AIS-006

AUTOMOTIVE INDUSTRY STANDARD

Automotive Vehicles – Bumper fitment on M1 Category of Vehicles – Test Methods

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ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLE RULES - TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)

GOVERNMENT OF INDIA

December 2005

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

Sr. No.	Corr-igenda.	Amend-ment	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 Standard 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, has published this standard. For better dissemination of this information ARAI may publish this document on their Web site.

The purpose of this standard is to assure exterior protection of elements located at front and rear ends of the vehicle against small shocks and low energy impacts. The elements include lighting & signaling, engine cooling, fuel lines, bonnet / boot lids, doors, engine/vehicle exhausts, propulsion, steering, braking, suspension including tyres.

With this objective to ensure suitable anchorages of bumpers, this standard has been formulated by offering three equivalent optional methods. These methods have been arrived at after suitable debate in the expert forums and also after relevant test work by member agencies. These methods are also founded on ECE R 42 “Uniform Provisions Concerning the Approval of Vehicles with regard to their Front and Rear Protective Devices (Bumpers etc.) and JIS D1601-1995 “Vibration Testing Methods for Automotive Parts”.

The Automotive Industry Standards Committee responsible for preparation of this standard is given in Annexure IV.

Automotive Vehicles – Bumper fitment on M1 Category of Vehicles – Test methods

1.0 SCOPE

This standard establishes requirements for approval of vehicles of category M1 with regard to integrity of anchorages of front and rear bumpers to the vehicle.

2.0 DEFINITIONS

For the purpose of this standard:

2.1 **"Approval of vehicle"** means the approval of a vehicle type with regard to the anchoring of front and rear bumpers.

2.2 **"Vehicle type"** means M1 category of vehicles which do not differ in such essential respects as:

2.2.1 The size, material and mass of the bumpers,

2.2.2 The type of mounting and mounting fasteners for the bumpers.

3.0 APPLICATION FOR APPROVAL

3.1 The vehicle manufacturer shall apply for approval by providing all the information given in Annexure I.

4.0 REQUIREMENTS

4.1 The bumper of the vehicle under approval shall not show cracks/failures at or around the anchorages when subjected to vibration durability test as described in 4.1.1 or 4.1.2 below.

4.1.1 A test bench test as described in Annexure II or

4.1.2 A full vehicle test as described in Annexure III.

4.2 Specifications of paragraph 4.1 above are deemed to be met if the vehicle equipped with the same design of bumpers and their anchorages complies with the specifications of paragraph 6 of ECE regulation No. R 42, (Apr. / 2002).

4.3 Other equivalent test methods are permitted provided that the equivalence can be demonstrated with the test conditions referred in 4.1 and 4.2.

5.0 CRITERIA FOR EXTENSION OF APPROVAL

5.1 In case of the following changes, the verification for bumper fitment shall be carried out for establishing compliance of the changed parameters to the requirements specified in this standard.

5.1.1 Any increase in mass of the bumper by more than 10%,

5.1.2 Decrease in thickness by more than 10%,

5.1.3 Decrease in number of anchorage points,

5.1.4 Reduction in the size of fasteners,

5.1.5 Reduction in the number of fasteners,

Note: Bumpers manufactured by different bumper vendors for the same vehicle manufacturer's proprietary design need not be tested.

5.2 If the component is manufactured by different sources to the same type approved design, no retesting is required for granting extension to the approval.

6.0 CHANGES IN THE TECHNICAL SPECIFICATIONS ALREADY TYPE APPROVED

6.1 Every modification pertaining to the information declared in accordance with paragraph 2.0 of Annexure I related to bumper mounting shall be intimated by the manufacturer to the certifying agency.

6.2 If the changes are in parameters not related to the provisions, no further action need be taken.

6.3 If the changes are in parameters related to the provisions, the Testing Agency may then consider, whether,

6.3.1 The model with the changed specifications still complies with provisions; or,

6.3.2 Any further verification is required to establish compliance.

6.4 For considering whether any further verification is required or not, guidelines given in paragraph 5 (Criteria for Extension of Approval) may be used.

6.5 In case of 6.3.1, verification for only those parameters that are affected by the modifications needs to be carried out.

6.6 In case of fulfillment of criterion of para 6.3.1 or after results of further verification as per para of 6.3.2 are successful; the approval of compliance shall be extended for the changes carried out.

Annexure : I

INFORMATION TO BE PROVIDED BY THE VEHICLE MANUFACTURER FOR APPROVAL OF THE BUMPERS

1.0 GENERAL

1.1 Name of model/variants of the applicable vehicle:

1.2 Name and address of the vehicle manufacturer:

2.0 DESCRIPTION OF THE BUMPER

2.1 Schematic diagram showing -

2.1.1 Location of bumper – front / rear

2.1.2 Fitment of the bumper

2.1.3 Additional fitments on the bumper,

2.1.4 Overall bumper dimensions,

2.1.5 Number of mounting points,

2.1.6 Details of the mounting fasteners (i.e. size and qty.),

2.2 Material (metallic / non metallic)

2.3 Mass of Bumper, kg:

2.4 Vehicle GVW:

Annexure: II
VIBRATION TEST OF THE BUMPER ASSEMBLY

1.0 TEST FIXTURE

1.1 At the choice of the vehicle manufacturer the bumper shall be mounted on the vibration platform either through

1.1.1 A representative part of vehicle structure required for bumper mounting.
Or

1.1.2 An alternate fixture representing the bumper mounting as per vehicle mounting.

1.1.3 The structure of the fixture shall be rigid enough so that it neither attenuates nor amplifies the input vibration signals to the component. Also the method of securing the bumper to the rigid test bench shall be representative of the vehicle fitment.

2.0 VIBRATION TEST CONDITIONS

2.1 The vibration endurance test shall be carried out at the following test conditions in vehicle longitudinal (x) and vertical (z) directions.

2.2 Acceleration level: ±3 g, where "g" is the gravitational acceleration, which is 9.81 m/s^2.

2.3 Durations:

2.3.1 Z-axis – 1 hour at resonance followed by 3 hours at 33 or 66 Hz*.

2.3.2 X-axis – 0.5 hour at resonance followed by 1.5 hours at 33 or 66 Hz*.
(* - Whichever is nearer to the resonance)

2.4 To locate the resonance frequency, an accelerometer shall be fitted on the component, with its axis parallel to the direction of vibration. Thereafter the whole assembly shall be subjected to a frequency sweep from 10 Hz to just over 66 Hz to search for the resonance. The resonance frequency shall be determined from the accelerometer response.

2.5 In case no resonance is observed up to 66 Hz, the test at resonance specified in 2.3.1 and 2.3.2 shall be carried out at fixed frequency of 66 Hz.

2.6 The vibration levels must be maintained on the vibration platform table close to the fixture mounting & in the directions specified in paragraph 2.1 above.

2.7 The tests specified in 2.3.1 and 2.3.2 may be performed in any order.

Annexure: III

FOUR POSTER TEST PROCEDURE FOR EVALUATION OF BUMPER FITMENT

1.0 VEHICLE PREPARATION

1.1 Check that the vehicle is equipped with qualified test samples.

1.2 Carryout tightening torque checks at all bumper mounting locations.

1.3 Mount four accelerometers near all wheels center in vertical directions and additional accelerometers at as close as possible to the bumper anchorage in Z direction. (Front and Rear).

Specification of accelerometers:

1. For wheel center location: 1. Range: 0 to 100g (1g = 9.81m/s^2)
2. Accuracy: ±1 % of Full Scale Output.

2. For bumper accelerometer: 1. Range: 0 to 100g
2. Accuracy: ± 1 % of Full Scale Output.

1.4 Mount wheel displacement transducers at all four wheels, to measure body to wheel displacements (optional).

1.5 Mount a data acquisition system in the vehicle.

Specification of Data acquisition system:

1. Minimum sampling rate of 200Hz on all channels.
2. Minimum 12 bit Analog to digital conversion (ADC) resolution
3. Common mode rejection (CMRR): 70dB

1.6 Weigh the vehicle and check the load distribution.

1.7 Load the vehicle to GVW condition.

1.8 Check the tyre pressure and set it as specified by manufacturer for GVW loading condition.

2.0 DATA ACQUISITION

2.1 To ensure repeatability, only Belgian Pave Test Track at NCAT, VRDE-Ahmednagar shall be used for the Road load data collection at a speed of 35 km/h (± 1 km/h)

2.2 Set the sampling rate for collection of all accelerations and displacements to 200Hz or above.

2.3 Use enclosed drawing in fig. 1 of VRDE Belgian Pave track. Collect the data only in indicated road patch.

2.4 After data collection, check and filter track test data by band pass filter as follows:

2.4.1 Between 0.6Hz to 40Hz. --- for Test Type - 1

2.4.2 Between 5 Hz to 40 Hz. --- for Test Type - 2

3.0 TEST RIG PREPARATION AND SIMULATION

3.1 Place the same vehicle on 4 poster with same loading condition and data acquisition system and transducers.

3.2 Place 75kg of weight on driver seat for simulating the weight of the driver.

3.3 Simulate collected track data of all wheel accelerations within 5 % of standard deviation of the total data set and all body to wheel displacements within 10% of standard deviation of the total data set on 4 poster for both test type - 1 and test type – 2.

3.4 The data collected on bumper will be used for monitoring purpose only and to check the acceleration levels are not exceeding the levels during four poster simulations.

3.5 After simulation is over remove data acquisition system and transducers. If by removing data acquisition system, weight reduction is more than 10kg, add equivalent weight to maintain vehicle GVW.

4.0 TESTING

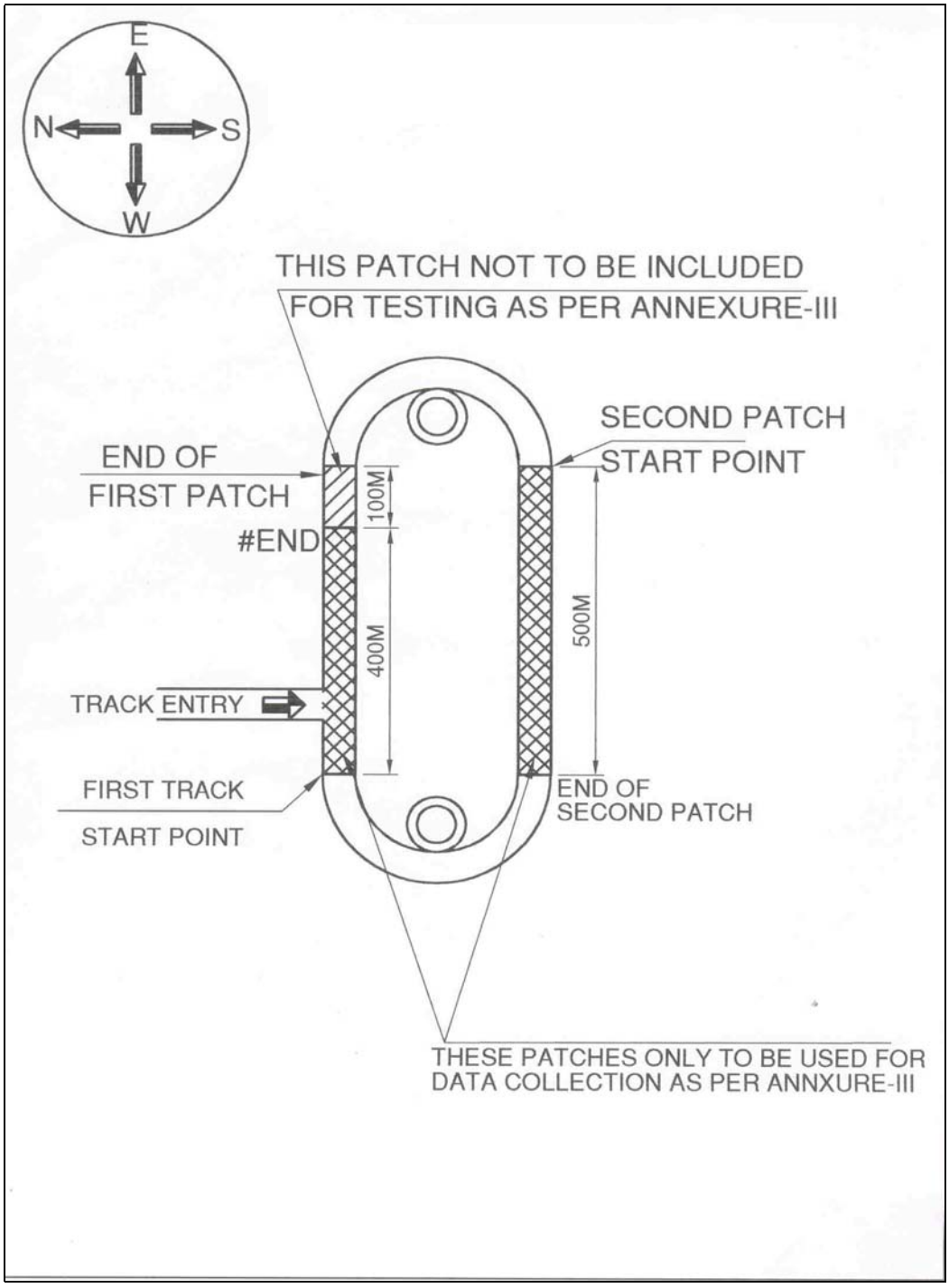
Run the 4 poster with above created files as follows:

4.1 For 5 hours with drive file in the frequency band as per clause 2.4.1 followed by

4.2 20 hours with drive file in the frequency band as per clause 2.4.2.

FIGURE : 1
(See Annexure: III, para. 2.3)

VRDE BELGIAN PAVE TRACK



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

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