manufacturer shall provide to the test agency all the relevant information /specifications of the anchorages in the format provided in Annex A.

### **4.3 Minimum Number of Belt Anchorages to be Provided**

**4.3.1** For the front seats of vehicles in category *M* and category *N*, two lower belt anchorages and one upper belt anchorage shall be provided. However, for front central seats, two lower belt anchorages shall be considered sufficient where the wind screen is located outside the reference zone defined in 3.27. As regards the belt anchorages, the windscreen is considered to be a part of the reference zone if it is capable of entering into contact with the test apparatus according to the method described in 3.27.

**4.3.2** For out board seating positions, other than front, of vehicles of category  $M_1$ , two lower anchorages are allowed, where there exists a passage between a seat and the nearest side-wall of the vehicle intended to permit access of passengers to other parts of the vehicle. A space between a seat and the side-wall is considered as a passage if the distance between that side-wall, with all doors closed and a vertical longitudinal plane passing through the centre line of the seat concerned, measured at the *R*-point position and perpendicular to the median longitudinal plane of the vehicle is more than 500 mm.

**4.3.3** The minimum number of safety belt anchorages for rearward facing seats in all locations is two lower anchorages.

**4.3.4** If seat belts are provided by the vehicle manufacturer as original equipment fitment for the other outboard seats of the vehicle category  $M_1$ , there shall be two lower belt anchorages if only 2-point lap belts are provided and additionally one upper belt anchorage if 3-point belts are provided.

**4.3.5** If seat belts are provided by the vehicle manufacturer as original equipment fitment for other seats in  $M_1$  category vehicle and all other non-protected seats in categories other than  $M_1$  as given in 4.3.1, there shall be at least two lower belt anchorages.

**4.3.6** For folding seats, and all the seats of any vehicle not covered by 4.3.1, 4.3.2 or 4.3.3 no belt anchorages are required. However, if the vehicle is fitted with anchorages for such seats, the anchorages shall comply with the provisions of this standard. In this case, two lower anchorages shall be adequate.

**4.3.7** In the case of the upper deck of a double-deck vehicle, the requirements for the centre front seating position shall apply also in the outboard front seating positions.

### **4.4 Location of Belt Anchorages**

**4.4.1** For the requirements related to areas of locations of effective belt anchorages are shown in Fig. 1. The belt anchorages for any one belt may be located either completely in the vehicle structure or in the seat structure or any other part of the vehicle or dispersed between these locations. Any one belt anchorage may be used for attaching the ends of two adjacent safety belts provided that the test requirements are met.

#### **4.4.2 Location of the Effective Lower Belt Anchorages**

**4.4.2.1** Points  $L_1$  and  $L_2$  are the lower effective belt anchorages. The angles  $\alpha_1$  and  $\alpha_2$  are respectively the angles between a horizontal plane and planes perpendicular to the median longitudinal plane of the vehicle and passing through point *H* and the points  $L_1$  and  $L_2$ .

#### **4.4.2.2 Front seats, vehicle category $M_1$**

In motor vehicles of category  $M_1$ , the angle  $\alpha_1$  (other than buckle side) shall be within the range of 30° to 80° and the angle  $\alpha_2$  (buckle side) shall be within the range of 45° to 80°. Both angle requirements shall be valid for all normal travelling positions of the front seats, Where at least one of the angles  $\alpha_1$  or  $\alpha_2$  is constant (for example anchorage fixed at the seat) in all normal positions of use, its value shall be  $60 \pm 10^\circ$ . In the case of adjustable seats with an adjusting device as described in 3.18 with a seatback angle of less than 20° (see Fig. 1), the angle  $\alpha_1$  may be below the minimum value (30°) given above, provided it is not less than 20° in any normal position of use.



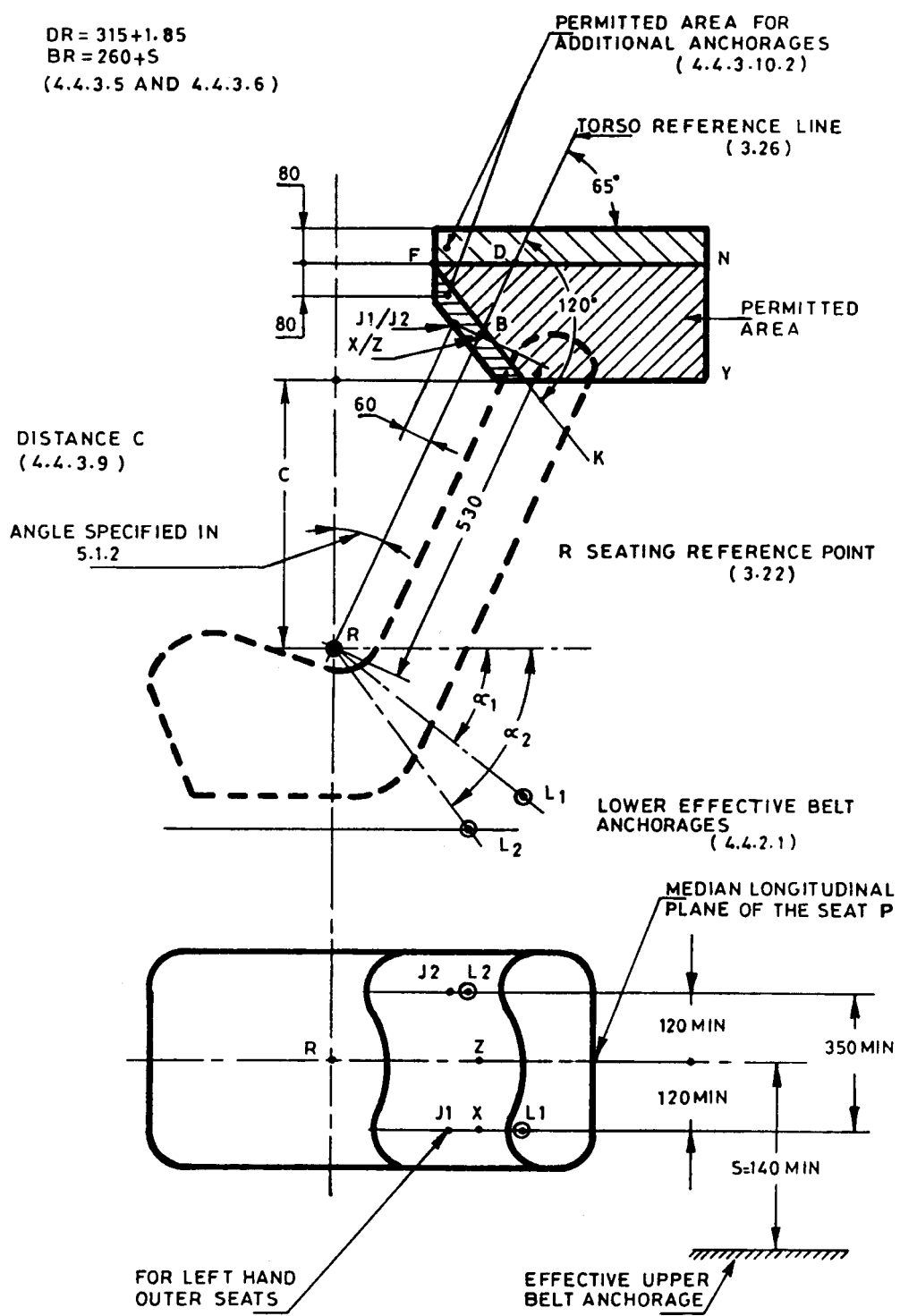


FIG. 1 AREAS OF LOCATION OF EFFECTIVE BELT ANCHORAGES

#### 4.4.2.3 Rear seats, vehicle category $M_1$

In motor vehicles of category  $M_1$ , the angles  $\alpha_1$  and  $\alpha_2$  shall be within the range of  $30^\circ$  to  $80^\circ$  for all rear seats. If rear seats are adjustable, the above angles shall be valid for all normal travelling positions.

#### 4.4.2.4 Front seats, vehicle categories other than $M_1$

In motor vehicles of categories other than  $M_1$ , the angles  $\alpha_1$  and  $\alpha_2$  must be between  $30^\circ$  and  $80^\circ$  for all normal travelling positions of the front seats. In the case of vehicles having a maximum vehicle mass not exceeding  $3.5\ t$ , and at least one of the angles  $\alpha_1$  or  $\alpha_2$  is constant in all normal positions of use (for example anchorage fixed at the seat) and its value shall be  $60^\circ \pm 10^\circ$ .

#### 4.4.2.5 Rear seats and special front or rear seats, vehicle categories other than $M_1$

In vehicles of categories of other than  $M_1$ , in the case of:

- bench seats;
- adjustable seats (front and rear) with an adjusting device as described in 3.18 with a seat back angle of less than  $20^\circ$  (see Fig. 1); and
- other rear seats.

Angles  $\alpha_1$  and  $\alpha_2$  may be between  $20^\circ$  and  $80^\circ$  in any normal position of use. Where in the case of the front seats of vehicles having a maximum vehicle mass not exceeding  $3.5\ t$ , at least one of the angles  $\alpha_1$  or  $\alpha_2$  is constant in all normal position of use (for example, anchorage fixed at the seat), its value shall be  $60 \pm 10^\circ$ .

In case of the seats, other than front seats, of the vehicle category  $M_2$  and  $M_3$ , the angles  $\alpha_1$  and  $\alpha_2$  shall be between  $45^\circ$  and  $90^\circ$  for all normal position of use.

4.4.2.6 The distance between the two vertical planes parallel to median longitudinal plane of the vehicle and passing through the two effective lower belt anchorages  $L_1$  and  $L_2$ , shall not be less than 350 mm. The median longitudinal plane of the seat shall pass between points  $L_1$  and  $L_2$  and shall be at least 120 mm from these points.

#### 4.4.3 Location of the Effective Upper Belt Anchorages (see Fig. 1)

4.4.3.1 If a strap guide or similar device is used which affects the location of the effective upper belt anchorage, this location shall be determined in a conventional way by considering the position of the anchorage when the longitudinal centre line of the strap passes through a point  $J1$  defined successively from the  $R$  point by the following three segments:

$RZ$ : a segment of the reference line measured in an upward direction from  $R$  and 530 mm long;

$ZX$ : a segment perpendicular to the median longitudinal plane of the vehicle, measured from point  $Z$  in the direction of the anchorage and 120 mm long; and

$XJ1$ : a segment perpendicular to the plane defined by segments  $RZ$  and  $ZX$  measured in a forward direction from point  $X$  and 60 mm long.

4.4.3.2 Point  $J2$  is determined by symmetry with point  $J1$  about the longitudinal vertical plane passing through the torso reference line of the manikin positioned in the seat in question (3.26 and Fig. 1).

4.4.3.3 Where a two-door configuration is used to provide access to both the front and rear seats and the upper anchorage is fitted to the 'B' post, the system must be designed so as not to impede access to or egress from the vehicle.

4.4.3.4  $S$  is the distance in millimetres of the effective upper belt anchorages from a reference plane  $P$  parallel to the longitudinal median plane of the vehicle defined as follows.

4.4.3.4.1 If the seating position is well defined by the shape of the seat, the plane  $P$  shall be the median plane of this seat.

4.4.3.4.2 In the absence of a well defined position:

- The plane  $P$  for the seat of driver is a vertical plane parallel to the median longitudinal plane of the vehicle which passes through the centre of the steering-wheel in the plane of the steering-wheel rim when the steering-wheel, if adjustable, is in its central position;
- The plane  $P$  for the front outboard passenger shall be symmetrical with that of the driver;
- The plane  $P$  for the rear outboard seating position shall be that specified by the manufacturer, on the condition that the limits for distance  $A$  between the longitudinal median plane of the vehicle and plane  $P$  are as follows;
- $A$  is equal or more than 200 mm if the bench seat has been designed to accommodate two passengers only; and
- $A$  is equal or more than 300 mm if the bench seat has been designed to accommodate more than two passengers.

4.4.3.5 The effective upper anchorages shall lie below the plane  $FN$ , which runs perpendicular to the longitudinal median plane of the seat and makes an angle of  $65^\circ$  with the reference line. The angle may be reduced to  $60^\circ$  in the case of rear seats. The plane  $FN$  shall be so placed as to intersect the reference line at a point  $D$  such that  $DR = 315\text{ mm} + 1.8S$ . However, when  $S \leq 200\text{ mm}$ , then  $DR = 675\text{ mm}$ .

**4.4.3.6** The effective upper belt anchorage shall lie behind a plane  $FK$ , running perpendicular to the longitudinal median plane of the seat and intersecting the reference line at an angle of  $120^\circ$  at a point  $B$  such that  $BR = 260 \text{ mm} + S$ , where  $S \geq 280 \text{ mm}$  the manufacturer may use  $BR = 260 \text{ mm} + 0.8S$  at his discretion.

**4.4.3.7** The value of  $S$  shall not be less than 140 mm.

**4.4.3.8** The effective upper belt anchorages shall be situated to the rear of a vertical plane perpendicular to the median longitudinal plane of the vehicle and passing through the  $R$  point as shown in Fig. 1.

**4.4.3.9** Point  $C$  is a point situated 450 mm vertically above the  $R$  point. However, if the distance  $S$  as defined in 4.4.3.4 is not less than 280 mm and the alternative formula  $BR = 260 \text{ mm} + 0.8S$  specified in 4.4.3.6 is chosen by the manufacturer, the vertical distance between  $C$  and  $R$  shall be 500 mm. The effective upper belt anchorages shall be situated above the horizontal plane passing through the point  $C$ .

**4.4.3.10** In addition to the upper anchorage specified in 4.4.3.1, other effective upper anchorages may be provided, if one of the following conditions is satisfied.

**4.4.3.10.1** The additional anchorages comply with the requirements of 4.4.3.1 to 4.4.3.9.

**4.4.3.10.2** The additional anchorages can be used without the aid of tools, comply with the requirements of 4.4.3.8 and 4.4.3.9 and are located in one of the areas determined by shifting the area shown in Fig. 1, 80 mm upwards or downwards in a vertical direction.

**4.4.3.11** The anchorage(s) is/are intended for a harness belt, complies/comply with the requirements laid down in 4.4.3.9, if it lie(s) behind the transverse plane passing through the reference line and is/are located.

**4.4.3.11.1** In the case of a single anchorage, within the area common to two dihedrals defined by the verticals passing through points  $J1$  and  $J2$  as defined in 4.4.3.1 and whose horizontal sections are shown in Fig 2.

**4.4.3.11.2** In the case of two anchorages, within whichever of the above defined dihedrals is suitable, provided that each anchorage is not more than 50 mm distant from the symmetrically-located, mirror-image position of the other anchorage about the plane  $P$ , as defined in 4.4.3.4 of the seat.

## 4.5 Strength of Anchorages

**4.5.1** Each anchorage shall be capable of withstanding the tests prescribed in 5.3 and 5.4. Permanent deformation, including rupture or breakage, of any anchorage or surrounding area shall not constitute failure if the required force is sustained for the specified time during the test, the minimum spacing for the effective lower belt anchorages specified in 4.4.2.6 and the requirement of 4.4.3.9 for effective upper belt anchorages shall be met.

**4.5.2** In vehicles where the above devices are used, the displacement and release systems which enable all the occupants to leave the vehicle shall be capable of being actuated manually after the tractive force has ceased.

## 4.6 Dimensions of Threaded Anchorage Holes

**4.6.1** An anchorage shall have a threaded hole of 7/16 inch (20UNF 2B).

**4.6.2** If the vehicle is fitted by the manufacturer with safety belts which are attached to all anchorages prescribed for the seat, these anchorages need not meet the requirement set out in 4.6.1, provided that they

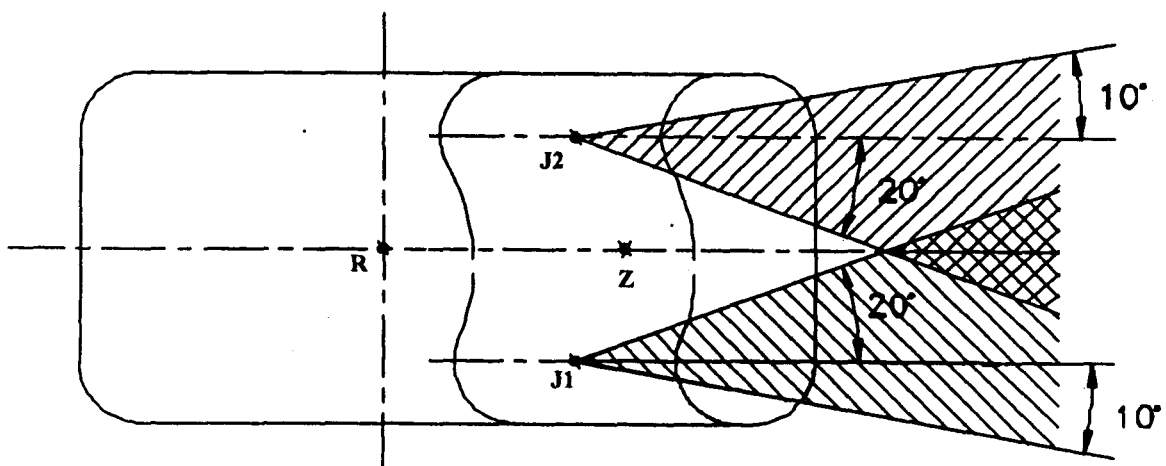


FIG. 2 EFFECTIVE UPPER BELT ANCHORAGES

comply with the other provisions of this standard. In addition, the requirement set out in 4.6.1 shall not apply to additional anchorages which meet the requirement set out in 4.4.3.11.

**4.6.3** It shall be possible to remove the safety belt without damaging the anchorage.

## 5 TESTS

### 5.1 General

**5.1.1** The tests may be carried out either on a vehicle structure or on a completely finished vehicle, with the windows and doors fitted or not and closed or not and any fitting normally provided and likely to contribute to the rigidity of the vehicle structure fitted. The above should not violate the provisions of 5.2.

**5.1.2** The seats shall be fitted and placed in the position for driving or use chosen by the testing authority to give the most adverse conditions with respect to the strength of the system. The position of the seats shall be stated in the report. The seat-back shall, if its inclination is adjustable, be locked as specified by the manufacturer or, in the absence of any such specification, in a position corresponding to an effective seat-back angle as close as possible to  $25^\circ$  for vehicle of categories  $M_1$  and  $N_1$  and to  $15^\circ$  for vehicles of all other categories.

**5.1.3** The tests may be restricted to the anchorages relating to only one seat or one group of seats on the condition that:

- a) the relevant anchorages have the same structural characteristics as the anchorages relating to the other seats or group of seats; and
- b) where such anchorages are fitted entirely or partially on the seat or group of seats, the structural characteristics of the seat or group of seats are the same as those for the other seat or group of seats.

### 5.2 Securing of the Vehicle

**5.2.1** The method used to secure the vehicle during the test shall not be such as to strengthen the anchorages or the anchorage areas or to lessen the normal deformation of the structure.

**5.2.2** A securing device shall be regarded as satisfactory if it produces no effect on an area extending over the whole width of the structure and if the vehicle or the structure is blocked or fixed in front at a distance of not less than 500 mm from the anchorage to be tested and held or fixed at the rear not less than 300 mm from that anchorage.

**5.2.3** It is recommended that the structure should rest on supports arranged in line with the axes of the wheels or if that is not possible, in line with the point of attachment of the suspension.

**5.2.4** If a securing method other than that prescribed in 5.2.1 to 5.2.3 is used an evidence shall be furnished that it is equivalent and shall be checked for its completeness.

### 5.3 General Test Requirements

**5.3.1** All the belt anchorages of the same group of seats shall be tested simultaneously. However, if there is a risk that non-symmetrical loading of the seats and/or anchorages may lead to failures, an additional test may be carried out with non-symmetrical loading.

**5.3.2** The tractive force shall be applied in a forward direction at an angle of  $10^\circ \pm 5^\circ$  above the horizontal in a plane parallel to the median longitudinal plane of the vehicle.

**5.3.3** Full application of the load shall be achieved in not more than 30 s. The belt anchorages must withstand the specified load for not less than 0.2 s.

**5.3.4** The belt anchorages for seats for which upper belt anchorages are provided shall be tested under the following conditions.

#### 5.3.4.1 Front outboard seats

- a) The belt anchorages shall be submitted to the test prescribed in 5.4.1 in which the loads are transmitted to them by means of a device reproducing the geometry of a three-point belt equipped with a retractor having a pulley or strap guide at the upper belt anchorage. In addition, if the number of anchorages is more than that in 4.3, these anchorages shall be subjected to the test specified in 5.4.5, in which the loads shall be transmitted to the anchorages by means of a device reproducing the geometry of the type of safety belt intended to be attached to them.
- b) In the case where the retractor is not attached to the required outboard lower belt anchorage or in the case where the retractor is attached to the upper belt anchorage, the lower belt anchorages shall also be submitted to the test prescribed in 5.4.3.
- c) In the above case the tests prescribed in 5.4.1 and 5.4.3 shall be performed on two different structures if desired by the manufacturer.

#### 5.3.4.2 Rear outboard seats and all centre seats

The belt anchorages shall be subjected to the test

prescribed in 5.4.2 in which the loads are transmitted to them by means of a device reproducing the geometry of a three point safety belt without a retractor and to the test prescribed in 5.4.3 in which the loads are transmitted to the two lower belt anchorages by means of a device reproducing the geometry of a lap belt. The two tests can be performed on two different structures if desired by the manufacturer.

**5.3.4.3** When a manufacturer submits his vehicle with safety-belts, the corresponding belt anchorages may, at the request of the manufacturer, be submitted only to a test in which the loads are transmitted to them by means of a device reproducing the geometry of the type of belts to be attached to these anchorages.

**5.3.5** If no upper belt anchorages are provided for the rear outboard seats and the centre seats, the lower belt anchorages shall be submitted to the test prescribed in 5.4.3 in which the loads are transmitted to these anchorages by means of a device reproducing the geometry of a lap belt.

**5.3.6** If the vehicle is designed to accept other devices which do not enable the straps to be directly attached to belt anchorages without intervening sheaves, etc, or which require belt anchorages supplementary to those mentioned in 4.2, the safety belt or an arrangement of wires, sheaves, etc, representing the equipment of the safety belt, shall be attached by such a device to the belt anchorages in the vehicle and the belt anchorages shall be subjected to the tests prescribed in 5.4 as appropriate.

**5.3.7** A test method other than those prescribed in 5.3 may be used, but evidence must be furnished that it is equivalent with the above.

## 5.4 Particular Test Specifications

### 5.4.1 *Test in Configuration of a Three Point Belt Incorporating a Retractor Having Pulley or Strap Guide at the Upper Belt Anchorage*

**5.4.1.1** A special pulley or guide for the wire or strap appropriate to transmit the load from the traction device or the pulley or strap guide supplied by the manufacturer shall be fitted to the upper belt anchorage.

**5.4.1.2** A test load of  $1\,350 \pm 20$  daN shall be applied to a traction device (see Fig. 3) attached to the belt anchorages of the same belt, by means of a device reproducing the geometry of the upper torso strap of such a safety belt, in the case of vehicle of categories  $M_1$  and  $N_1$ . The test load shall be  $675 \pm 20$  daN for categories  $M_2$  and  $N_2$  and  $450 \pm 20$  daN for  $M_3$  and  $N_3$ .

**5.4.1.3** At the same time, a tractive force of  $1\,350 \pm 20$  daN shall be applied to a traction device (see Fig. 4) attached to the two lower belt anchorages,

in the case of vehicle of categories  $M_1$  and  $N_1$ . The test load shall be  $675 \pm 20$  daN for categories  $M_2$  and  $N_2$  and  $450 \pm 20$  daN for categories  $M_3$  and  $N_3$ .

### 5.4.2 *Test in Configuration of a Three Point Belt Without Retractor or with a Retractor at the Upper Belt Anchorage*

**5.4.2.1** A test load of  $1\,350 \pm 20$  daN shall be applied to a traction device (see Fig. 3) attached to the upper belt anchorage and to the opposite lower belt anchorage of the same belt, using, if supplied by the manufacturer, a retractor fixed at the upper belt anchorage, in the case of vehicle of categories  $M_1$  and  $N_1$ . The test load shall be  $675 \pm 20$  daN for categories  $M_2$  and  $N_2$  and  $450 \pm 20$  daN for categories  $M_3$  and  $N_3$ .

**5.4.2.2** At the same time a tractive force of  $1\,350 \pm 20$  daN shall be applied to a traction device (see Fig. 4) attached to the lower belt anchorages in the case of vehicle of categories  $M_1$  and  $N_1$ . The test load shall be  $675 \pm 20$  daN for categories  $M_2$  and  $N_2$  and  $450 \pm 20$  daN for categories  $M_3$  and  $N_3$ .

### 5.4.3 *Test in Configuration of a Lap Belt*

A test load of  $2\,225 \pm 20$  daN shall be applied to a traction device (see Fig. 3) attached to the two lower belt anchorages in the case of vehicle of categories  $M_1$  and  $N_1$ . The test load shall be  $1\,110 \pm 20$  daN for categories  $M_2$  and  $N_2$  and  $740 \pm 20$  daN for categories  $M_3$  and  $N_3$ .

### 5.4.4 *Test for Belt Anchorages Located Completely within the Seat Structure or Dispersed Between the Vehicle Structure and the Seat Structure*

The test specified in 5.4.1, 5.4.2 and 5.4.3 above shall be performed, as appropriate, at the same time superimposing for each seat and for each group of seats, a force as stated below:

The loads indicated in 5.4.1, 5.4.2 and 5.4.3 shall be supplemented by a force equal to 20 times the mass of the complete seat applied horizontally and longitudinally through the centre of gravity of the seat, in the case of vehicle of categories  $M_1$  and  $N_1$ . The test load shall be equal to 10 times the weight of the complete seat for categories  $M_2$  and  $N_2$  and 6.6 times the weight of the complete seat for categories  $M_3$  and  $N_3$ .

### 5.4.5 *Test in Configuration of a Special — Type Belt*

**5.4.5.1** A test load of  $1\,350 \pm 20$  daN shall be applied to a traction device (see Fig. 4) attached to the belt anchorages of such a safety belt by means of a device reproducing the geometry of the upper torso strap or straps.

**5.4.5.2** At the same time, a tractive force  $1\,350 \pm 20$  daN shall be applied to a traction device (see Fig. 5) attached

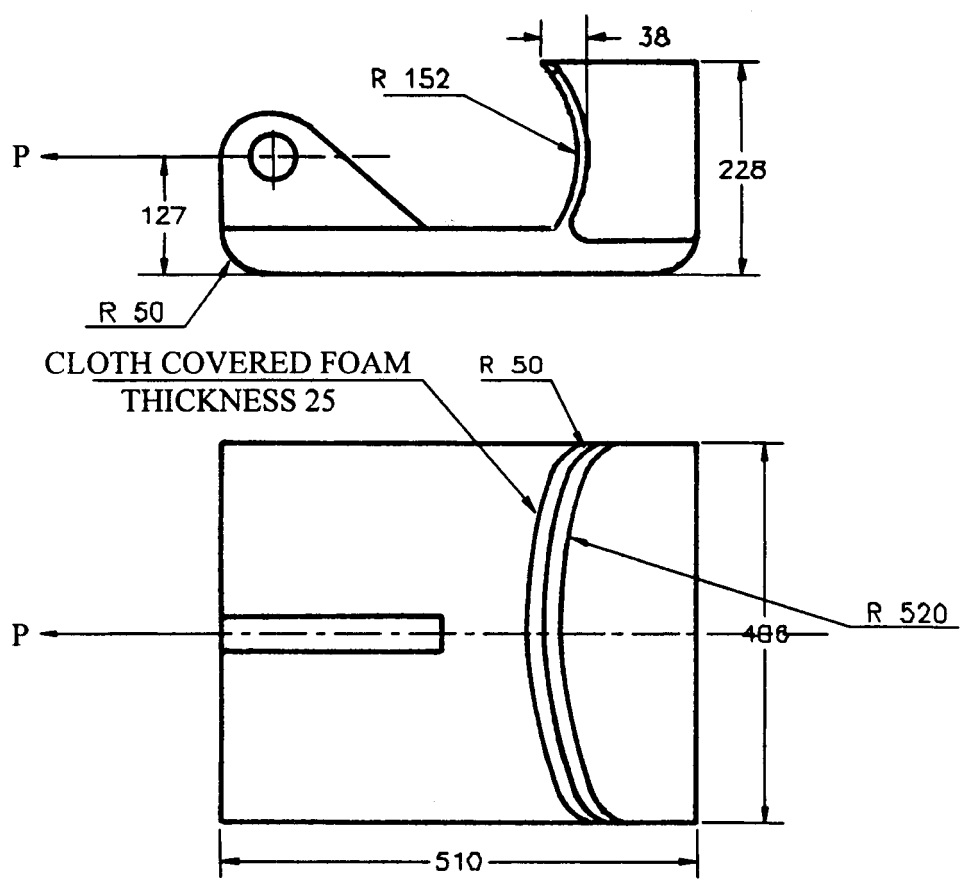


FIG. 3 TRACTION DEVICE

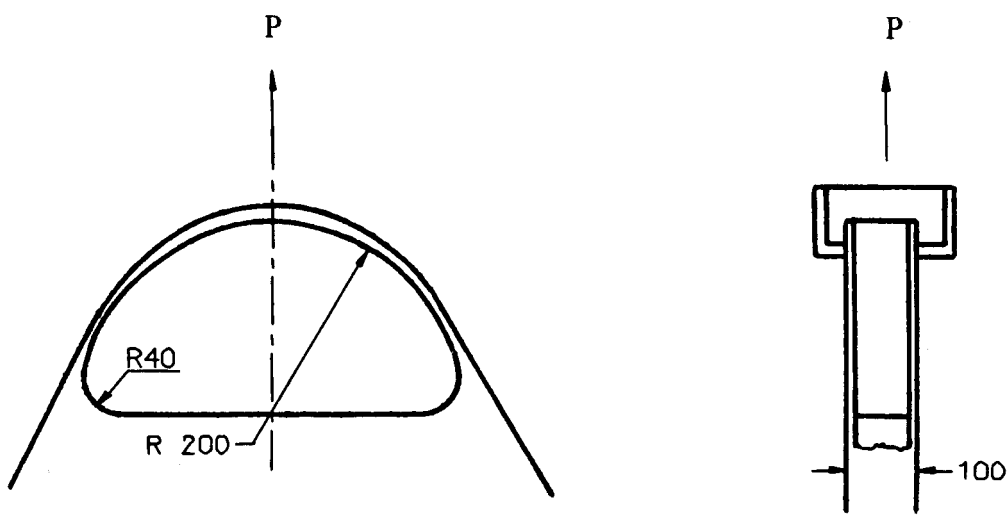


FIG. 4 TRACTION DEVICE

to lower belt anchorages, in the case of vehicle of categories  $M_1$  and  $N_1$ . The test load and tractive force shall be  $675 \pm 20$  daN for categories  $M_2$  and  $N_2$  and  $450 \pm 20$  daN for categories  $M_3$  and  $N_3$ .

5.4.6 Test in the Case of Rearward-Facing Seats

5.4.6.1 The anchorage points shall be tested according to the forces prescribed in 5.4.1, 5.4.2 or 5.4.3 as appropriate. In each case, the test load shall correspond

to the load prescribed for  $M_3$  or  $N_3$  vehicle.

5.4.6.2 The test load shall be directed forward in relation to the seating position corresponding to the procedure prescribed in 5.3.

5.5 Inspection After Testing

After testing, any damage to the anchorages and structures supporting load during tests shall be checked, verified and noted.

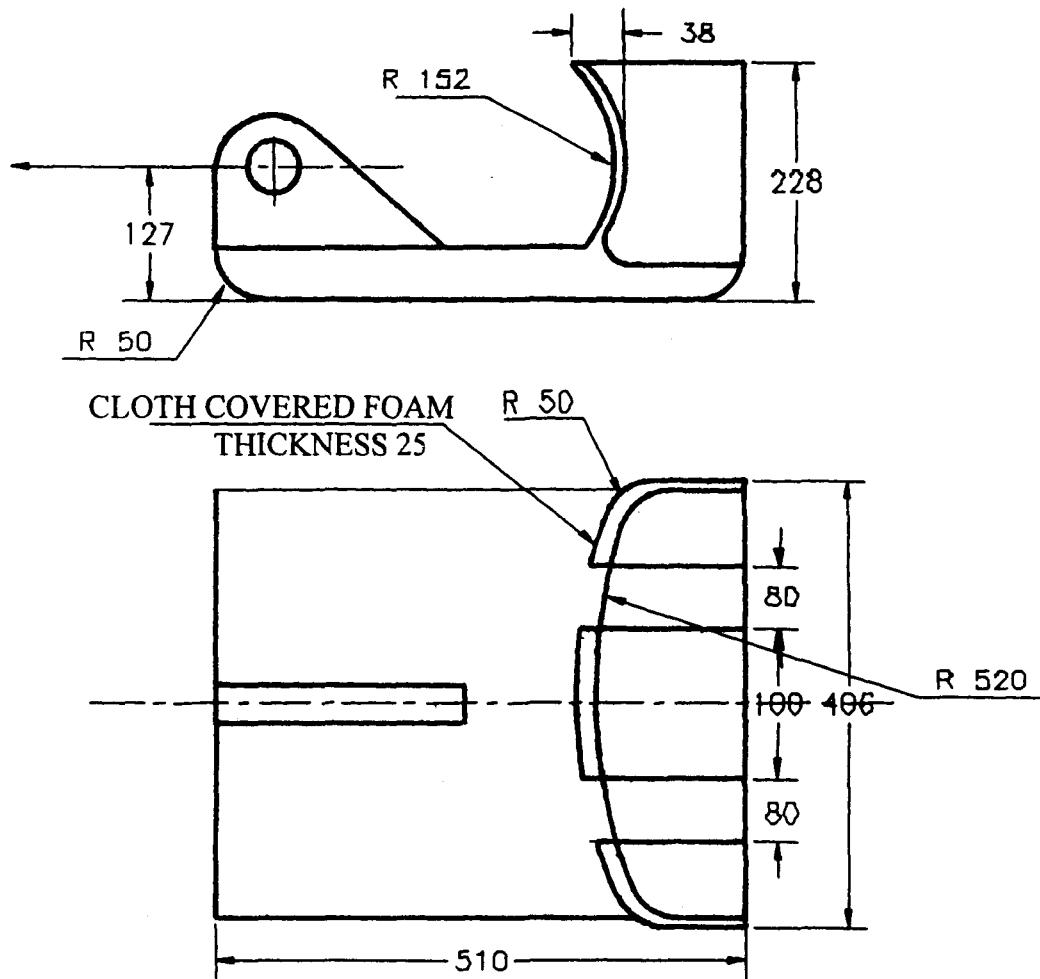


FIG. 5 TRACTION DEVICE

## ANNEX A

(Clause 4.2)

**TECHNICAL SPECIFICATIONS REQUIRED TO BE PROVIDED BY VEHICLE  
MANUFACTURER AT THE TIME OF TYPE OF EVALUATION RELEVANT TO THE  
REQUIREMENTS OF THIS STANDARD**

1. Trade name or mark of the power-driven vehicle.....
2. Vehicle type.....
3. Manufacturer's name and address.....
4. If applicable, name and address of the manufacturer's representative.....
5. Designation of the type of belts and retractors authorised for fitting to the anchorages with which vehicle is equipped:

				Anchorage on (*)	
Anchorage Position				Vehicle Structure	Seat Structure
Front	Right-hand Seat	{Lower anchorage	{Outboard		
		{Upper anchorage	{Inboard		
	Middle Seat	{Lower Anchorage	{Right		
		{Upper anchorage	{Left		
	Left-hand Seat	{Lower anchorage	{Outboard		
		{Upper anchorage	{Inboard		
Rear					

(\*) Insert in the actual position the following letter(s):

‘A’ for a three-point belt,

‘B’ for lap belts,

‘S’ for special-type belts; in this case the type shall be stated under ‘Remarks’,

‘Ar’, ‘Br’ or ‘Sr’ for belts with retractors,

‘Ae’, ‘Be’ or ‘Se’ for belts with energy absorption device,

‘Are’, ‘Bre’ or ‘Sre’ for belts with retractors and energy absorption devices on at least one anchorage.

Remarks:.....  
.....

6. Description of seats.....
7. Description of the adjustment, displacement and locking systems either of the seat or of its parts  
.....
8. Description of seat anchorage.....



- 9. Description of particular type of safety-belt required in the case of an anchorage located in the seat structure or incorporating an energy-dissipating device.....  
.....
- 10. Documents to be furnished along with test request :
  - 10.1 Drawings, diagrams and plans of the belt anchorages and of the vehicle structure.
  - 10.2 Photographs of the belt anchorages and of the vehicle structure.
  - 10.3 Drawings, diagrams and plans of the seats, their anchorages on the vehicle, of the adjustment and displacement systems of the seats and their parts, and their locking devices.
  - 10.4 Photographs of the seats, their anchorages, the adjustment and displacement systems of the seats and their parts, and their locking devices.

**ANNEX B****(Foreword)****COMMITTEE COMPOSITION****Automotive Body, Chassis Accessories and Garage Equipment Sectional Committee, TED 6**

<i>Organization</i>	<i>Representative(s)</i>
Association State Road Transport Undertaking, New Delhi	DR M. KOTEESHWARAN ( <i>Chairman</i> )
Automotive Research Association of India, Pune	SHRI S. RAJU SHRI M. S. OGALE ( <i>Alternate</i> )
Andhra Pradesh State Road Transport Corporation, Hyderabad	SHRI P. ARJUNA SHRI M. V. NAGAVENDER RAO ( <i>Alternate</i> )
Ashok Leyland Ltd, Chennai	SHRI C. B. S. MENON SHRI K. HARIKRISHNANN ( <i>Alternate</i> )
Society of Indian Automobile Manufacture (SIAM), New Delhi	SHRI ATANU GANGULI SHRI SUMIT SHARMA ( <i>Alternate</i> )
Bajaj Auto Ltd, Pune	SHRI T. M. BALARAMAN SHRI V. M. MANEL ( <i>Alternate</i> )
Bajaj Tempo Ltd, Pune	SHRI D. P. SHAH SHRI V. V. DESHPANDE ( <i>Alternate</i> )
Central Institute of Road Transport, Pune	SHRI V. R. JALGAONKAR SHRI P. S. MUNOLI ( <i>Alternate</i> )
Controllorate of Quality Assurance (Veh.), Ahmednagar	SHRI R. R. RANALKAR LT COL S. BAJAJ ( <i>Alternate</i> )
Daewoo Motors India Ltd, New Delhi	SHRI DINESH TYAGI SHRI S. JINDAL ( <i>Alternate</i> )
Vehicle Research and Development Establishment, Ahmednagar	SHRI D. PANDURANGAN SHRI S. RAMAKRISHNA ( <i>Alternate</i> )
Eicher Motors Ltd, Pithampur	SHRI S. VENKATESH
Hindustan Motors Ltd, Distt Hooghly, West Bengal	SHRI U. K. KINI
J.M.A. Industries Ltd, New Delhi	SHRI KABIR BHANDARI SHRI KULDIP SINGH ( <i>Alternate</i> )
Maharashtra State Road Transport Undertakings, Mumbai	SHRI P. N. RAJGOPADHYA
Mahindra & Mahindra Ltd, Nasik	SHRI B. BHAUMIK SHRI R. V. DESHMUKH ( <i>Alternate</i> )
Maruti Udyog Ltd, Gurgaon	SHRI P. AGRAWAL SHRI R. K. PARMIOO ( <i>Alternate</i> )
Ministry of Heavy Industries & Department Public Enterprises of Heavy Industry, New Delhi	SHRI B. N. DAS SHRI R. K. JAISWAL ( <i>Alternate</i> )
Ministry of Surface Transport, New Delhi	SHRI D. G. SHIRKE
Ind Auto Ltd, Mumbai	SHRI A. PECORELLI SHRI A. M. DESHPANDE ( <i>Alternate</i> )
Autoliv IFB India Ltd, Bangalore	SHRI V. RAGHU SHRI S. RANGARAJAN ( <i>Alternate</i> )
Research, Designs & Standards Organization, Lucknow	DIRECTOR (MOTIVE POWER)
Ruby Coach Builders Pvt Ltd, Mumbai	SHRI MANOJ D. KAPASHI SMT MANJARI M. KAPASHI ( <i>Alternate</i> )
Small Scale Industries	DEVELOPMENT COMMISSIONER
Swaraj Mazda Ltd, Ropar	SHRI S. R. AGRAHARI SHRI LAKHINDER SINGH ( <i>Alternate</i> )
Tata Engineering & Locomotive Co Ltd, Pune	SHRI N. S. BABU SHRI SUJAN CHAKRABORTY ( <i>Alternate</i> )

(Continued on page 14)

(Continued from page 13)

<i>Organization</i>	<i>Representative(s)</i>
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Vankos & Co, Patna	SHRI V. N. SHARMA SHRI SAIFUDDIN HUSSAIN ( <i>Alternate</i> )
Volvo India Pvt Ltd, Bangalore	SHRI ARNE KNABEN SHRI S. V. SUDERSON ( <i>Alternate</i> )
Fiat India Ltd, Thane Dombivili (Thane)	MANAGER (R&D)
BIS Directorate General	SHRI A. R. GULATI, Director & Head (Transport Engg) [Representing Director General ( <i>Ex-officio</i> ) ]
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**Amendments Issued Since Publication**

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