

AUTOMOTIVE INDUSTRY STANDARD

**External Projection requirements for
Two Wheeled Motor Vehicles**

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ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLE RULES – TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA

September 2018

Status chart of the Standard to be used by the purchaser for updating the record

Sr. No.	Corrigenda.	Amendment	Revision	Date	Remark	Misc.

General Remarks:

INTRODUCTION

1. The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the erstwhile Ministry of Surface Transport (MOST) has constituted a permanent Automotive Industry Standards Committee (AISC) vide order No. RT-11028/11/97-MVL dated September 15, 1997. The standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CMVR-TSC). After approval, the Automotive Research Association of India, (ARAI), Pune, being the Secretariat of the AIS Committee, will publish this standard. For better dissemination of this information ARAI may publish this document on their Web site.
2. The Requirements of External Projections test is intended to reduce the Injury cause to pedestrian while vehicle in motion/stationary.
3. The purpose of this standard is to reduce the risk of seriousness of body injury to a person hit by the vehicle part or crushing against it in the event of a collision. There is also likelihood of injury if some parts are projected out more than specified particularly while taking a turn or cornering. In preparation of this Automotive Industry Standard (considerable assistance has been derived from Annex VIII of EC regulation 44/2014 of 21 November 2013, with regard to the vehicle construction and general requirements for the approval of two- or three- wheel vehicles and quadricycles issued by European commission. As decided in 54th AISC Meeting to formulate new AIS on External Projections of L1 and L2 category of vehicles.
4. The AISC panel and the Automotive Industry Standards Committee (AISC) responsible for preparation of this standard are given in Annex D and E respectively.

External Projection requirements for Two Wheeled Motor Vehicles

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External Projection requirements for Two Wheeled Motor Vehicles

1. SCOPE

This standard specifies the external projection requirements for L1 and L2 categories of vehicles as defined in AIS-053.

2. REFERENCES

AIS-053 - Automotive Vehicles -Types - Terminology

3. DEFINITIONS

For the purposes of this standard, the following definitions shall apply:

- 3.1 **‘outer parts of the vehicle’**: means the parts of the vehicle likely to be involved with external obstacles in the event of a collision;
- 3.2 **‘grazing’**: means any contact which, under certain conditions, could cause injury by laceration;
- 3.3 **‘collision’**: means any contact which, under certain conditions could cause penetration injuries;
- 3.4 **‘radius of curvature’**: means radius of the arc of the circle most closely approaching the rounded shape of the part under consideration.
- 3.5 **‘stem’** means any projection or part which appears to have a round or virtually round shape, including bolt and screw heads, with a relatively constant overall diameter and which has a free end that can be contacted;
- 3.6 **‘plate edge’** means the outline of a plate which would have a total of four clearly identifiable edges if its shape were flat and rectangular and of an overall material thickness not exceeding 10 mm;
- 3.7 **‘type of vehicle in respect of external projections’**: means vehicles not differing essentially from one another with regard, in particular, to the shape, dimensions, direction of travel and hardness of the outer parts of the vehicle.

4. GENERAL REQUIREMENTS

- 4.1 Vehicles of categories L1 and L2 shall meet the following general requirements:
 - 4.1.1 Vehicles shall incorporate no pointed, sharp or protruding parts, pointing outwards, of such a shape, dimension, angle of direction and hardness that they increase the risk or seriousness of body lesions and lacerations suffered by any person struck or grazed by the vehicle in the event of an accident. Vehicles shall be designed so that parts and edges with which vulnerable road users such as pedestrians are likely to come into contact in the event of an accident comply with the requirements in points 4. to 5.4.8.

- 4.1.2 All contactable projections or edges which are made of or covered with material such as soft rubber or soft plastic having a hardness of less than 60 Shore (A) are considered to meet the requirements in points 5.4 to 5.4.8. Vehicle manufacturer shall submit component report for hardness testing for which the test shall be carried out with the material fitted to the vehicle as intended. In case test report has not submitted the hardness measurement shall be carried out with the material fitted to the vehicle as intended

5. SPECIFIC REQUIREMENTS

- 5.1 Vehicles of categories L1 and L2 category shall be assessed in accordance with the provisions in points 5.3 to 5.3.4.1.
- 5.1.1 In the case of vehicles fitted with a form of structure or panels intended to partially or fully enclose the rider, passenger or luggage or to cover certain vehicle components, the vehicle manufacturer may as an alternative choose to apply the relevant requirements of AIS-120 as prescribed for vehicle category M1, covering either specific external projections or the full external surface of the vehicle. The relevant external projections assessed in conformity with this clause shall be clearly identified in Annex B of this standard and any remaining external surface shall comply with the requirements of this standard.
- 5.2 Specific Provisions for motorcycle with sidecar
- 5.2.1 When the side-car is connected to the motorcycle, either permanently or in a detachable way, the space between the motorcycle and the side-car is exempted from assessment (See Figure 1)

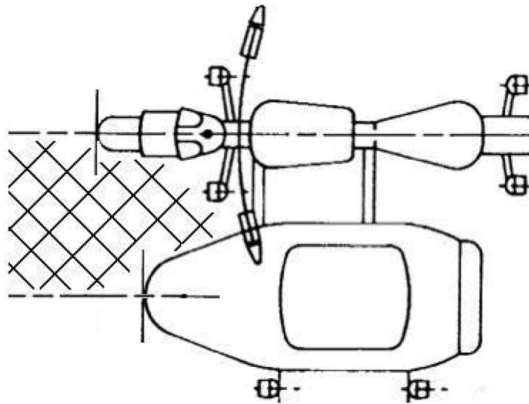


Figure 1 (see 5.2.1)

Top-down view of motorcycle with side-car

- 5.2.2 If the side-car can be detached from the motorcycle so that the motorcycle can be used without it, the motorcycle itself shall fulfill the requirements for solo motorcycles in points 4. to 5.4.8.

5.3 Assessment of external projections

- 5.3.1 A testing device conforming to the specifications laid down by Annex A shall be used to check the external projections of the vehicle.
- 5.3.2 The vehicle shall be placed on a horizontal surface and kept in an upright position, initially with the steering control and steered wheel in the straight-ahead position.
- 5.3.2.1 A 50th percentile anthropomorphic dummy or a rider with 75 ± 5 kg weight and height 1.75 ± 0.05 m shall be seated on the test vehicle in the normal riding position in such a way that it does not hamper the free rotation of the steering control. The feet shall be placed on the designated foot supports and shall not be resting on any gear shift lever or brake pedal.
- 5.3.3 The testing device shall be moved from the front towards the rear of the vehicle, in a smooth motion, on both sides of it. If the testing device contacts the steering control or any parts mounted on it, it shall be rotated away into its fully locked position, during and after which the test continues. The testing device shall remain in contact with the vehicle or rider during the test (See figure 2)

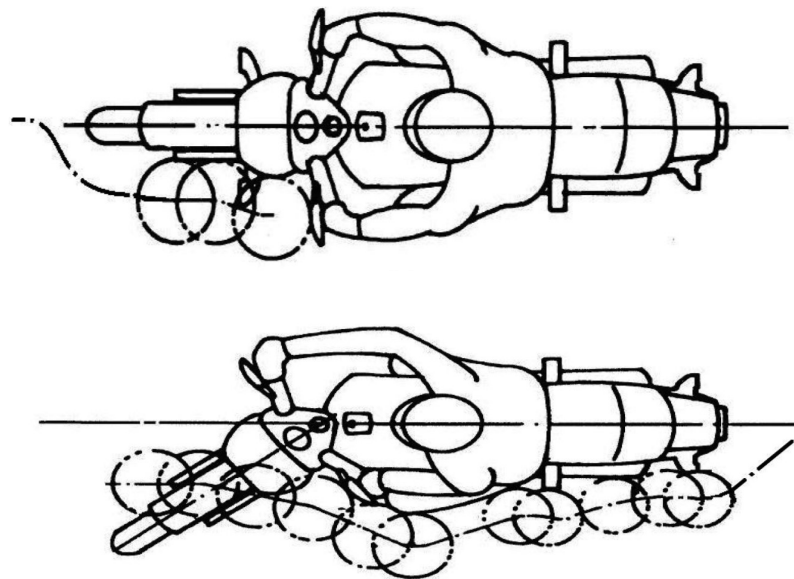


Figure 2 (see 5.3.3)
Test device movement zones

- 5.3.3.1 The front of the vehicle shall be the first point of contact and the testing device shall move sideways in an outward direction following the contour of the vehicle and the rider if applicable. The testing device shall also be allowed to move inward at a rate not exceeding the rate of rearward movement (i.e. at an angle of 45° in relation to the longitudinal median plane of the vehicle).

- 5.3.3.2 The hands and feet of the rider shall be pushed away by the testing device if it comes into direct contact with them and any relevant supports (e.g. foot supports) shall be allowed to freely rotate, fold, bend or flex as a result of contact with the testing device and assessed in all resulting intermediate positions.
- 5.3.3.3 Parts and components of rear-view mirrors which are duly covered by the relevant component type-approval are deemed to comply with the requirements of points 4. to 5.4.8.
- 5.3.3.4 Projections which may be contacted by the testing device in any position of intended use (e.g. passenger foot supports both in stowed and folded-out condition) shall be assessed in all positions of intended use.
- 5.3.4 When the testing device is moved along the vehicle as described above, the projections and edges of the vehicle which are contacted by that device are considered to fall within:
- group 1: if the testing device grazes parts of the vehicle, or
 - group 2: if the testing device collides with parts of the vehicle.
- 5.3.4.1 In order to differentiate in which group the contacted projections and edges fall, the testing device shall be used in accordance with the assessment method shown in Figure 3 below and considered to belong to:
- group 1 if $0^\circ \leq \alpha < 45^\circ$; and
 - group 2 if $45^\circ \leq \alpha \leq 90^\circ$.

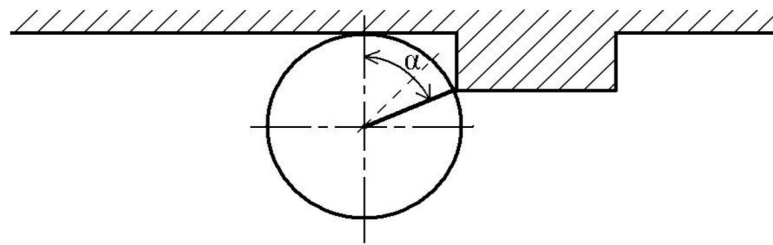


Figure 3 (see 5.3.4.1)

**Top-down view of the testing device grazing the side of a vehicle
and colliding with a protruding part**

- 5.3.4.2 The assessment shall be carried out with number plates fitted on vehicle.
- For this purpose any plate complying with the dimensions prescribed in paragraph (vi) of sub rule 1 of CMV Rule 50 or fourth proviso of sub rule 1 of this rule, as recommended by the manufacturer.
- Contact of the testing device with above number plates shall not be considered for assessment.

5.4. Specific Requirements

5.4.1 Radius requirements concerning group 1 parts (contacted by grazing):

5.4.1.1 Plates:

- Plate edges shall have a radius of curvature of at least 0.5 mm. Structure, fairings, bodywork, etc.:
- corners shall have a radius of curvature of at least 3.0 mm. A 'corner' means the three-dimensional shape of a surface which is not a plate edge or a stem.

5.4.1.1.1 The radii on corners and plate edges shall be determined at the point(s) of contact with the testing device and there shall be a smooth transition to a smaller radius, if any, in the direction where contact between the testing device and corner or edge no longer occurs.

5.4.1.2 Stems

- stems or similar parts shall have an overall diameter of at least 10 mm;
- the edges on the end of a stem shall have a radius of curvature of at least 2.0 mm.

5.4.1.2.1 The radii on edges on the end of a stem shall be determined at the point(s) of contact with the testing device and may be progressively less around the full circumference of the stem end.

5.4.2 Radius requirements concerning group 2 parts (contacted by collision):

5.4.2.1 Plates:

- plate edges shall have a radius of curvature of at least 2.0 mm; Structure, fairings, bodywork, etc.:
- corners shall have a radius of curvature of at least 2.0 mm.

5.4.2.1.1 The radii on corners and plate edges shall be determined at the point(s) of contact with the testing device and shall be continued or progressively less in the directions where contact between the testing device and corner or edge no longer occurs.

5.4.2.2 Stems

- stems or similar parts shall have an overall diameter of at least 20 mm;
- however, a stem or a similar part may have an overall diameter of less than 20 mm, provided that its projection is less than half of its overall diameter;
- the edges on the end of a stem shall have a radius of curvature of at least 2.0 mm.

- 5.4.2.2.1 The radii on edges on the end of a stem shall be determined at the point(s) of contact with the testing device and may be progressively less around the full circumference of the stem end.
- 5.4.3 The upper edge of a windscreen or fairing, transparent or not, shall have a radius of curvature of at least 2.0 mm or may be covered with protective material in compliance with point 4.1.2.
- 5.4.3.1 The upper edge is bounded by planes at a 45° angle in relation to the horizontal plane (see Figure 4).

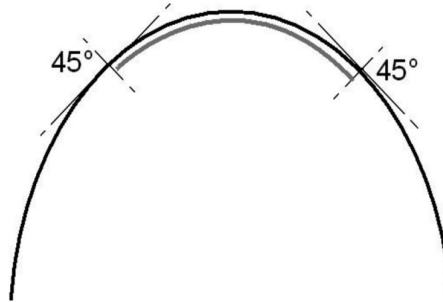


Figure 4 (see 5.4.3.1)

View of rider through transparent windshield

- 5.4.3.2. If a radius is applied to the upper edge, it shall not be larger than 0.70 times the thickness of the windscreen or fairing measured at the upper edge, subject to a minimum of 2.0 mm as prescribed in 5.4.3
- 5.4.3.3 Covers which resemble windscreens or fairings and which are installed only to protect the rider's instrument cluster or headlamp device and which have an overall projection of no more than 50 mm measured from the top surface of the relevant instrument cluster or headlamp device are exempted from the requirements in points 5.4.3, 5.4.3.1. and 5.4.3.2.
- 5.4.4 The end of clutch and brake levers mounted on the steering control shall be perceptibly spherical and have a radius of curvature of at least 7.0 mm. The remaining outward edges of these levers shall have a radius of curvature of not less than 2.0 mm along the complete grip application area. The verification is done with the levers in non-applied position.
- 5.4.4.1 If the levers are fully covered by protection shields and can therefore not come into contact with a person struck by the vehicle, the levers are deemed to comply with the requirements of point 5.4.4.
- 5.4.5 The leading edge of the front mudguard or any parts mounted onto it shall have a radius of curvature of at least 2.0 mm

- 5.4.5.1 The leading edge of the front mudguard is bounded by two vertical planes forming a horizontal angle of 45° in relation to the longitudinal median plane of the vehicle.
- 5.4.5.2 If a radius is applied to the leading edge, it shall not be larger than 0.70 times the thickness of the windscreen or fairing measured at the leading edge, subject to a minimum of 2.0 mm as prescribed in 5.4.5
- 5.4.6 The rear edge of a fuel filler cap or similar shaped device located on the upper surface of the fuel tank, for instance, and likely to be struck by the rider moving forward during a collision, shall not project more than 15 mm from the underlying surface and the transition from the underlying surface shall be smooth or perceptibly spherical. An example is given in Figure 5. It may project more than 15 mm from the underlying surface provided that a protective device is located behind it ensuring that the relative projection of 15 mm is not exceeded.

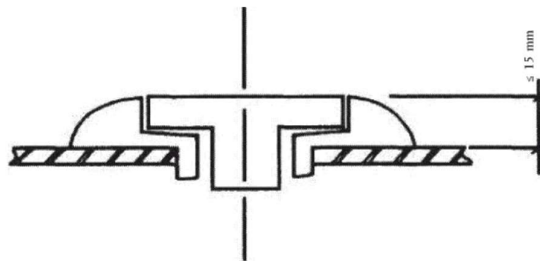


Figure 5 (See 5.4.6)

Fitting requirement for filler cap on fuel tank

- 5.4.6.1 Fuel filler caps or similar shaped devices which are not placed forward of the rider or located below the level of the rider's seating position are exempted from the requirements of point 5.4.6.
- 5.4.7 Ignition key heads shall have a protective cap made from rubber or plastic with blunted edges
 - 5.4.7.1 Ignition keys which are not required to be inserted in the ignition lock during vehicle operation, which are flush with or encased by the surrounding surface, of which the head can fold in relation to its shaft or barrel, which is located below the level of the rider's seating position or which is not located forward of the rider are exempted from the requirements of point 5.4.7.
- 5.4.8 Outward pointed and protruding parts of the vehicle in its normal and upright position which are not contacted by the testing device, but which could increase the risk or seriousness of body lesions and lacerations as a result of any contact with a person being struck in a collision, shall be blunted.

- 6. TYPE APPROVAL AND CRITERIA FOR EXTENSION OF APPROVAL**
- 6.1 Type Approval
 - 6.1.1 The manufacturer shall submit the details as specified in Annex B.
 - 6.1.2 The type approval for external projections of a model/variants submitted for approval in pursuance of this standard shall be granted when the vehicle complies to the requirements of this standard.
- 6.2 Modification in the parts related to external projections and Extension of Approval
 - 6.2.1 Any modification in technical requirements affecting the type approval declared in accordance with Annex B shall be intimated to the test agency.
 - 6.2.2 Testing agency may then consider, whether;
 - 6.2.2.1 The component with modification complies with specified requirements; or
 - 6.2.2.2 Any further verification is required.
 - 6.2.3 In case of 6.2.2.2 checks for those parameters, which are affected by the modifications, only need to be carried out.
 - 6.2.4 In the event of 6.2.2.1 or in the case of 6.2.2.2, after successful compliance to requirements, the certificate of compliance shall be validated for the modified version.
 - 6.2.5 For deciding whether any further verification is required, guidelines given in Annex C shall be followed.

ANNEX A
(see 5.3.1)
TESTING DEVICE

A-1. External projections testing device

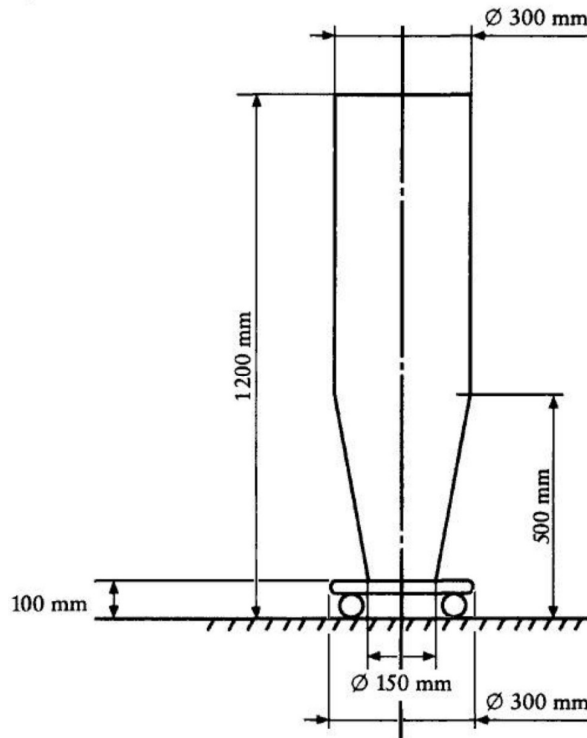


Figure A-1
Diagram of the testing device

A-2 Procedure for use

- A-2.1. The testing device shall be kept in an orientation such as to ensure that the line corresponding to the angle of $\alpha = 90^\circ$ remains parallel to the longitudinal median plane of the vehicle throughout the test.
- A-2.2. The lower portion of the testing device (i.e. the 100 mm high base) may be of a different design for stability or convenience purposes. However, if this lower portion comes into direct contact with the vehicle, it shall be adapted (e.g. locally trimmed down to a minimum of 150 mm in diameter) in order to allow full contact between the vehicle and the portion of the testing device between 100 mm to 1200 mm in height.

ANNEX B*(See 6.1.1)***INFORMATION TO BE SUBMITTED BY THE MANUFACTURER
FOR TYPE APPROVAL**

B-1	General		
B-1.1	Make	:-	
B-1.2	Type (state any possible variants and versions)	:-	
B-1.3	Vehicle category as per AIS-053	:-	
B-1.4	Name and address of manufacturer	:-	
B-1.5	Name and address of manufacturer's authorized representative, if any:	:-	
B-2.0	General arrangement of vehicle		
B-2.1	Dimensional drawing of the complete vehicle:	:-	
B-2.2	Diagram showing external projections related parts and relevant dimensions.	:-	
B-3.0	Details of compliance as per AIS-120 mentioned in Clause 5.1.1	:-	

ANNEX C

(See 6.2.5)

CRITERIA FOR EXTENSION OF APPROVAL

Sr. No.	Parameter/Criteria	Whether verification required
1.	Shape of vehicle	Yes
2.	Addition of parts relevant to external projections.	Yes
3.	Deletion of parts relevant to external projections	No
4.	Decrease in radius of curvature of parts relevant to external projections	Yes
5.	Decrease in stem diameter relevant to external projections	Yes
6.	Decrease in end diameter or radius of spherical end of clutch and brake levers-	Yes (document verification)
7.	Decrease in radius of curvature for front mudguard, windshield	Yes
8.	a) Increase in projection height of fuel tank filler cap b) Change in location of fuel tank filler cap	Yes (document verification)
9.	Increase in hardness due to change of material of relevant parts from below 60 shore (A) to above it	Yes, wherever applicable
Changes other than those listed above, are considered to be having no adverse effect requirements of external projections.		

ANNEX D

PANEL COMPOSITION*
(See Introduction)

Chairman	
Mr. S. Arun	SIAM (Hero Moto. Corp. Ltd.)
Members	Representing
Mr. P. D. Betgeri	ARAI
Mr. V. P. Rawal	ARAI
Mr. Ramu Konanki	ARAI
Mr. Tagad Nilesch	CIRT
Ms. Vijayanta Ahuja	ICAT
Mr. Gurukaran	ICAT
Mr. Arvind Kumbhar	SIAM (Bajaj Auto Ltd.)
Mr. T. M. Balaraman	SIAM (Hero Moto. Corp. Ltd.)
Mr. Danish Gazali	SIAM (Hero Moto. Corp. Ltd.)
Mr. Suraj Agarwal	SIAM (Honda Motorcycle & Scooter India)
Mr. Vipin Sharma	SIAM (Honda Motorcycle & Scooter India)
Mr. Sandeep Miskeen	SIAM (Honda Motorcycle & Scooter India)
Mr. Piyush Chowdhry	SIAM (Hero Moto. Corp. Ltd.)
Mr. Vivek	SIAM (Piaggio Vehicles Pvt. Ltd.)
Mr. Anantkumar	SIAM (TVS Motor Company Ltd.)
Mr. Venusuresh	SIAM (Yamaha Motor)
Mr. Gaurav	SIAM (Suzuki Motorcycle Ind. Pvt. Ltd.)
Mr. Rakesh Sharma	H. D. Motor
Mr. Uday Harite	ACMA

* At the time of approval of this Automotive Industry Standard (AIS)

ANNEX E
(See Introduction)
COMMITTEE COMPOSITION *

Automotive Industry Standards Committee

Chairperson	
Mrs. Rashmi Urdhwareshe	Director The Automotive Research Association of India, Pune
Members	Representing
Representative from	Ministry of Road Transport and Highways (Dept. of Road Transport and Highways), New Delhi
Representative from	Ministry of Heavy Industries and Public Enterprises (Department of Heavy Industry), New Delhi
Shri S. M. Ahuja	Office of the Development Commissioner, MSME, Ministry of Micro, Small and Medium Enterprises, New Delhi
Shri Shrikant R. Marathe	Former Chairman, AISC
Shri R.R. Singh	Bureau of Indian Standards, New Delhi
Director	Central Institute of Road Transport, Pune
Director	Global Automotive Research Centre
Director	International Centre for Automotive Technology, Manesar
Director	Indian Institute of Petroleum, Dehra Dun
Director	Indian Rubber Manufacturers Research Association
Director	Vehicles Research and Development Establishment, Ahmednagar
Representatives from	Society of Indian Automobile Manufacturers
Shri R. P. Vasudevan	Tractor Manufacturers Association, New Delhi
Shri Uday Harite	Automotive Components Manufacturers Association of India, New Delhi

Member Secretary
Shri Vikram Tandon
Dy. General Manager
The Automotive Research Association of India, Pune

* At the time of approval of this Automotive Industry Standard (AIS)