

AUTOMOTIVE INDUSTRY STANDARD

**Automotive Vehicles -
Safety Belt Anchorages -
Specifications**

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ON BEHALF OF :

AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE
UNDER
CENTRAL MOTOR VEHICLE RULES - TECHNICAL STANDING COMMITTEE
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GOVERNMENT OF INDIA

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Status chart of the Standard to be used by the purchaser
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General Remarks :

Introduction

The Automotive Industries Standards Committee (AISC) functions under the guidance of CMVR Technical Standing Committee. AISC is setup to assist the Automotive Industry as well as Government of India in the preparation of new standards and review of the existing standards. ARAI acts as the Secretariat for AISC.

Seats, seat belts, seat belt anchorages, etc., are safety critical items for the passenger in case of sudden acceleration/deceleration and accidents. Further, seats and their design, mounting, etc., constitute substantially to the ride comfort of the vehicle users. Presently there are no Indian standards or CMVR covering the seats and related items. AISC identified these as one of the priority items and a series of standards are being drafted by a Panel. This standard is one of them.

Seat belts have become mandatory fitments on front seats of M and N categories of vehicles from April 1994 in India. Seat belt without a proper anchorage does not serve any purpose. Hence, it is necessary to have a standard for safety belt anchorages. This standard fulfils the above requirement.

The Panel responsible for preparation of the standard is given in Annexure-II.

Annexure-III gives the list of the members of AISC.

Automotive Vehicles : Safety Belt Anchorages - Specifications

1. SCOPE

- 1.1 This standard specifies the requirements of safety belt anchorages viz., 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):1995.

2. REFERENCES

- 2.1 The following Indian Standards are necessary adjunct to this standard:
 - 2.1.1 IS:13749-1993 - Automotive Vehicles - Determination of H-Point - method of Test.
 - 2.1.2 IS:14272 (Part-1):1995 - Automotive Vehicles - Types - Terminology

3. DEFINITIONS

For the purposes of this standard,

- 3.1 **Approval of a Vehicle** means the approval of a vehicle type with anchorages for given types of safety-belts.
- 3.2 **Vehicle Type** means 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** means 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** (or 'seat belt' or 'belt') means 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 wearer's body. Such an arrangement is generally referred to as a 'belt assembly', a term also embracing any device for energy absorption or belt retraction.

- 3.5 **Strap Guide** means a device which alters the lie of the strap in relation to the wearer of the belt assembly.
- 3.6 **Effective Belt Anchorage** means the point used to determine conventionally (as specified in para 4.4) the angle of each part of the safety belt in relation to the wearer i.e. 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 eg., in the case;
- 3.6.1.1 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 the positions of the seat adjustment is the point where the strap is attached to that rigid part;
- 3.6.1.2 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 wearer's side, shall be considered as the effective belt anchorage; and,
- 3.6.1.3 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** means 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** means 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** means 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** means either a bench-type seat, or seats which are separate but side by side (i.e., 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 person;

- 3.11 **Bench Seat** means a structure complete with trim, intended to seat more than one adult person.
- 3.12 **Folding Seat** means an auxiliary seat intended for occasional use which is normally folded.
- 3.13 **Seat Type** means a category of seats which do not differ in such essential respects as :
- 3.13.1 the shape, dimensions and materials of the seat structure,
- 3.13.2 the type and dimensions of the adjustment systems and all locking systems,
- 3.13.3 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** means seating position to which the seat is designed to sit as defined by the vehicle manufacturer.
- 3.15 **Outboard Seat** means forward facing seat next to the side doors/side walls of body shell.
- 3.16 **Outboard Seating Position** means 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** means 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** means 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, in particular, permit
- 3.18.1 longitudinal displacement;
- 3.18.2 vertical displacement;
- 3.18.3 angular displacement;
- 3.19 **Displacement System** means 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** means any 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** represents the pivot centre of torso and the occupant in the seated position in the passenger compartment. It is measured with the manikin described in Indian Standard IS:13749-1993 “Automotive Vehicles : Seats : ‘H’ Point Measurement” (Ref. Fig.1).
- 3.22 **R Point** or the seating reference point 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 (Ref. Fig.1).
- 3.23 **Torso Angle** means the inclination of the seat back in relation to the vertical.
- 3.24 **Actual Torso Angle** means 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 the Indian Standard IS:13749-1993 “Automotive Vehicles : Seats : ‘H’ Point Measurement”.
- 3.25 **Design Torso Angle** means 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 is a straight line passing through the joint between the leg and the pelvis and the theoretical joint between the neck and thorax (Ref. Fig.1).
- 3.27 **Reference Zone** means 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 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 should 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 :
- 3.27.1 In the case of sliding seats
 - 3.27.1.1 at the H Point, and
 - 3.27.1.2 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

- 3.27.2 In the case of non-sliding seats :
 3.27.2.1 at the H Point of the seat considered

4. SPECIFICATIONS

4.1 General Specifications

- 4.1.1 Anchorage for safety belt shall be so designed, made and situated as to
 4.1.1.1 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.
 4.1.1.2 reduce to a minimum the risk of the belt's slipping when worn correctly;
 4.1.1.3 reduce to a minimum the risk of strap damage due to contact with sharp rigid parts of the vehicle or seat structures;
 4.1.1.4 enable the vehicle, in normal use, to comply with the provisions of this standard;
 4.1.1.5 for anchorages which take up different positions to allow persons to enter the vehicle and to restrain the occupants, the specifications shall apply to the anchorages in the effective restraint position.
- 4.2 The vehicle manufacturer should provide to the test agency all the relevant information/specifications of the anchorages in the format provided in Annexure-I.

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 anchorage 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 para 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 para 3.27.

- 4.3.2 However, for outboard seating positions, other than front, of vehicles of category M₁, 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 perpendicularly 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 out-board seats of the vehicle category M1, there should 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 the other seats in M1 category vehicle and all other non-protected seats in categories other than M1 as referred to in para 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 para 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 sufficient.
- 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 The specifications related to the areas of locations of effective belt anchorages are shown in Fig.1. The belt anchorages for any one belt may be located either wholly 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 Point L_1 and L_2 are the lower effective belt anchorages. The angles α_1 and α_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 point L_1 and L_2 .

4.4.2.2 **Front Seats, Vehicle Category M_1**

In motor vehicles of category M_1 , the angle α_1 (other than buckle side) shall be within the range of 30 to 80 degrees and the angle α_2 (buckle side) shall be within the range of 45 to 80 degrees. Both angle requirements shall be valid for all normal travelling positions of the front seats, Where at least one of the angles α_1 and α_2 is constant (e.g. 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 para 3.18. with a seatback angle of less than 20° (see figure 1), the angle α_1 may be below the minimum value (30°) stipulated above, provided it is not less than 20° in any normal position of use.

4.4.2.3 **Rear Seats, Vehicle Category M_1**

In motor vehicles of category M_1 , the angles α_1 and α_2 shall be within the range of 30 to 80 degrees 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 α_1 and α_2 must be between 30 and 80 degrees for all normal travelling positions of the front seats. In the case of vehicles having a maximum vehicle mass not exceeding 3.5 tones and at least one of the angles α_1 and α_2 is constant in all normal positions of use (e.g. anchorage fixed at the seat), its value shall be $60 \pm 10^\circ$.

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 para 3.18 with a seat back angle of less than 20° (Ref. Fig.1), and
- other rear seats

angles α_1 and α_2 may be between 20° and 80° in any normal position of use. In the case of the front seats of vehicles having a maximum vehicle mass not exceeding 3.5 tons and at least one of the angles α_1 and α_2 is constant in all normal position of use (e.g. 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 M₂ and M₃, the angles α_1 and α_2 shall be between 45° and 90° 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 L₁ and L₂, shall not be less than 350 mm. The median longitudinal plane of the seat shall pass between points L₁ and L₂, and shall be at least 120 mm from these points.

4.4.3 Location of the Effective Upper Belt Anchorages (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;

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 reference line of the manikin positioned in the seat in question (described in para 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 driver's seat 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 following limits for distance A between the longitudinal median plane of the vehicle and plane P are respected :
 - * A is equal or more than 200 mm if the bench seat has been designed to accommodate two passengers only;
 - * 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° with the reference line. The angle may be reduced to 60° 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° 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 para 4.4.3.4 is not less than 280 mm and the alternative formula $BR = 260 \text{ mm} + 0.8S$ specified in para 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 para 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 para 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 para 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 para 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 J_1 and J_2 as defined in para 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 para 4.4.3.4 of the seat in question.

4.5 Strength of Anchorages

- 4.5.1 Each anchorage shall be capable of withstanding the tests prescribed in para 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 para 4.4.2.6 and the requirement of para 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 (20 UNF 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 in question, these anchorages need not meet the requirement set out in para 4.6.1, provided that they comply with the other provisions of this Standard. In addition, the requirement set out in para 4.6.1 shall not apply to additional anchorages which meet the requirement set out in para 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 At the request of the manufacturer, 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 para 5.2.
- 5.1.2 The seats shall be fitted and placed in the position for driving or use chosen by the test agency 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° for vehicle of categories M₁ and N₁ and to 15° 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 :

- 5.1.3.1 the anchorages concerned have the same structural characteristics as the anchorages relating to the other seats or group of seats; and

- 5.1.3.2 where such anchorages are fitted totally 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 approximately 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 para 5.2.1 to 5.2.3 is used, evidence must be furnished that it is equivalent.

5.3 General Specifications

- 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 second.
- 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

- 5.3.4.1.1 The belt anchorages shall be submitted to the test prescribed in para 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 prescribed in para 4.3 these anchorages shall be subjected to the test specified in para 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.
- 5.3.4.1.2 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 para 5.4.3.

- 5.3.4.1.3 In the above case the tests prescribed in para 5.4.1 and 5.4.3 can be performed on two different structures if the manufacturer so requests.

5.3.4.2 Rear Outboard Seats and All Centre Seats

The belt anchorages shall be subjected to the test prescribed in para 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 para 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 the manufacturer so requests.

- 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 para 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 para 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 para 5.4 as appropriate.
- 5.3.7 A test method other than those prescribed in para 5.3 may be used, but evidence must be furnished that it is equivalent.

5.4 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 $1350 \text{ daN} \pm 20 \text{ daN}$ 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 M₁ and N₁. The test load shall be $675 \text{ daN} \pm 20 \text{ daN}$ for categories M₂ and N₂ and $450 \text{ daN} \pm 20 \text{ daN}$ for M₃ and N₃.

5.4.1.3 At the same time, a tractive force of $1350 \text{ daN} \pm 20 \text{ daN}$ shall be applied to a traction device (see Fig.4) attached to the two lower belt anchorages, in the case of vehicle of categories M₁ and N₁. The test load shall be $675 \text{ daN} \pm 20 \text{ daN}$ for categories M₂ and N₂ and $450 \text{ daN} \pm 20 \text{ daN}$ for categories M₃ and N₃.

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 $1350 \text{ daN} \pm 20 \text{ daN}$ 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 M₁ and N₁. The test load shall be $675 \text{ daN} \pm 20 \text{ daN}$ for categories M₂ and N₂ and $450 \text{ daN} \pm 20 \text{ daN}$ for categories M₃ and N₃.

5.4.2.2 At the same time a tractive force of $1350 \text{ daN} \pm 20 \text{ daN}$ shall be applied to a traction device (Fig.4) attached to the lower belt anchorages in the case of vehicle of categories M₁ and N₁. The test load shall be $675 \text{ daN} \pm 20 \text{ daN}$ for categories M₂ and N₂ and $450 \text{ daN} \pm 20 \text{ daN}$ for categories M₃ and N₃.

5.4.3 Test in Configuration of a Lap Belt

A test load of $2225 \text{ daN} \pm 20 \text{ daN}$ shall be applied to a traction device (see Fig.3) attached to the two lower belt anchorages in the case of vehicle of categories M₁ and N₁. The test load shall be $1110 \text{ daN} \pm 20 \text{ daN}$ for categories M₂ and N₂ and $740 \text{ daN} \pm 20 \text{ daN}$ for categories M₃ and N₃.

5.4.4 Test for Belt Anchorages Located Wholly Within the Seat Structure or Dispersed Between the Vehicle Structure and the Seat Structure

5.4.4.1 The test specified in para 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 :

5.4.4.2 The loads indicated in para 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 M₁ and N₁.

The test load shall be equal to 10 times the weight of the complete seat for categories M₂ and N₂ and 6.6 times the weight of the complete seat for categories M₃ and N₃.

5.4.5 Test in Configuration of a Special-Type Belt

- 5.4.5.1 A test load of 1350 daN ± 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 of 1350 daN ± 20 daN shall be applied to a traction device (see Fig.5) attached to two lower belt anchorages, in the case of vehicle of categories M₁ and N. The test load and tractive force shall be 675 daN ± 20 daN for categories M₂ and N₂ and 450 daN ± 20 daN for categories M₃ and N₃.

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 Para 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 M₃ or N₃ vehicle.
- 5.4.6.2 The test load shall be directed forward in relation to the seating position in question, corresponding to the procedure prescribed in Para 5.3.

5.5 Inspection After Testing

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

Explanatory Note :

This standard is 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”.

DR=315+1.8S
BR=260+S
(REF PARA 4.4.3.5&4.4.3.6)

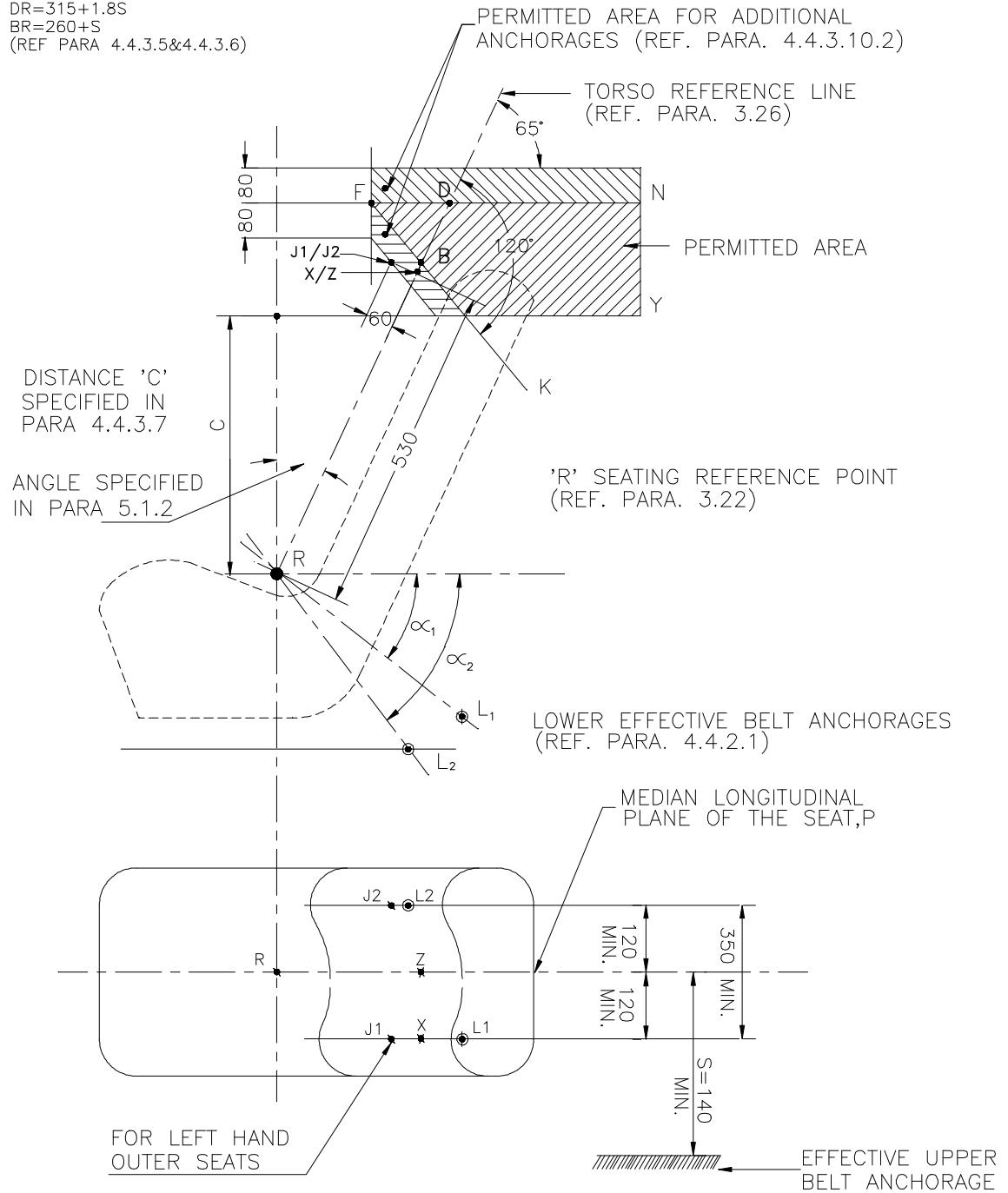
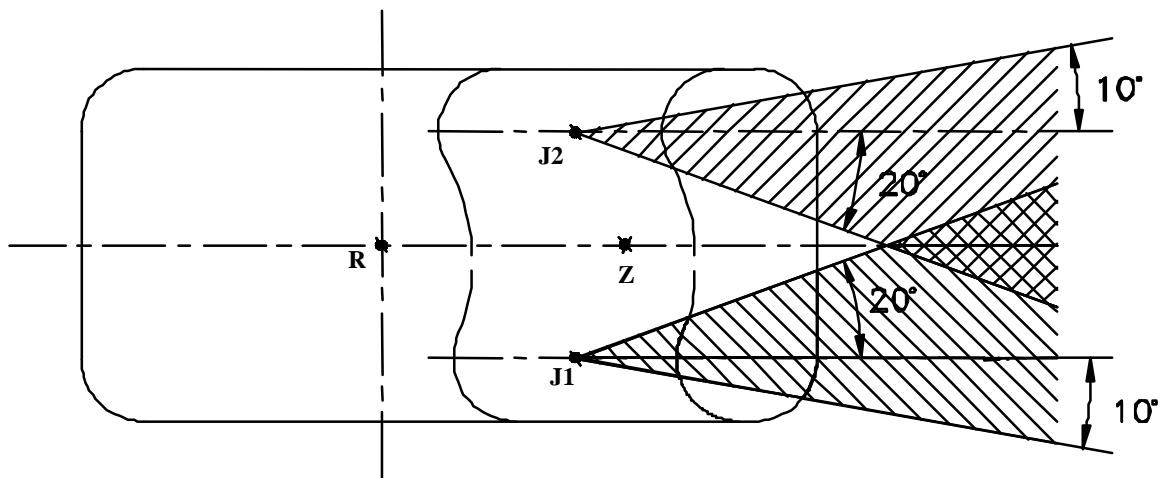


FIG 1 AREAS OF LOCATION OF EFFECTIVE BELT ANCHORAGES

ALL DIMENSIONS ARE IN mm



**FIG 2 EFFECTIVE UPPER BELT ANCHORAGES
CONFORMING TO PARA 4.4.3.11.1**

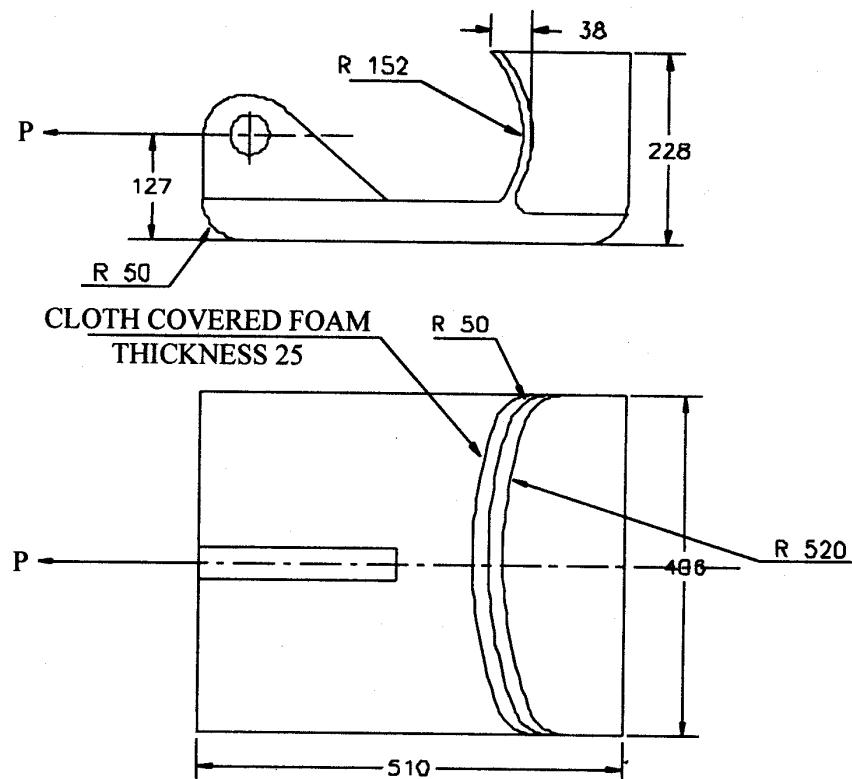


FIG 3 TRACTION DEVICE (REF PARA 5.4.1.2, 5.4.2.1 & 5.4.3)

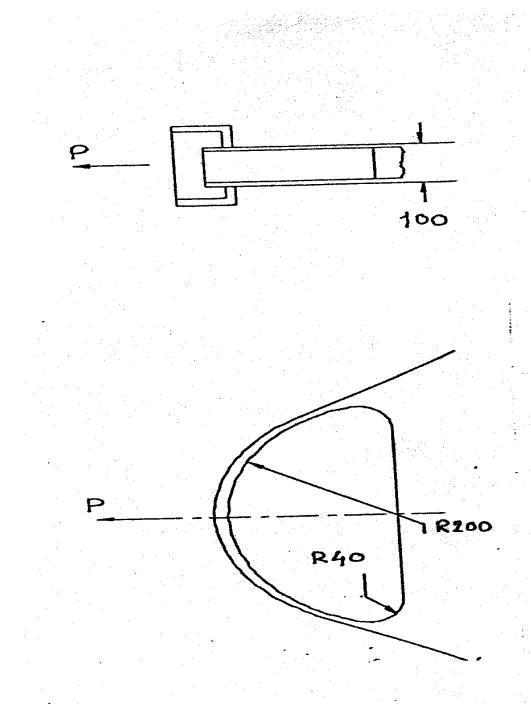


FIG 4 TRACTION DEVICE (REF PARA 5.4.1.3, 5.4.2.2 & 5.4.5.1)

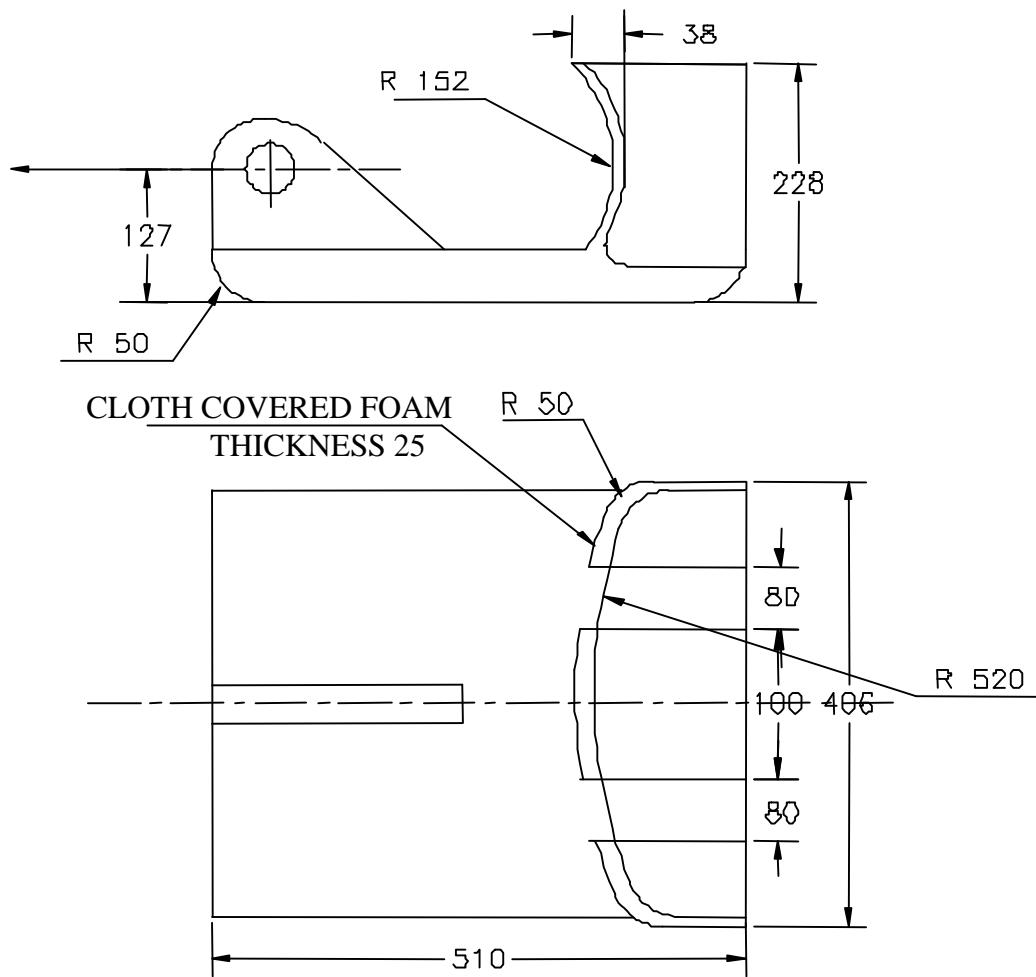


FIG 5 TRACTION DEVICE (REF PARA 5.4.5.2)

ANNEXURE-I

AUTOMOTIVE VEHICLES : SAFETY BELT ANCHORAGES - SPECIFICATIONS

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 {Inboard {Upper anchorage Middle Seat {Lower Anchorage {Right {Left {Upper anchorage Left-hand Seat {Lower anchorage {Outboard {Inboard {Upper anchorage		
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.

ANNEXURE-II

**MEMBERS OF THE PANEL ON SEATS, SEAT BELT ANCHORAGES,
SEAT ANCHORAGES AND HEAD RESTRAINTS**

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13	Mr.Rahul Goyal Asst. Manager - R&D Krishna Maruti Ltd. 40 KM, NH-8, Delhi-Jaipur Highway Village Narsinghpur Gurgaon - 122 001	FAX : 0124-329618 E-Mail : kmlworks@ndf.vsnl.net.in
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19	Mr.Kulwant S.Wilkhu Director - Engg. & Marketing Sutlej Coach Builders Pvt. Ltd. 5th KM Stone, Kapurthala Road Jalandhar - 144 002	FAX : 0181-253282
20	Mr.V.Kapur President Vijayjyot Seats Ltd. Plot No.318, Village Baska Tal. Halol, Dist. Panchmahal GUJARAT – 389 350	Mr.A.D.Tare Manager-QA&DD FAX : 02676-47192 E-Mail: vijayjyot@wilnetonline.net

Annexure: III
 (See Introduction)
COMMITTEE COMPOSITION
Automotive Industry Standards Committee

Chairman

Shri. B. Bhanot	Director The Automotive Research Association of India, Pune.
Members	Representing
Shri. V.C. Mathur	Department of Heavy Industry, Ministry of Industries & Public Enterprises, New Delhi.
Shri. J. R. Kapoor	Ministry of Surface Transport, New Delhi.
Shri. G. S. Kashyab Shri. M.K. Bhat (Alternate)	Office of the Development Commissioner Small Scale Industries, Ministry of Industry, New Delhi.
Shri. A. R. Gulati	Bureau of Indian Standards, New Delhi.
Shri. R. C. Sethi Shri. N. Karuppaiah (Alternate)	Vehicle Research & Development Establishment, Ahmednagar.
Shri. S. R. Tapade Shri. P. C. Barjatia (Alternate)	Central Institute of Road Transport, Pune.
Dr. P. D. Singhal	Society of Indian Automobile Manufacturers.
Shri. T. M. Balaraman	Society of Indian Automobile Manufacturers.
Shri. I. V. Rao	Society of Indian Automobile Manufacturers.
Shri. Z. A. Mujawar (Alternate)	Society of Indian Automobile Manufacturers.
Shri. Vivek Adyanthaya (Alternate)	Society of Indian Automobile Manufacturers.
Shri. U. K. Kini (Alternate)	Society of Indian Automobile Manufacturers.
Shri. T. C. Gopalan	Tractor Manufacturers Association, New Delhi.
Shri. Klaus Goehring	Automotive Components Manufacturers Association.
Shri. G. P. Banerji	Automotive Components Manufacturers Association

Member Secretary

Mrs. Rashmi Urdhwareshe

Assistant Director,

The Automotive Research Association of India, Pune