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भारतीय मानक

स्वचल वाहन — एम 1 श्रेणी के वाहनों पर बम्पर फिटमेंट — परीक्षण पद्धतियाँ

Indian Standard

AUTOMOTIVE VEHICLES — BUMPER FITMENT ON M1 CATEGORY OF VEHICLES — TEST METHODS

ICS 43.040.60

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 2

Automotive Body, Chassis, Accessories and Garage Equipment Sectional Committee, TED 6

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Body, Chassis, Accessories and Garage Equipment Sectional Committee had been approved by the Transport Engineering Division Council.

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 and signaling, engine cooling, fuel lines, bonnet / boot lids, doors, engine/vehicle exhausts, propulsion, steering, braking, suspension including tyres.

In the formulation of this standard, assistance has been derived from the following standards:

AIS 006	Automotive vehicles — Bumper fitment on M1 category of vehicles — Test methods
ECE R 42	Uniform provisions concerning the approval of vehicles with regard to their front and rear protective devices (Bumpers, etc)
JIS D1601-1995	Vibration testing methods for automotive parts

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated expressing the result of test or analysis, is to be rounded off, it should be done accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’.

Indian Standard

AUTOMOTIVE VEHICLES — BUMPER FITMENT ON M1 CATEGORY OF VEHICLES — TEST METHODS

1 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 DEFINITIONS

For the purpose of this standard the following definitions shall apply.

2.1 Approval of Vehicle — The approval of a vehicle type with regard to the anchoring of front and rear bumpers.

2.2 Vehicle Type — M1 category of vehicles which do not differ in such essential respects as,

a) the size, material and mass of the bumpers; and

b) the type of mounting and mounting fasteners for the bumpers.

3 APPLICATION FOR APPROVAL

The vehicle manufacture shall apply for approval by providing all the information given in Annex A.

4 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**.

4.1.1 A test bench test as described in Annex B.

4.1.2 A full vehicle test as described in Annex C.

4.2 Specification of **4.1** are deemed to be met, if the vehicle equipped with the same design of bumpers and their anchorages complies with the specifications of **6** of ECE R 42.

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 CRITERIA FOR EXTENSIONS 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:

a) Any increase in mass of the bumper by more than 10 percent.

b) Decrease in thickness by more than 10 percent.

c) Decrease in number of anchorage points.

d) Reduction in the size of fasteners.

e) 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 CHANGES IN THE TECHNICAL SPECIFICATIONS ALREADY TYPE APPROVED

6.1 Every modification pertaining to the information declared in accordance with **A-2** 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 to taken.

6.3 If the changes are in parameters related to the provisions, the testing agency may then consider, whether;

a) the model with the changed specifications still complies with provisions; or

b) any further verification is required to establish compliance.

6.4 For considering whether any further verification is required or not, guidelines given in **5** may be used.

6.5 In case of **6.3**(a), 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 **6.3**(a) or after results of further verification as per **6.3**(b) are successful; the approval of compliance shall be extended for the changes carried out.

ANNEX A
(*Clauses* 3 *and* 6.1)

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

A-1 GENERAL

A-1.1 Name of model/variants of the applicable vehicle.

A-1.2 Name and address of the vehicle manufacture.

A-2 DESCRIPTION OF THE BUMPER

A-2.1 Schematic diagram showing the following:

a) Location of bumper — front/rear,
b) Fitment of the bumper,
c) Additional fitments on the bumper,
d) Overall bumper dimensions,
e) Number of mounting points, and
f) Details of the mounting fasteners (that is size and quantity).

A-2.2 Material (metallic/non-metallic).

A-2.3 Mass of bumper, kg.

A-2.4 Vehicle GVW.

ANNEX B
(*Clause* 4.1.1)

VIBRATION TEST OF THE BUMPER ASSEMBLY

B-1 TEST FIXTURE

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

a) a representative part of vehicle structure required for bumper mounting; or
b) an alternate fixture representing the bumper mounting as per vehicle mounting.

B-1.2 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.

B-2 VIBRATION TEST CONDITIONS

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

B-2.2 Acceleration Level

± 3 g, where 'g' is the gravitational acceleration, which is 9.81m/s^2.

B-2.3 Durations

B-2.3.1 *Z-axis*

1 h at resonance followed by 3 h at 33Hz or 66 Hz, whichever is nearer to the resonance.

B-2.3.2 *Z-axis*

0.5 h at resonance followed by 1.5 h at 33Hz or 66 Hz, whichever is nearer to the resonance.

B-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 at 1 'g' input.

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

B-2.6 The vibration levels must be maintained on the vibration platform table close to the fixture mounting and in the directions specified in **2.1**.

B-2.7 The test specified in **B-2.3.1** and **B-2.3.2** may be performed in any order.

ANNEX C
(*Clause* 4.1.2)

FOUR POSTER TEST PROCEDURE FOR EVALUATION OF BUMPER FITMENT

C-1 VEHICLE PREPARATION

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

C-1.2 Carry out tightening torque checks at all bumper mounting locations.

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

C-1.3.1 *Specification of Accelerometers*

a) For wheel centre location:

   1) Range : 0 – 100 g (1g = 9.81 m/s^2)
   2) Accuracy : ± 1 percent of full scale output.

b) For bumper accelerometer:

   1) Range : 0 – 100 g
   2) Accuracy : ± 1 percent of full scale output.

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

C-1.5 Mount a data acquisition system in the vehicle.

C-1.5.1 *Specification of Data Acquisition System*

a) Minimum sampling rate of 200 Hz on all channels.

b) Minimum 12 bit analog to digital conversion (ADC) resolution.

c) Common mode rejection (CMRR), 70 dB.

C-1.6 Weight the vehicle and check the load distribution.

C-1.7 Load the vehicle to GVW condition.

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

C-2 DATA ACQUISITION

C-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).

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

C-2.3 Use Fig. 1 of VRDE Belgian Pave Track. Collect the data only in indicated road patch.

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

a) Between 0.6 Hz to 40 Hz : for Test Type 1
b) Between 5 Hz to 40 Hz : for Test Type 2

C-3 TEST RIG PREPARATION AND SIMULATION

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

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

C-3.3 Simulate collected track data of all wheel accelerations with 5 percent of standard deviation of the total data set and all body to wheel displacements with 10 percent of standard deviation of the total data set on 4 poster for both test Type 1 and test Type 2.

C-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.

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

C-4 TESTING

Run the 4 poster with above created files as follows:

a) For 5 h with drive file in the frequency band as per **C-2.4**(a) followed by; and
b) 20 h with drive file in the frequency band as per **C-2.4**(b).

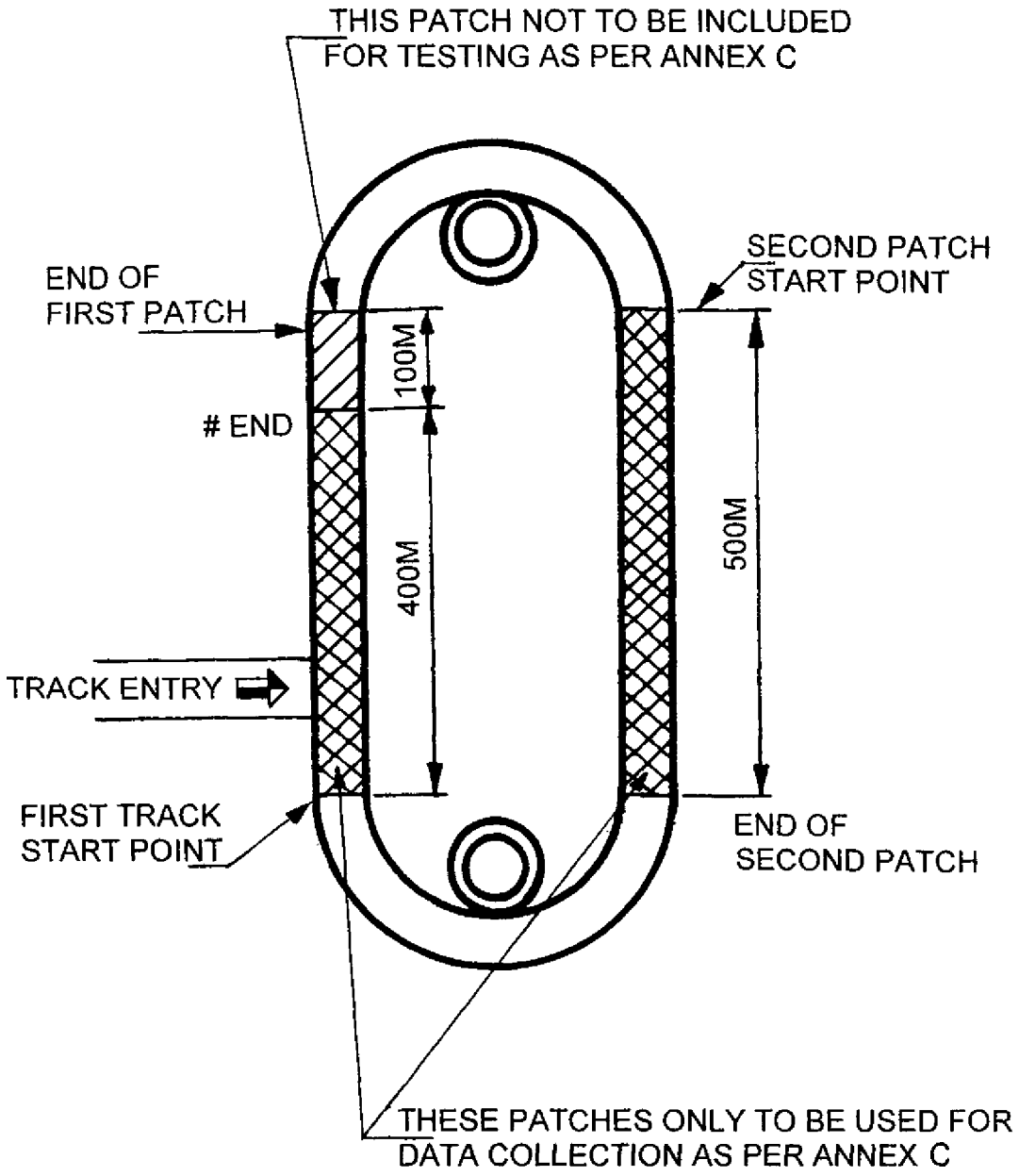

FIG. 1 VRDE BELGIAN PAVE TRACK

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

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AMENDMENT NO. 1 DECEMBER 2012
TO
IS 15901 : 2010 AUTOMOTIVE VEHICLES — BUMPER FITMENT ON M1 CATEGORY OF VEHICLES — TEST METHODS

(*Page* 2, *clause* **B-2.3.2**) — Substitute the following for the existing:

'**B-2.3.2** *X-axis*'

(*Page* 2, *clause* **B-2.6**) — Substitute the following for the existing:

'**B-2.6** The vibration levels shall be maintained on the vibration platform table close to the fixture mounting and in the directions specified in **B-2.1**.'

(*Page* 3, *clause* **C-1.6**) — Substitute the following for the existing:

'**C-1.6** Weigh the vehicle and check the load distribution.'

(*Page* 3, *clause* **C-3.3**) — Substitute the following for the existing:

'**C-3.3** Simulate collected track data of all wheel accelerations within 5 percent of standard deviation of the total data set and all body to wheel displacements within 10 percent of standard deviation of the total data set on 4 poster for both test Type 1 and test Type 2.'

(TED 6)

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