

FINALIZED DRAFT

AUTOMOTIVE INDUSTRY STANDARD

**Additional Safety features for
Category M & N Vehicles**

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CHECK LIST FOR PREPARING AUTOMOTIVE INDUSTRY STANDARD
Draft AIS-145/DF1: Additional Safety features for Category M & N vehicles

SR. NO.	PARTICULARS	REMARKS
1.	Indicate details of the base reference standard. (e.g. ECE / EEC Directive/GTR etc.)	The standard covers 5 different safety features. UN R16.05 reference regulation for safety belt reminder. No Regulatory reference standard available for other features. Aid of ISO 17386 taken for developing requirements of Rear Parking Alert system.
2.	Add an explanatory note indicating differences between the above standard and the draft, if any.	SBR: No deviations from reference standard. All other features: No reference regulatory standard. India unique regulatory requirements developed.
3.	Specify details of technical specifications to be submitted at the time of type approval relevant to the requirements of this standard covered.	As specified in Annexure 1
4.	Are the details of Worst Case Criteria covered?	No
5.	Are the performance requirements covered?	Yes
6.	Is there a need to specify dimensional requirements?	Yes
7.	If yes, are they covered?	Yes
8.	Is there a need to specify COP requirements? If yes, are they covered?	No
9.	Is there a need to specify type approval and routine test separately, as in the case of some of the Indian Standards? If yes, are they covered?	No
10.	If the standard is for a part / component or sub-system; i) AIS-037 or ISI marking scheme be implemented for this part? ii) Are there any requirements to be covered for this part when fitted on the vehicle? If yes, has a separate standard been prepared?	No.
11.	If the standard is intended for replacing or revising an already notified standard, are	No

	transitory provisions for re-certification of already certified parts/vehicles by comparing the previous test result, certain additional test, etc. required? If yes, are they included?	
12.	Include details of any other international or foreign national standards which could be considered as alternate standard.	No
13.	Are the details of accuracy and least counts of test equipment/meters required to be specified? If yes, have they been included?	Yes
14.	What are the test equipment for establishing compliance?	As specified in this standard.
15.	If possible, identify such facilities available in India.	ARAI, (other testing agencies to confirm)
16.	Are there any points on which special comments or information is to be invited from members? If yes, are they identified?	No
17.	Does the scope of standard clearly identify vehicle categories?	Yes
18.	Has the clarity of definitions been examined?	Yes

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

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 (CTSC). After approval, the Automotive Research Association of India, (ARAI), Pune, being the secretariat of the AIS Committee, will publish this standard.

Ministry of Road Transport took initiative to further increase vehicular safety with the aim to reduce causes of accidents. Following was the focus while formulation of this standard:

1. Enhancement in use of safety belts to improve safety
2. Accidents caused due to over speeding of vehicles.
3. Ease of occupant exit in case of electric power failure in a centrally locked vehicle
4. Reduce possibilities of accidents (child over run) while parking in reverse gear.
5. Driver airbag mandate as additional passive safety measure.

This standard specifies requirements of special features, which are in addition to present mandatory requirements to mitigate above causes.

Reverse Park Alert Systems (RPAS) which uses object-detection devices (sensors) or camera based displays in order to provide the driver with information about obstacles in specified zone while reversing the vehicle. The test objects in this standard are defined based on systems using ultrasonic sensors and electromagnetic sensors which reflect the most commonly used technology. For other sensing technologies possibly coming up in the future, these test objects shall be checked and changed if required.

The AISC panel responsible for formulation of this standard is given in Annex 8.

The Automotive Industry Standards Committee (AISC) responsible for approval of this standard is given in Annex 9.

Additional Safety features for Category M & N vehicles

1.	SCOPE
1.1	<p>This standard specifies the requirements for additional safety features for M & N category vehicles that are aimed to further enhance vehicular and road safety.</p> <p>The requirements of this standard are applicable to M1 category vehicles in respect of the following:</p> <ul style="list-style-type: none"> (i) Speed alert system to alert driver in case of over speeds; (ii) Driver and co-driver safety belt reminder; (iii) Manual override for central locking system; (iv) Driver Airbag <p>The requirements of vehicle reverse parking alert system of this standard shall be applicable to all M and N category vehicles, as defined in AIS-053.</p>
2.	REFERENCES
2.1	AIS-053 Automotive Vehicles - Types – Terminology
2.2	AIS-004 (Part 3) Automotive Vehicles – Requirements for Electromagnetic Compatibility
2.3	AIS-098 Requirements for the Protection of the Occupants in the event of an Offset Frontal
2.4	AIS- 096 Requirements for Behavior of Steering Mechanism of a Vehicle in a Head-on Collision
3.	DEFINITIONS: The definitions pertaining to the requirements are specified at respective Annexures to this standard.
4.	APPLICATION FOR TYPE APPROVAL
4.1	<p>The application for type approval of a vehicle type shall be submitted by the vehicle manufacturer along with at least the details given in Annexure 1.</p> <p>Note: If the details are covered in application for complete vehicle type approval, it is not necessary to submit them separately.</p>
5.	TECHNICAL REQUIREMENTS: These requirements are in addition to the requirements specified in the respective standards notified under CMVR. The vehicle submitted for type approval shall meet the requirements specified in the following Annexures of this standard.
5.1	Speed alert system to alert driver in case of over speeds provided in category M1, shall meet requirements given at Annexure 2 .
5.2	Driver and co-driver safety belt reminder provided in category M1, shall meet requirements given at Annexure 3 ;
5.3	Manual override for central locking system for category M1 shall meet requirements given at Annexure 4 .
5.4	Driver airbag provided in category M1 shall meet requirements given at

	Annexure 5.
5.5	Vehicle reverse parking alert shall meet requirements of Annexure 6 for vehicle of M1 category and M2 category derived from M1.
5.6	<p>Vehicle Reverse Parking Alert shall meet requirements of Annexure 7 for vehicles other than M1 category.</p> <p>All vehicles other than M1 equipped with vehicle reverse parking alert shall comply with the requirements of Annexure 7 of this standard. To address the diversity of vehicle heights and rear end configuration, it shall be permissible for vehicles of category other than M1 to comply with the requirements of Annexure 6 as an alternative. Tractors including Puller Tractors of N category shall be exempted from the requirements of both Annexures 6 & 7.</p>
6	EXTENSION OF TYPE APPROVAL
6.1	<p>Every modification pertaining to the information, even if the changes are not technical in nature declared in accordance with 4.1 shall be intimated by the manufacturer to the testing agency.</p> <p>If the changes are in parameters not related to the provisions, no further action need be taken.</p> <p>If the changes are in parameters related to the provisions, the Testing Agency, which has issued the certificate of compliance, shall then consider, whether,</p>
6.1.1	the device with the changed specifications still complies with provisions, or
6.1.2	Any further verification is required to establish compliance.
6.2	In case of 6.1.2, tests for only those parameters which are affected by the modifications need be carried out
6.3	In case of fulfilment of criterion of para 6.1.1 or after results of further verification as per para of 6.1.2 are satisfactory, the approval of compliance shall be extended for the changes carried out.

ANNEXURE 1

(See 4.1)

TECHNICAL INFORMATION TO BE SUBMITTED BY VEHICLE MANUFACTURER FOR TYPE APPROVAL (Applicable for all Additional Safety features addressed in this standard)

A	General information	
1.	Name and address of vehicle manufacturer	
2	Vehicle model and its variant(s)	
3	Vehicle overall dimensions, (length, width and height), mm	
B	Information for Speed alert	
1.	Details of audible alert (Alert above 80 kmph)	
2.	Details of audible alert Continuous /intermittent. (Alert above 120 kmph)	
3.	if intermittent, Interval between Alerts	
C.	Information for Safety belt reminder	
1.	Whether Visual warning for Safety belt reminder provided	
2.	Whether audible warning for Safety belt reminder provided	
D.	Information for manual over-ride (Door, Door locks and hinges):	
1.	Doors	
1.1	No. of doors	
1.2	Position and type of door	
2.	Door lock / latch	
2.1	Front	
2.1.1	Make	
2.1.2	Identification No. / Part No.	
2.2	Rear	

2.2.1	Make	
2.2.2	Identification No. / Part No.	
E.	Information for Driver airbag	
1.	Relevant information as per clause 3 of AIS-098 / AIS-096	
2.	Airbags information as	
2.1	Make	
2.2	Identification No. / Part No.	
F.	Information for Reverse Parking Alert System	
1.	Type of System (Sensor based / Camera based system)	
2.	Sensor based system-(as applicable) information	
2.1	Make	
2.2	Identification No. / Part No.	
2.3	Number of sensors and mounting location	
3.	Camera based System (as applicable)	
3.1	Make	
3.2	Identification No. / Part No.	
3.3	Camera mounting location	
3.4	Display Make	
3.5	Display Identification No. / Part No.	
3.6	Display location	

ANNEXURE 2

(See 5.1)

REQUIREMENTS FOR SPEED ALERT SYSTEMS (Applicable for category M1)

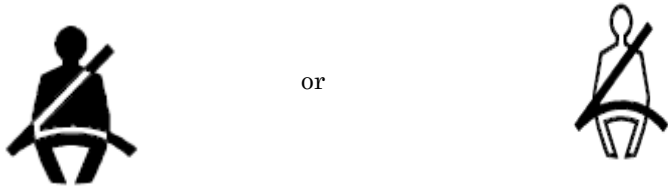
1.	Definitions
1.1	“ Speed alert system ” means a system which alerts the driver; whenever the motor vehicle plies at excess speed beyond its specified limits;
1.2	Audible warning means for the purpose of this annexure sound signal used to alert the driver after exceeding the set limit of the speed.
2.	General and functional requirements Every motor vehicle of M1 category shall be equipped with at least audible warning which automatically alerts the driver whenever the motor vehicle exceeds prescribed level of speeds as mentioned below. Provided further that these requirements are exempted for M1 category vehicles which are (i) Police vehicles (ii) Ambulances (iii) verified and certified by a testing agency specified in rule 126 to have maximum design speed of not more than 80 km/h (iv) fitted with speed governor (speed limiting device or speed limiting function) at pre-set speed of 80 km/h or less
2.1	The audible warning shall warn the driver with frequency not less than 1 cycle/ 2 minute when vehicle speed indicated in the speedometer exceeds 80 km/h (primary level) and continuously or intermittently with frequency not less than 1 cycle/ 2 sec when the vehicle speed indicated in the speedometer exceeds 120 km/h (secondary level).
2.2	Manufacturer shall ensure that audible warning created as per 2.1 above shall be easily recognized by the driver.
2.3	The speed alert system shall be designed in such a way that the warning signal cannot be stopped by means other than control of the speed by the driver.
3.0	Test Requirements
	Compliance to this Annexure 2 can be verified by driving the vehicle exceeding prescribed speed levels either on chassis dynamometer or on test track, on the recommendation of the manufacturer. The requirements as mentioned in paragraph 2 of this annexure shall be complied with however a tolerance of $\pm 8\%$ on speed indicated in the speedometer can be given respectively for primary & secondary level speeds. The vehicle condition shall be as below to reduce the background noise <ul style="list-style-type: none">- The sound level will be assessed by a driver, having normal hearing acuity.- The radio / audio system shall be switched off.- The air conditioning shall be switched off- All windows shall be closed.- Roof shall be closed for convertibles- Any other condition which has impact on background noise

ANNEXURE 3

(See 5.2)

SAFETY-BELT REMINDER REQUIREMENTS
(Applicable for category M1)

1.	Definitions
1.1	“ Safety-belt reminder ” means a system dedicated to alert the driver when driver or co-driver does not use the safety-belt. The system is constituted by a detection of an unfastened safety-belt and by a driver's alert which is a first level warning and a second level warning.
1.1.1	“ Visual Warning ” means a warning by visual signal (lighting, blinking or visual display of symbol or message).
1.1.2	“ Audible Warning ” means a warning by sound signal.
1.1.3	“ First Level Warning ” means a visual warning activated when the ignition switch is engaged (engine running or not) and the driver's or co-driver's safety-belt is not fastened. An audible warning can be added as an option.
1.1.4	“ Second Level Warning ” means a visual and audible warning activated when a driver operates a vehicle without fastening of driver or co-driver safety-belt.
1.1.5	“ Safety-Belt is not fastened ” means, at the option of the manufacturer, either the driver or co-driver safety-belt buckle is not engaged or the webbing length pulled out of the retractor is 100 mm or less.
1.1.6	“ Vehicle is in Normal Operation ” means that vehicle is in forward motion at the speed greater than 10 km/h.
1.1.7	“ Co-Driver ” means the person occupying the Front outboard seating position, other than the driver seat.
2.	Requirements concerning the Safety-Belt Reminder
2.1	Safety-Belt Reminder Equipment
2.1.1	Where the vehicle manufacturer equips the driver or co-driver seating position of M1 category of vehicles with a safety-belt reminder system the vehicle manufacturer shall provide following: a) First level Warning b) Second level Warning: The safety-belt reminder system shall satisfy the requirements of 2.1.2
2.1.1.1	The deactivation of the safety-belt reminder may be allowed, provided that such deactivation satisfies to the requirements of 2.1.2.6.

2.1.2	Safety-Belt Reminder
2.1.2.1	General Requirements
2.1.2.1.1	<p>Visual warning shall be so located as to be readily visible and recognisable in the daylight by the driver and distinguishable from other alerts. Where the visual signal warning employs the colour red, it shall use a symbol as shown in Fig.2 below.</p> <div style="text-align: center;">  <p>or</p> </div> <p style="text-align: center;">FIG. 2</p>
2.1.2.1.2	Visual warning shall be by continuous or intermittent signal.
2.1.2.1.3	Audible warning shall be by continuous or intermittent sound signal or by vocal information. Where vocal information is employed, the manufacturer shall ensure that the alert uses the language either English or Hindi. This audible warning may be constituted by more than one step.
2.1.2.1.4	Audible warning shall be easily recognized by the driver.
2.1.2.2	First level warning shall be at least a visual warning activated for 4 seconds or longer when the driver or co-driver safety-belt is not fastened and the ignition switch is engaged.
2.1.2.2.1	The first level warning may be discontinued when (i) None of the safety-belts which triggered the warning are unfastened, or (ii) The seat or seats which triggered the warning are no longer occupied.
2.1.2.3	The activation of the first level warning shall be tested according to the test procedure defined in 3.1
2.1.2.4	<p>Second level warning shall be a visual and audible signal activated for 30 seconds or longer except for cases in which the warning stops for over 3 seconds when the safety-belt is not fastened, when the vehicle is in normal operation and when at least one of the following conditions (or any combination of these conditions), is fulfilled:</p> <ol style="list-style-type: none"> a) Distance driven greater than the distance threshold. The threshold shall not exceed 500 m. The distance the vehicle is not in normal operation shall be excluded. b) Speed greater than the speed threshold. The threshold shall not exceed 25 km/h. c) Duration time (engine running) greater than the duration time threshold. The threshold shall not exceed 60 seconds. The first level warning duration time and the duration time the vehicle is not in normal operation shall be excluded.

2.1.2.4.1	The thresholds to trigger safety belt reminder listed in paragraphs 2.1.2.4 (a) to (c), may be reset when: (i) Any of the doors have been opened while the vehicle is not in normal operation or (ii) The seat or seats which triggered the warning are no longer occupied.
2.1.2.4.2	The second level warning may be discontinued when (i) None of the safety-belts which triggered the warning are unfastened, (ii) The vehicle ceases to be in normal operation, or (iii) The seat or seats which triggered the warning are no longer occupied.
2.1.2.5	The activation of the second level warning shall be tested according to the test procedure defined in 3.2 .
2.1.2.6	The safety-belt reminder may be designed to allow deactivation.
2.1.2.6.1	In the case a short term deactivation is provided, it shall be more difficult to deactivate the safety-belt reminder than buckling the safety-belt on and off. When the ignition is switched off for more than 30 minutes and switched on again, a short-term deactivated safety-belt reminder must reactivate.
2.1.2.6.2	In the case that a facility for a long term deactivation is provided, it shall require a sequence of operations to deactivate, that are detailed only in the manufacturer's technical manual and/or which requires the use of tools (mechanical, electrical, digital, etc.) that are not provided with the vehicle.
3.0	Safety-belt reminder tests
3.1	The first level warning shall be tested according to the following conditions: a) Safety-belt is not fastened; b) Engine is stopped or idling and the vehicle is not in forward or reverse motion; c) Transmission is in neutral position; d) Ignition switch is engaged.
3.2	The second level warning shall be tested according to the following conditions: a) Safety-belt is not fastened; b) Test vehicle driven with one or any combination of the conditions of described in 3.2.1 to 3.2.3 at the manufacturer's choice.
3.2.1	Accelerate the test vehicle to 25 -0/+10 km/h from a halt and continue on the same speed.
3.2.2	The test vehicle is driven forward at least 500 m from a halt position.
3.2.3	The vehicle is tested when the vehicle is in normal operation for at least 60 seconds.
3.3	A system that the first level warning stops after a certain period of time, the second level warning shall be tested according to 3.2 after the first level warning has been deactivated. A system that the first level warning does not stop after a certain period of time, the second level warning shall be tested

	according to 3.2 while the first level warning is activated.
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ANNEXURE 4

(See 5.3)

REQUIREMENTS FOR MANUAL OVERRIDE FOR CENTRAL LOCKING SYSTEM (Applicable for category M1)

1.	Definitions
1.1	“ Manual over-ride ” means the system that enables the motor vehicle occupant to open the door from inside using door release lever or control with or without electric power assistance to door locking system.
2.	Requirements
2.1.	Manual override system need to satisfy following functional requirement
2.2	In order to avoid non-opening of side doors after activation of central locking system, there shall be provision by way of manual over-ride or otherwise that enables the vehicle occupant to open the door from inside using door release lever / control regardless of with or without electric power assistance to door locking system. This requirement shall not be applicable when the child safety lock system of the door is engaged.
2.3	Functionality of manual override shall be checked with following procedure with vehicle in static condition. <ol style="list-style-type: none">1. Vehicle occupant shall activate central lock to lock all the doors, with child safety lock system of the door in disengaged mode.2. Disconnect electrical supply either at system level (For example central locking, controller, etc.) or disconnect main battery supply by suitable means. Occupant shall be able to open the door from inside using internal controls

ANNEXURE 5

(See 5.4)

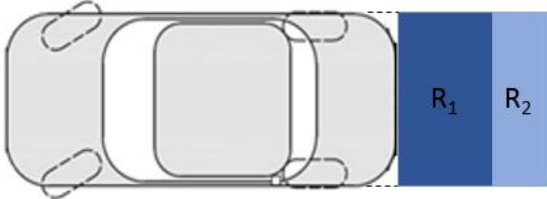
REQUIREMENTS FOR DRIVER AIRBAG (Applicable for category M1)

1.	Definitions
1.1	"Airbag" means a device installed to supplement safety belts and restraint systems in power-driven vehicles, i.e. systems which, in the event of a severe impact affecting the vehicle, automatically deploy a flexible structure intended to limit, by compression of the gas contained within it, the gravity of the contacts of one or more parts of the body of an occupant of the vehicle with the interior of the passenger compartment.
2.	Requirements
2.1.	<p>Vehicles of category M1 with total permissible mass not exceeding 2.5 tones shall be equipped with appropriately designed driver airbag and shall comply with the performance requirements of AIS-098.</p> <p>Vehicles of category M1 with total permissible mass exceeding 2.5 tones shall be equipped with driver airbag. The verification of compliance as per para. 5.2 and 5.3 of AIS-096 shall be done with steering airbag equipped.</p> <p>For vehicles complying the requirements of AIS-098 with Driver Airbag, testing as per para. 5.2 and 5.3 of AIS-096 with driver airbag need not be conducted, provided requirements as per para 5.2 and 5.3 of AIS-096 are already complied without Airbag.</p>

ANNEXURE 6

(See 5.5)

REQUIREMENTS FOR VEHICLE REVERSE PARKING ALERT (Applicable for category M1, M2 derived from M1)

1.	Definitions						
1.1	“ Vehicle reverse parking alert ” means a systems that are designed to alert / display the driver about obstacles on rear side of vehicles during parking in reverse gear”						
1.2	“ Audible information and warning ” means acoustical signal that is used to present information about relevant obstacles, to the driver						
1.3	“ Visual information and warning ” means Optical signal which is used to present information about relevant obstacles to the driver						
1.4	<p>Monitoring range (M.R.)</p> <p>Monitoring range is space at the rear side of the vehicle, which is divided into following zones</p> <p>(i) Rear-1 (R_1) (ii) Rear-2 (R_2)</p> <p>Refer Table 1 below for monitoring Ranges and corresponding detection Distance. The pictorial representation of R_1 & R_2 zone described in Figure 1 for reference.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Monitoring range</th> <th style="text-align: center;">Detection distance (M1)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Rear-1 (R_1)</td> <td style="text-align: center;">0.6 m</td> </tr> <tr> <td style="text-align: center;">Rear-2 (R_2)</td> <td style="text-align: center;">1.0 m</td> </tr> </tbody> </table> <p style="text-align: center;">Table 1: Rear Parking Alert – Monitoring Range & Detection</p> <div style="text-align: center; margin-top: 20px;">  <p>The diagram shows a top-down view of a vehicle's rear. Two rectangular zones are highlighted in blue behind the vehicle. The inner, darker blue zone is labeled R_1 and the outer, lighter blue zone is labeled R_2.</p> </div>	Monitoring range	Detection distance (M1)	Rear-1 (R_1)	0.6 m	Rear-2 (R_2)	1.0 m
Monitoring range	Detection distance (M1)						
Rear-1 (R_1)	0.6 m						
Rear-2 (R_2)	1.0 m						
1.5	Reversing detection system						

	System that gives an indication to the driver, when the reverse gear is selected, whether there are objects in the rear monitoring range.
1.6	Sensor Component that detects objects in the monitoring range.
1.7	System activation Action of transitioning the system operation from a non-active mode to an active mode in which the system is monitoring the rear monitoring ranges, evaluating the objects detected and generating appropriate feedback to assist the driver.
1.8	Test object Object with a specific material, geometry and surface for testing the monitoring range as detailed in clause 3.
2.0	Functional and performance requirements
2.1	System activation and deactivation
2.1.1	The system is activated/deactivated automatically according to the driving situation
2.1.2	Activation criteria is Reverse gear selected .Deactivation criteria is gear other than reverse is selected.
2.1.3	The system may have on / off switch or push button to override automatic (de) activation
2.1.4	In order to reduce annoyance of the driver, the system may automatically switch off the audible signal temporarily after a certain time (duration can be defined by manufacturer). The system, however shall remain in active state.
2.1.5	On vehicles with automatic transmission the system may be deactivated if the P (parking) gear position is selected.
2.1.6	It may be allowed to deactivate the system while the parking brake is engaged.
2.2	Parking Alert information
2.2.1	The Rear parking alert system shall give an acoustic signal to warn the driver on the obstacles detected in the monitoring range in case of sensor based system. The system may have optical warning as supplementary alert to warn the driver. In case of camera based systems, obstacle within monitoring range shall be visible to driver. Additionally Vehicle manufacturer may provide acoustic warning or optical warning or both.
2.2.2	Duration of signaling In general, signaling an obstacle shall be maintained as long as the obstacle is detected and shall cease when the obstacle is no longer detected or the system is

deactivated.
 Provided that provisions under clause 2.1 shall be permitted.

2.3 Monitoring Range coverage
 Rear parking alert system shall meet the performance requirements described below. Vehicle shall be in normal condition during the verification.

2.3.1 Method of Evaluation of Horizontal coverage
 The horizontal areas of relevance are the two-dimensional projections of the monitoring ranges on to the driveway. The minimum detection distances as measured from the vehicle boundary are defined in Table 1.
 The first 0.2 m starting from the vehicle boundary (see Figure 2) shall not be tested, because state-of-the-art sensing technology cannot guarantee detection in this close proximity.
 In order to perform the operational test the relevant monitoring range shall be scanned horizontally with test object H as specified in Clause 3. Each detected grid position is represented by a covered square with edge lengths of dx and dy (dx = 0.1 m, dy = 0.1 m for testing the horizontal coverage) and its center at the position of the longitudinal axis of the standard obstacle. The grid is explained in Fig 3.

2.3.2 The monitoring range is divided into two ranges, “A₁” that extends from the vehicle boundary up to 0.6 m and “A₂” which covers the range beyond 0.6 m till 1.0 m. “A” is the distance starting from the vehicle boundary. The width of the rectangle, is equal to the vehicle width, measured along the rear axle. The dimensions shall be rounded up to the nearest 0,1 m. The grid is arranged symmetrically to the vehicle centre line. (Refer Figure 2)

Fig 3 explains location of test object within grid.

Figure 2 : Determination of the rear horizontal coverage ratio in the sub-areas A₁ and A₂

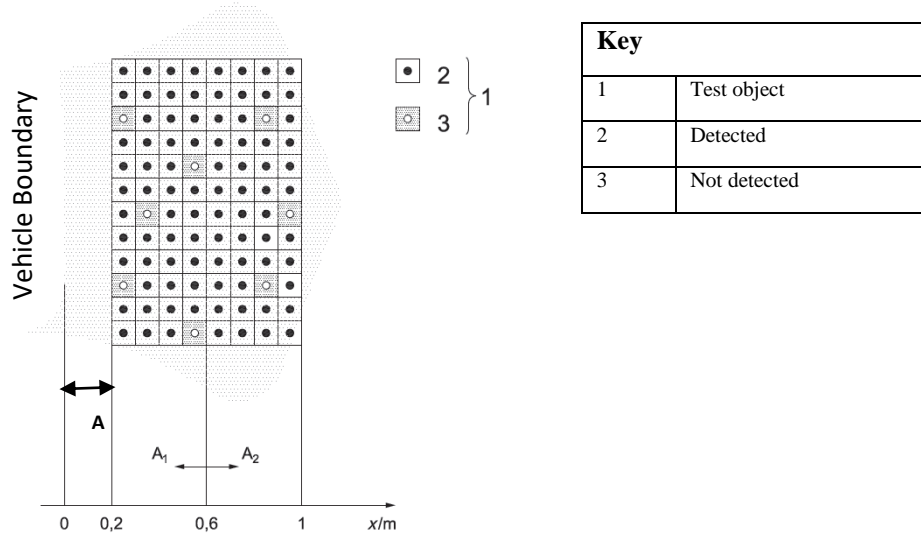
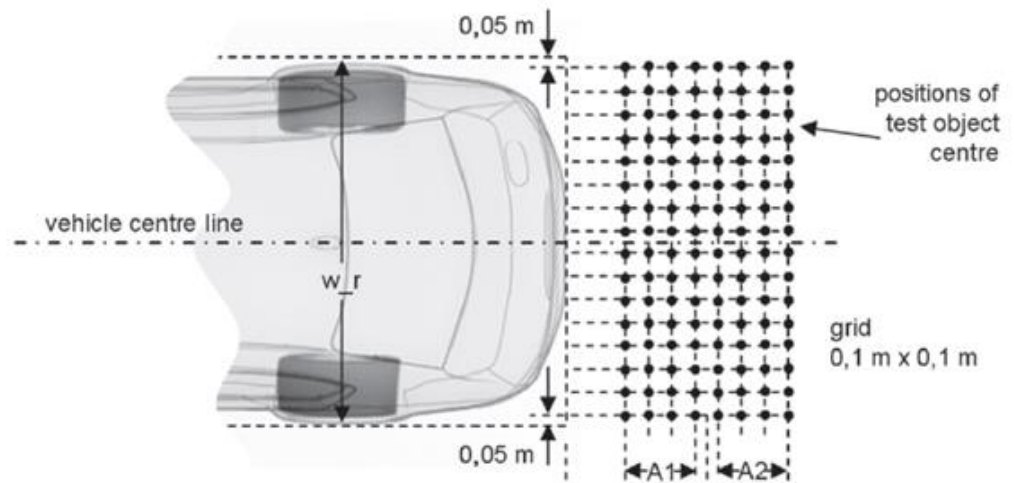


Figure 3 : “Grid positions for testing the horizontal coverage of the rear monitoring range”



The coverage ratio is defined as the ratio of the covered area over the total area of relevance.

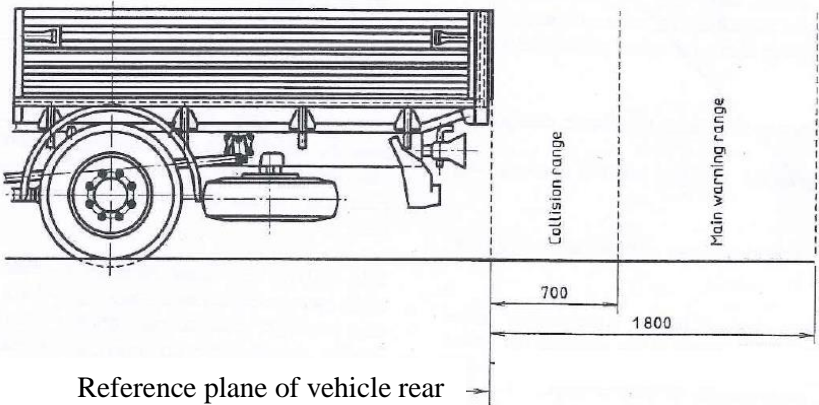
Example: For a total area of relevance of 90 cells with a covered area of 78 cells, the average coverage ratio is 87 %. The area of a single detection hole is defined as the dx^2 corresponding to a “not detected” standard obstacle. The result shall be rounded off to nearest full number.

2.4	Monitoring Range - Horizontal coverage:
2.4.1	Requirements for Sensor based system:
2.4.1.1	The minimum required coverage ratios for the rear horizontal areas of relevance are as follows when tested as per clause 2.3.1 & 2.3.2
	(a) 87 % in Area A_1 (Zone R_1) (b) 87 % in the Area A_2 (Zone R_2)
2.4.1.2	Requirements for Camera based system: The display visible to driver from normal driving position shall show at least 87% test objects (by number) when tested as shown in Fig. 3 Alternately, the display visible to the driver from normal driving position shall show full vision on ground as per figure 3. where dimension “A” is 0.3 meter. (refer Fig.2 for “A”)
2.4.2	The system can use either sensor or camera based solutions or any other system for compliance to requirements. In case vehicles are provided with alert as well as display, manufacturer may choose to meet either of the requirements specified for sensor based system or camera based system as per his discretion.

2.4.3	<p>Test Setup: Perform the operational test on a vehicle or test structure that allows the installation conditions of the selected vehicle model or selected vehicle range to be reproduced. In case a vehicle is used to perform the test, it shall have kerb weight. A tolerance of +/- 5 % shall be allowed on kerb weight. If the ride height is adjustable, it shall be set to normal driving condition on paved roads. Sensor surfaces shall be visibly clean and free of contamination.</p>								
2.5	Reverse Parking Alert System shall meet the requirements of AIS-004 (Part 3) for Electro Magnetic Compatibility applicable to electronic sub-assembly (ESA) or at vehicle level								
3.0	<p style="text-align: center;">Table 2 — Test objects</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Monitoring range</th> <th>Material</th> <th>Diameter</th> <th>Length</th> </tr> </thead> <tbody> <tr> <td>All horizontal areas Test object H</td> <td>metal</td> <td>75 mm</td> <td>1_{+0.2} m</td> </tr> </tbody> </table>	Monitoring range	Material	Diameter	Length	All horizontal areas Test object H	metal	75 mm	1 _{+0.2} m
Monitoring range	Material	Diameter	Length						
All horizontal areas Test object H	metal	75 mm	1 _{+0.2} m						
3.1	<p>General ambient conditions</p> <p>During testing, the wind speed shall not exceed 5.4 m/s (wind force 3). Temperature shall be within 15°C to 40°C under non-precipitating conditions (not raining, sleet, snowing, etc.). The test location shall be on a flat, dry, asphalt or concrete surface. The tests shall not be affected by reflections, neither of sonic nor of electromagnetic waves from walls in the environment, auxiliary test equipment or other objects.</p>								

ANNEXURE 7
(See 5.6)
REQUIREMENTS FOR VEHICLE REVERSE PARKING ALERT
(Applicable for category M and N not covered by annexure 6)

1.	Definitions
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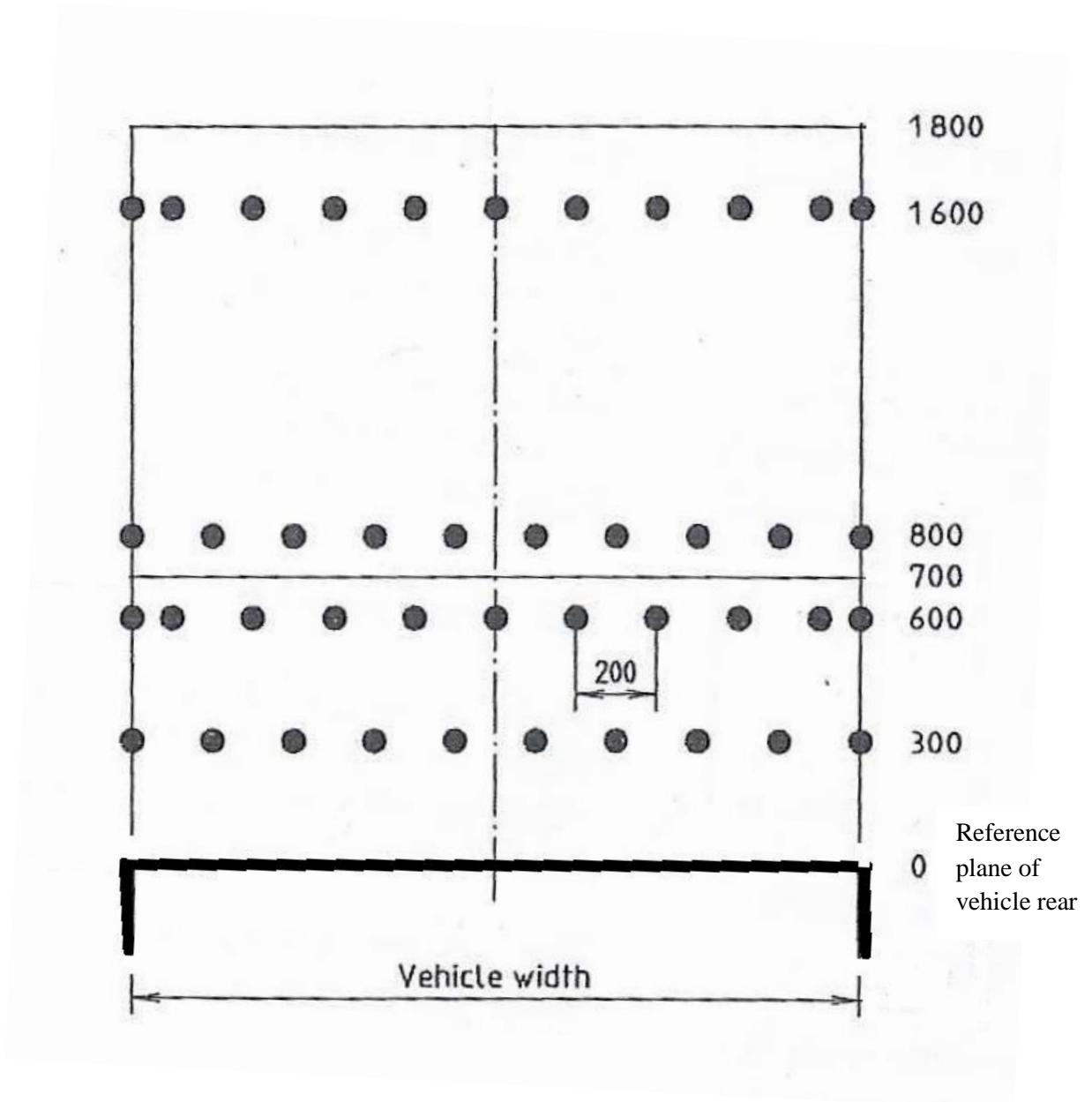
1.1	“Vehicle reverse parking alert system (RPAS)” means a system that is designed to alert the driver about obstacles on the rear side of vehicles while parking in reverse
1.2	“Audible information and warning” means acoustical signal that is used to present information about relevant obstacles, to the driver eg. Pulses, Speech etc.
1.3	“Visual information and warning” means Optical signal which is used to present information about relevant obstacles to the driver eg. Telltale, Display, etc.
1.4	<p>Monitoring range</p> <p>Monitoring range is the space at the rear side of the vehicle, which is divided into two parts as below (dimensions in mm):</p>  <p style="text-align: center;">Figure 1 – Monitoring range of reversing detection devices</p>
1.5	<p>Reversing detection system</p> <p>System that gives an indication to the driver, when the reverse gear is selected, whether there are objects in the rear monitoring range.</p>
1.6	<p>Sensor</p> <p>Component that detects objects in the monitoring range.</p>
1.7	<p>System activation</p> <p>Action of transitioning the system operation from a non-active mode to an active one in which the system is monitoring the rear monitoring ranges, evaluating the objects detected and generating appropriate feedback to assist the driver.</p>
1.8	<p>Test object</p> <p>Object with a specific material, geometry and surface for testing the monitoring range.</p>
1.9	<p>Rear view camera</p> <p>Rear view camera is a video camera which can continuously monitor the zone just behind the vehicle when activated.</p>
1.10	Frame height

	Height of the upper flank of the chassis frame at rear end of vehicle from the ground.
2.0	Functional and performance requirements
2.1	System activation and deactivation
2.1.1	The RPAS shall be automatically activated whenever reverse gear is selected and the ignition switch is in ON condition.
2.1.2	The RPAS system shall be automatically deactivated whenever a gear position other than reverse gear is selected.
2.1.3	It shall not be possible to disable the RPAS by simply switching it off.
2.1.4	The audible warning signal shall be maintained as described in clause no 2.4.1
2.1.5	On vehicles with automatic transmission the RPAS shall be deactivated if any gear position other than R (reverse gear) is selected.
2.2	Monitoring range The monitoring range for RPAS is defined by the measuring points in figures 2, 3, 4 & 5 when the vehicle is in fully laden condition.
2.3	Arrangement of sensors The sensors shall be arranged such that the monitoring range specified in clause no. 2.2 is covered.
2.4	Indicators & signals The RPAS shall be equipped with audible warnings and optionally with visual indicators.
2.4.1	Audible warnings The audible warnings shall have the functions given below –
2.4.1.1	The audible warning signals shall consist of – a) Continuous sequence of individual tones when there are objects in the main warning zone b) Continuous tone when there are objects in the collision zone
2.4.1.2	Faults a) The faults in the system shall be indicated by a continuous tone and this tone shall differ markedly from the normal warning tones in its frequencies. b) The warning tone shall have minimum duration of 3 seconds after selection of reverse gear. After sounding for the required period, the warning shall automatically switched off. c) It shall only sound when the reverse gear is engaged & sound every time this gear is selected as long as the fault remains. d) The warning signal shall not be cancelled unless the fault is rectified.

2.4.2	<p>Visual indicators</p> <p>Visual indicators if fitted shall be readily visible to the driver and may indicate messages related to one or more of the following:</p> <ul style="list-style-type: none"> a) Objects being in the main warning range or collision range, b) System activation c) System readiness d) Faults
2.4.3	The vehicle manufacturer shall provide information on the method of operation of the audible warning and visual indicators in the user manual.
2.5	<p>Rear View Camera System (optional fitment)</p> <p>The rear view camera system shall display the zone behind the vehicle where an object may be present.</p>
2.6	<p>Electromagnetic Compatibility</p> <p>The RPAS equipment shall comply with EMC requirements of AIS-004 (Part 3)</p>
3.0	Tests
3.1	General test conditions
3.1.1	<p>The desirable ambient conditions are</p> <ul style="list-style-type: none"> a) Ambient temperature: 15 to 40°C b) Relative Humidity: 60 ± 25% c) Ambient wind speed: 5.4 m/s Max.
3.1.2	The test shall not be affected by reflected sounds from surrounding walls, auxiliary test equipment or other objects.
3.2	<p>Test object</p> <p>The monitoring range capability of the RPAS shall be tested with the following test objects:</p> <ul style="list-style-type: none"> a) Test object H for the horizontal test: plastic tube, grey, 75 mm diameter, 1000 mm length b) Test object V for the vertical test: plastic tube, grey, 75 mm diameter, 300 mm length <p>The material of the tube for the test object may be different from the above specification with agreement between manufacturer & test agency.</p>
3.3	Test procedure
3.3.1	Operational tests for compliance to the specified monitoring range shall be performed on a vehicle or on a test structure on which the installation conditions of the RPAS of the selected vehicle model or model range (in fully laden condition) can be reproduced.
3.3.2	Appropriate aids shall be used for identifying the test object positions.
3.3.3	A log shall be kept of the test positions where the object is detected and where the object is not detected.
3.4	Test 1 – Horizontal monitoring range test
3.4.1	Position the test object H (1 m long) such that the axis of the tube is standing

	perpendicular to the ground & at positions shown in the grid in Figure 2.
3.4.2	The number of measuring points in each row at 200 mm interval as shown in the Figure 2 is indicative and will depend upon the actual width of the vehicle. Referencing for the measuring point pattern shall be from the center of the vehicle.
3.4.3	If the distance from the outermost measuring point of the 200 mm grid to the outer edge of the vehicle is more than 100 mm, an additional measuring point shall be located there.
3.4.4	In the case of tippers, the 1.8 m monitoring range shall be measured from the face of the sensor mounting. Any projections of the tipping superstructure behind the sensor mounting surface shall be ignored.
3.4.5	The fraction obtained by dividing the number of points at which the test object is detected by the total number of points at which it is placed shall be at least 0.9.
3.5	Test 2 - Vertical monitoring range test
3.5.1	Position the test object V (300 mm long) so that the axis of the tube is static & parallel to the ground and its longitudinal center is at the grid measuring points shown in Figures 3 & 4 as applicable.
3.5.2	The detection of test object V shall be checked at all indicated positions of the test planes at 500 mm, 800 mm & 1100 mm, as applicable. (See Figure 5)
3.5.3	In case of vehicles where the frame height does not exceed 800 mm, the test at 1100 mm level shall not be performed and in case of vehicles where the frame height exceeds 800 mm, the test at 500 mm level shall not be performed. Frame height shall be measured upto the topmost point of the frame from ground.
3.5.4	Further RPAS fitted on Tippers need not provide any detection at 500 mm level (See Figure 5)
3.5.5	Finally, the fraction obtained by dividing the number of points at which the test object is detected by the total number of points at which it is expected to be detected shall be at least 0.9.
4.0	APPLICATION FOR TYPE APPROVAL
4.1	The data to be submitted by the manufacturer for type approval is indicated in Annexure 1
4.2	Additionally, manufacturer may need to submit data which may be relevant to application for approval, e.g., frame height when seeking exemption.

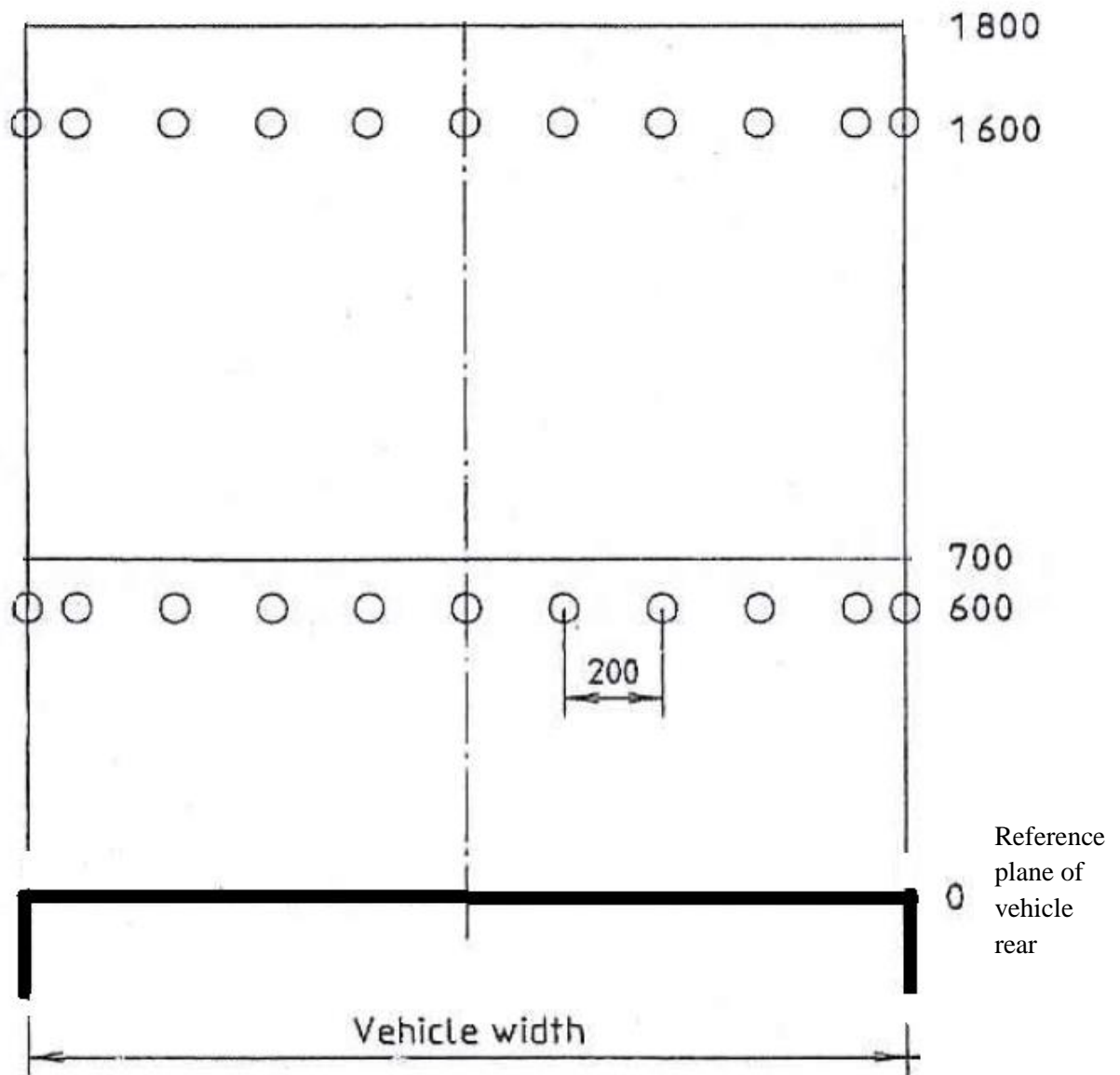
Dimensions in mm



- Grid Position of object H when standing perpendicular to ground.

Figure 2 – Test 1 – Horizontal Monitoring Range Test (Plan view)

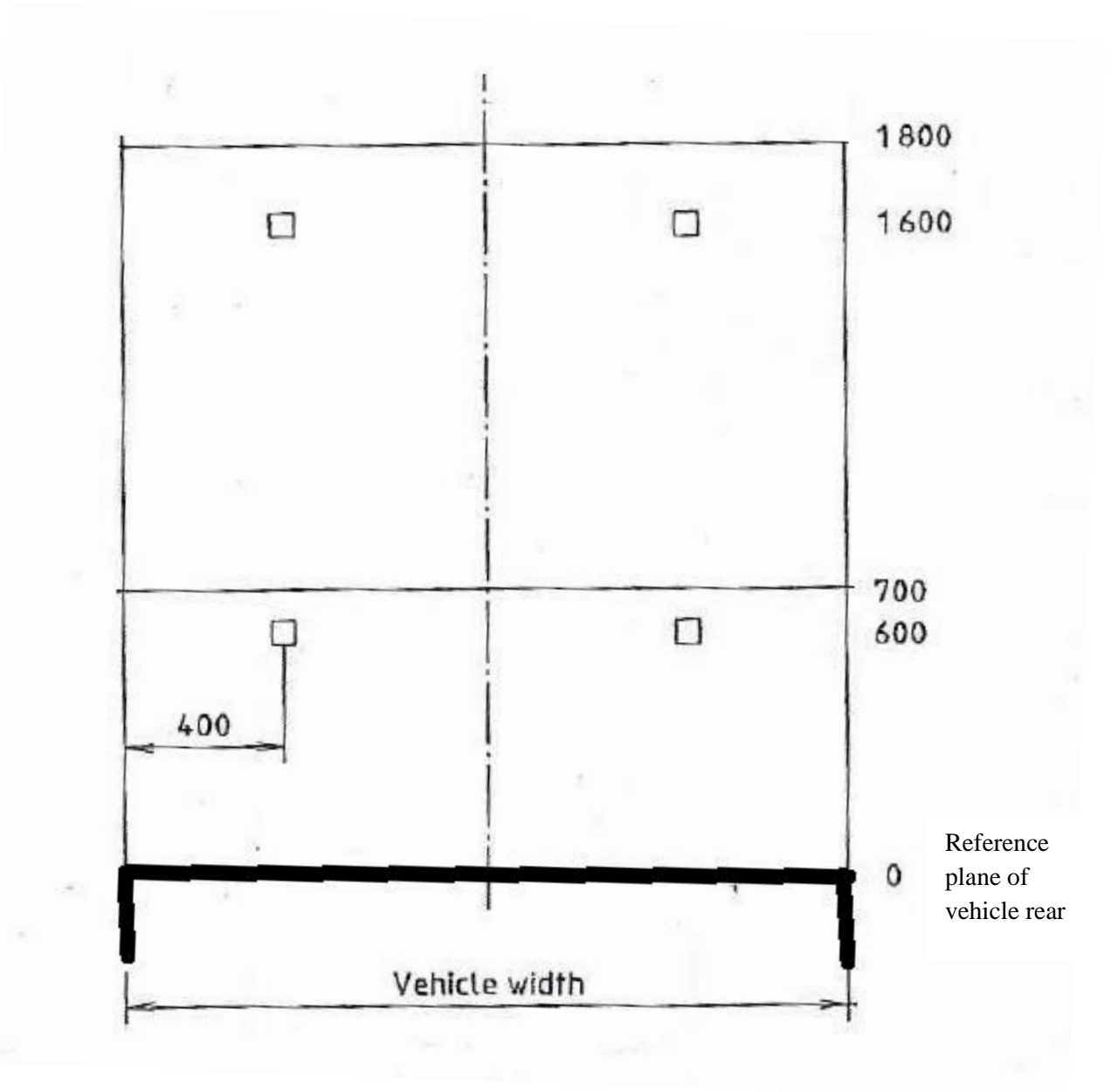
Dimensions in mm



○ Grid Position for lateral placement of Test Object V at 500 mm and 800mm planes parallel to ground

Note: For side view see Figure 5.

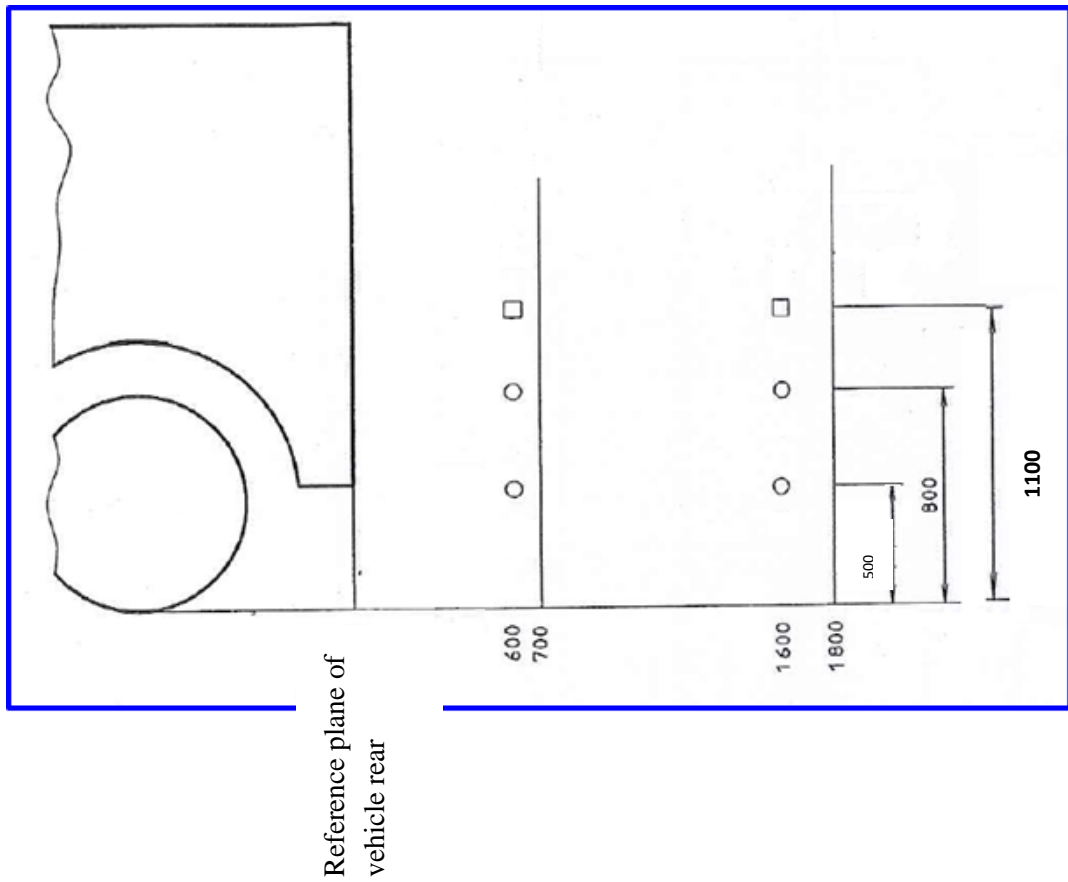
**Figure 3 – Test 2 – Vertical Monitoring Range Test (Plan view)
(for 500 mm & 800mm planes)**



□ Grid Position for lateral placement of Test Object V at 1100mm plane parallel to ground

Note: For side view see Figure 5.

**Figure 4 – Test 2 – Vertical Monitoring Range Test (Plan view)
(for 1100mm plane)**



- See figure 3 for plan view
- See figure 4 for plan view

Figure 5 – Test 2 – Vertical Monitoring Range Test (Side view)

ANNEXURE 8
PANEL COMPOSITION*

(See Introduction)

Chairman	
Mr. A. V. Mannikar	ARAI
Members	Representing
Mr. A. A. Badusha	ARAI
Mr. V. P. Rawal	ARAI
Mr. V. P. Godbole	CIRT
Ms. Shubhangi Dalvi	CIRT
Ms. Vijayanta Ahuja	ICAT
Mr. P. K. Banerjee	SIAM
Mr. S. Ravishankar	SIAM (Ashok Leyland Ltd.)
Mr. V. Faustino	SIAM (Ashok Leyland Ltd.)
Mr. Kedar Kshirsagar	SIAM (FCA India)
Mr. Girish S Kodolikar	SIAM (Force Motors Ltd.)
Mr. Pankaj Karn	SIAM (Ford India Pvt. Ltd.)
Mr. Sanjay Thakur	SIAM (General Motors India Ltd.)
Mr. Yoshihisa Hara	SIAM (Honda Cars R&D India Ltd.)
Mr. Feroz Khan	SIAM (Honda Motors)
Mr. Jaiganesh D	SIAM (Hyundai Motor India Ltd.)
Mr. Kiran Mulki	SIAM (Mahindra & Mahindra Ltd.)
Mr. Shailesh Kulkarni	SIAM (Mahindra & Mahindra Ltd.)
Mr. J. Jaiprakash	SIAM (Mahindra & Mahindra Ltd.)
Mr. V. G. Kulkarni	SIAM (Mahindra Truck & Bus Division)
Mr. Uday Shinde	SIAM (Mahindra Truck & Bus Division)
Mr. Gururaj Ravi	SIAM (Maruti Suzuki India Ltd.)
Mr. Ashim Howlader	SIAM (Maruti Suzuki India Ltd.)
Mr. Nikhil Desai	SIAM (Mercedes Benz India Pvt. Ltd.)
Mr. Rajendra Khile	SIAM (Renault Nissan)
Mr. Pratik Joshi	SIAM (Skoda Auto India Pvt. Ltd.)
Mr. P. S. Gowrishankar	SIAM (Tata Motors Ltd.)
Mr. Raju M.	SIAM (Toyota Kirloskar Motor Pvt. Ltd.)
Mr. Suchindran M.	SIAM (Toyota Kirloskar Motor Pvt. Ltd.)
Mr. Vikrant Lokhande	SIAM (VoIvo Trucks)
Mr. Makarand Brahme	SIAM (Volkswagen India Pvt. Ltd.)
Ms. Subhag Naqvi	ACMA
Mr. Uday Harite	ACMA
Mr. Harish Chandrashekar	Autoliv India Pvt. Ltd.
Mr. Prabhakar Y	Denso
Mr. Kishor Golesar	Nippon Audiotronix Pvt. Ltd.
Mr. Priyank Mani	Nippon Audiotronix Pvt. Ltd.
Mr. Uday Wasule	Minda Stonebridge Instrument Ltd.
Mr. Alauddin Ali	JLRIL
Mr. Suresh M.	Pricol Ltd.
Mr. N. Rajagopal	Pricol Ltd.
Mr. Sharan Basappa	Pricol Ltd.
Mr. Bijoy Santra	Sandhar Tech. Ltd.

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

ANNEXURE 9

(See Introduction)

COMMITTEE COMPOSITION*

Automotive Industry Standards Committee

Chairperson	
Mrs. Rashmi Urdhwareshe	Director The Automotive Research Association of India, Pune
Members	Representing
Shri Priyank Bharti	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 T. R. Kesavan	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)