

AUTOMOTIVE INDUSTRY STANDARD

Requirements for Sleeper Coaches

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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

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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, has published this standard. For better dissemination of this information ARAI may publish this document on their Web site.

The Code of Practice for Bus Body Design and Approval, i.e. AIS-052 has been formulated and published. The testing and approval for body building of buses shall be in accordance with AIS-052, which is due for implementation. The AIS-052 has provided details about construction of buses suitable for seating and standee passengers. At the same time, there is an urgent need for framing guidelines for the construction of Sleeper Coaches in India, specially for the safety and comfort of sleeping passengers. In absence of a standard on sleeper coaches, presently some of the States are having their own guidelines on this subject. Under the circumstances, the CMVR - Technical Standing Committee at its 16th meeting, decided that suitable guidelines for sleeper coaches be drawn involving all the concerned stakeholders. CIRT was requested to take the lead and associate members from SIAM, ARAI, Bus Body Builders and fleet operators to formulate the standard on Sleeper Coaches. The CMVR-TSC at its 18th meeting directed to collect available information on sleeper coaches from SIAM and also to go through different state rules available on the subject before finalizing the standard on sleeper coaches. Consequently, the CMVR-TSC at its 19th meeting broadly guided as under:

- i) Sleeper coaches would be considered as a special category under Type IV of the Bus Body Code Classification.
- ii) CIRT would also explore other options of foldable berth arrangement as existing in railways.
- iii) SIAM members would get written comments from their Body Builders.
- iv) The safety corridors provided in the sleeper coaches should not be utilized for carriage of passengers.
- v) Fitment of air-conditioners to be made compulsory for sleeper coaches considering all aspects of safety of passengers during night travel, etc.
- vi) CIRT to continue the work and put up the recommendations.

It was discussed and decided in 32nd meeting of AISC to have a separate standard for Sleeper Coaches in line with that of AIS-063, i.e. Requirements of School Buses. The Bus Body Code - AIS-052(Rev.1) is the basic standard and only

special requirements would be covered in specific standard for sleeper coaches pertaining to the layout, dimensions, safety requirements, strength requirements and other technical requirements. However, the bus body building meant for sleeping passengers will have to be carried out as per the Bus Body Code, AIS-052 along with the CMVR provisions made in the subject standard.

Proposed standard for sleeper coaches was discussed in CMVR-TSC meetings as well as AISC meetings. Suggestions given by CMVR-TSC as well as AISC were discussed in the several panel meetings of the subject standard. Subject standard was drafted to ensure that the maximum benefit is achieved with respect to safety requirements.

Panel deliberated on constraints like body structure strength testing, restraint system etc which were brought to the notice of the AISC. Regarding body structure strength there is need to device evaluation/testing method. Expert committee will work to device testing methodology, till such time body structure test need not be mandatory. Regarding restraint system it was agreed to retain existing provision, however better methods/system needs to be devised. Expert committee will work to device better restraint method/system which can be incorporated subsequently. Continuous development in technology and innovation may further help to perfect the standard.

The AISC panel and Automotive Industry Standards Committee (AISC) responsible for preparation of this standard are given in Annexure II and Annexure III respectively.

Requirements for Sleeper Coaches

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Requirements for Sleeper Coaches

0.0 SCOPE

The standard lays down the requirements for Sleeper Coaches over and above the requirements laid for buses in “AIS-052 (as amended from time to time) - Code of Practice for Bus Body Design and Approval”. This will apply to vehicles with equivalent seating capacity of 13 passengers and above excluding driver meant for sleeper coach application. These requirements are being laid down for the following reasons.

- (i) To maximize safety and minimize severity of injuries.
- (ii) To take care of specific needs related to sleeping passengers.

1.0 REFERENCES

- 1.1 AIS-052 Code of Practice for Bus Body Design & Approval
- 1.2 IS 15061-2002 Automotive Vehicles - Flammability Requirements
- 1.3 AIS-023 Automotive Vehicles - Seats, their Anchorages and Head Restraints for Passenger Vehicles of Categories M2, M3 and Goods Vehicles of Category N – Specifications

2.0 DEFINITIONS

In addition to those mentioned in AIS-052

- 2.1 **‘Sleeper Coach’** means vehicles designed and constructed with additional provision/berth for passengers to sleep while travelling.
- 2.2 **‘Sleeper Berth’** means berth intended to facilitate passengers for sleeping.
 - 2.2.1 **‘Lower Berth’** means sleeper berth which is on the lower side/deck.
 - 2.2.2 **‘Upper Berth’** means sleeper berth which is on the upper side/deck.
- 2.3 **‘Restraint System’** means a device or system used to prevent occupants of the vehicle falling from berth.
- 2.4 **‘Type IV’** Vehicles are those designed and constructed for special purpose use such as the following:-
 - 2.4.1 **‘Type IV-2’ DLX Sleeper Coaches:** means vehicles designed and constructed, with additional provision/berths for passengers to sleep while travelling without Air Condition provision.
 - 2.4.2 **‘Type IV-2’ ACX Sleeper Coaches** means the vehicle designed and constructed with additional provision/berths for passengers to sleep while travelling with Air Condition provision.

3.0 CATEGORISATION OF SLEEPER COACHES

Sleeper coaches are special purpose buses which are designed and constructed specially to accommodate passengers to sleep and are placed in category “Type IV” as per clause No. 2.0 of AIS-052. The sleeper coaches shall be A.C. Deluxe (ACX) and Deluxe (DLX).

4.0 GENERAL REQUIREMENTS

General requirements shall be as per chapter 2 of AIS-052 applicable for A.C. Deluxe (ACX) and Deluxe (DLX) type III buses by considering following specific requirements applicable for ‘Type IV-2’ sleeper coaches.

4.1 Windows

4.1.1 The window panes shall be of sliding type for ‘Type IV-2’ DLX type buses. However, in ‘Type IV-2’ ACX buses the provision for adequate ventilation in case of AC failure shall be made.

4.1.2 Separate windows on sides of the bus for upper and lower berths shall be provided for ‘Type IV-2’ DLX buses. Lower tier shall have openable windows and upper tier can be with fixed/openable glass windows for Type IV-2’ DLX buses. ‘Type IV-2’ ACX buses can be fitted with fixed glass windows or separate split type glass windows applicable for ‘Type IV-2’ DLX buses. In case ‘Type IV-2’ ACX buses fitted with fixed glass windows, there shall be provision of power hatches (2 nos.).

4.1.3 The minimum width of window aperture shall be 700 mm.

4.1.4 The minimum height of lower edge of the sliding part of the window aperture shall be 200 mm from the top of berth in the uncompressed state.

4.2 Gangways

The gangways for sleeper coaches shall be designed and constructed as per clause No. 2.2.8 of AIS-052, applicable for type III buses with diameter of Lower Cylinder (A) = 450mm.

4.3 Hand Rails and Hand Holds

4.3.1 For sleeper coaches, provision of hand rails and hand holds in passage (gangways) is not applicable.

4.4 **Seats and Berths**

4.4.1 **Layout**

4.4.1.1 Upper tier shall be for the passengers intended to sleep and lower tier (floor tier) shall be for the passengers intended to sleep or sit.

4.4.1.2 Berth layout shall be 1x2 type or 1x1 type for berth orientation along with the longitudinal axis of the vehicle.

4.4.1.3 Berth layout shall be 1x1 type for berth orientation along with the transverse axis of the vehicle. No seats shall be permitted in the lower tier in this orientation.

4.4.1.4 Sleeper as well as seating layout shall be 1x2 type or 1x1 type.

4.4.2 The seating and sleeping passenger capacities shall be indicated in the Type Approval certificate for the bus body.

4.4.3 **Seats**

The seats specification stipulated in Bus Body Code (AIS-052), shall be followed. In case of differences between the values specified in Bus Body Code (AIS-052) and that of AIS-023, the values specified in AIS-023 shall be considered as final and standing.

4.4.3.1 Seats, if fitted in sleeper coaches, shall be installed facing forward, on the floor.

4.4.3.2 Seats, if fitted in sleeper coaches, shall be in accordance with clause No. 2.2.11 of AIS-052, applicable for ACX and DLX Type III buses along with the requirements stipulated in this standard.

4.4.3.3 **Seat base height (T)**

In case of sleeper coaches, if lower tier is used for seating and upper tier is used as a Sleeper, the height of the uncompressed seat cushion (T) i.e. the distance from the floor to the horizontal plane tangent to the front upper surface of the seat cushion shall be between 400 ± 50 mm.

4.4.3.4 **Free height over seating position (Head room)**

In case of Type IV-2 (sleeper coaches) free height over seating position (Head Room) shall be 900 mm minimum between uncompressed seat cushion and lower face of upper berth.

4.4.4 **Berths**

4.4.4.1 In sleeper coaches the berth structure shall be welded/bolted or interlocked by suitable means in such a way that during the operation there shall not be any rattling or dislodging of berths. There shall not be any sharp edges causing injury to the occupants.

4.4.4.2 **Dimensions of berth**

Dimensions of the berth and clearances in case of Type IV-2 (sleeper coaches) shall be as specified below:

4.4.4.3 Length of the berth shall be minimum 1800 mm.

4.4.4.4 Width of the berth shall be minimum 600 mm for 1x2 layout and 560-750 mm for 1x1 layout.

4.4.4.5 The minimum thickness of berth cushion shall be 75 mm.

4.4.4.6 In case of berth orientation along with the transverse axis of the vehicle, the distance between two opposite berths shall be 400 mm minimum.

4.4.4.7 Height of lower berth including uncompressed cushion from the floor should be 300 ± 50 mm.

4.4.4.8 Minimum clear distance between uncompressed lower berth and lower face of upper berth shall be 800 mm minimum.

4.4.4.9 Clear distance between uncompressed upper berth and inner panel of the roof of the bus shall be minimum 800 mm. In case of Air-conditioned Sleeper coaches it will be minimum 500 mm near the sidewall and 800 mm near side of the gangway.

4.4.4.10 The berth shall be able to withstand a total load of 300 kgs, wherein 100 kg load is applied on the area of 400 mm x 400 mm at three places namely one at centre and two at extreme ends. After the test, there shall not be any visual deformation of the berth structure as well as breakage of berth anchorages.

4.4.4.11 Each berth may be provided with a pillow. The pillow may be an integral part of the berth. The pillow shall be made of fire retardant material.

4.5 **Access to Upper Berths**

4.5.1 There shall be provision for the passengers to reach the upper berth with ease from the floor, for which a ladder shall be provided with at least two steps. The height of first step from the floor shall be at a distance of 250 mm to 350 mm and the second step shall be at a distance of ≤ 250 mm from the first step.

4.5.2 At least one handhold at suitable height along with ladder shall be provided for easy reach to upper berth. Handholds shall be rounded and free from sharp edges to reduce risk of injury to the occupants of the vehicle.

4.6 **Restraint Systems**

4.6.1 In case of sleeper coaches the restraint system shall be provided for both lower and upper berths to prevent occupants falling from the berth while bus is in motion. The restraint system shall be a guard rail of 200 mm height measured from the top of the berth, made up of round bar of suitable material and size.

Restraint system shall be covering 60% of the length of the berth. The guard rail shall be sufficiently rigid and shall withstand a normal force of at least 100 kgf when applied at the center of the guard rail.

In case of transverse layout, two vertical bars of suitable size shall be provided for upper berths.

4.6.2 The restraint system shall not have any sharp corners, edges, causing any injury to the occupants.

4.7 **Cabin Luggage**

4.7.1 For sleeper coaches cabin luggage-keeping arrangement shall be provided under the sleeper berths of lower tier in such a way that, it is prevented from slipping in to the gangways. In case if lower tier is meant for sitting and upper tier meant for sleeping then separate suitable arrangement shall be provided for keeping the cabin luggage.

4.8 **Roof Luggage Carrier**

4.8.1 Roof luggage carrier shall not be provided in sleeper coaches.

4.9 **Design Seating and Sleeping Passenger Capacities**

4.9.1 The design berth capacities shall be calculated based on the available floor area and the area required for individual berth.

4.9.2 The design seating capacity shall be calculated based on the available floor area and as per the requirements of individual passenger seat described in clause No. 2.2.11.4 of AIS-052.

4.10 **Provisions for Disabled Passengers**

4.10.1 At least one berth on lower tier nearer to the service door shall be reserved for disabled passenger.

4.10.2 A call bell shall be provided on the berth which is reserved for disabled passenger.

4.11 **Pad Material**

4.11.1 The pad materials shall be fire retardant Polyurethane Foam moulded or plain.

4.12 **Upholstery**

4.12.1 The upholstery materials for sleeper coaches shall be fire retardant, tapestry cloth, velvet cloth or suitable rexene cloth.

4.13 **Flammability Requirements**

4.13.1 Flammability requirements for the materials used in the construction of sleeper coaches such as plywood, pad material, upholstery, curtains, ABS, flooring material, side lining material, etc. shall be as per IS 15061:2002, as amended from time to time.

4.14 **Other Features**

The recommended features for Sleeper Coaches are given in the table below. However, features superior to the ones indicated in this table shall also be permitted.

Feature	Type IV-2 (Sleeper Coaches)
	DLX, ACX
Head rest	✓*
Seat arm	✓*
Seat back –Reclining	✓*
Magazine pouch	✓
Folding table for food tray	✓*
Water bottle holding fixture	✓
Reading light for each berth	✓

* Applicable only when seating provided on lower tier

5.0 TECHNICAL AND SAFETY REQUIREMENTS

5.1 Technical and safety requirements shall be as per chapter 3 of AIS-052 applicable for A.C. Deluxe (ACX) and Deluxe (DLX) type III buses by considering following specific requirements applicable for ‘Type IV-2’ sleeper coaches.

5.1.1 **Body structure strength**

Body structure strength test shall not be mandatory till such time testing methodology is devised and made available.

6.0 LIGHTING AND ILLUMINATION

6.1 Lighting and illumination requirements shall be as per chapter 4 of AIS-052 applicable for A.C. Deluxe (ACX) and Deluxe (DLX) type III buses by considering following specific requirements applicable for 'Type IV-2' sleeper coaches.

6.2 Passenger Compartment Lighting

6.2.1 Illumination shall be provided for each berth such that illumination level at each berth shall be in accordance with clause 4.1.2.4.1.3.3 of chapter 4 of AIS-052 when it is measured at eye level of the occupying passenger i.e. 200 mm above the uncompressed berth surface.

7.0 ELECTRICAL EQUIPMENT AND WIRING

7.1 Electrical equipment and wiring requirements shall be as per chapter 5 of AIS-052 applicable for A.C. Deluxe (ACX) and Deluxe (DLX) type III buses.

8.0 TYPE APPROVAL AND COP PROCEDURE

8.1 Type Approval and COP procedure requirements shall be as per chapter 7 of AIS-052 applicable for A.C. Deluxe (ACX) and Deluxe (DLX) type III buses by considering following specific requirements applicable for 'Type IV-2' sleeper coaches.

8.2 Additional information which is to be furnished by the vehicle manufacturer/bus body builder specific to sleeper coaches shall be as given in Annexure I .

ANNEXURE I

**INFORMATION ON TECHNICAL SPECIFICATIONS
SPECIFIC TO SLEEPER COACHES**

(See 8.2)

(To be submitted by the Vehicle Manufacturer / Body Builder to the Test Agency)

1.0 Details of Body

- 1.1 Type of body :
(Type-IV-2)
- 1.2 Comfort category :
(DLX/ACX)
- 1.3 No. of seats :
- 1.4 No. of berths :
- 1.5 Berth orientation :
a. Along the Longitudinal axis of the vehicle
b. Along the transverse axis of the vehicle
- 1.6 Type of Layouts :
a. All berths
b. Combination of berths and seats
- 1.7 Berth layout :
1x1 or 1x2
- 1.8 Seat Layout :
1x1 or 1x2

Test Agency	Vehicle Manufacturer/Body builder	Document No. (indicating also revision status)
Signature	Signature	
Name	Name	
Designation	Designation	
Date	Date	Sheet No. of

ANNEXURE II

(See introduction)

**COMPOSITION OF AISC PANEL ON
Requirements for Sleeper Coaches***

Convenor	
Shri D. P. Saste	Central Institute of Road Transport (CIRT)
Members	Representing
Shri A. Akbar Badusha	The Automotive Research Association of India (ARAI)
Shri S. N. Dhole	Central Institute of Road Transport (CIRT)
Shri S. H. Ali	Central Institute of Road Transport (CIRT)
Shri Sam Shaikh	Vehicles Research & Development Establishment (VRDE)
Shri J. Ramesh	Ashok Leyland Ltd. (SIAM)
Shri S. Arun	Ashok Leyland Ltd. (SIAM)
Shri Feroz Khan	Tata Motors Ltd. (SIAM)
Shri Shridhar Kalmadi	Corona Bus Manufacturers
Shri K. Srinivas Reddy	Veera Vahan Udyog Pvt. Ltd., Bangalore
Shri Prabhu Salauri	VRL Logistics Ltd.
Shri Rajendra Singh	VRL Logistics Ltd., Hubli
Shri N. Gangadhar	KMS Coaches, Bangalore
Shri V. Radhakrishnan	S.M. Kannappa Automobiles, Bangalore
Shri Jayant Dixit	Shri Damodar Coach Pvt. Ltd., Goa
Shri C.G. Anand	KSRTC, Karnataka
Shri Prasanna Patwardhan	Prasanna Travels
Shri Rohit Pardeshi	Prasanna Travels
Shri. S. R. Agrahari	SML ISUZU Ltd.

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

ANNEXURE III

(See introduction)

COMMITTEE COMPOSITION *
Automotive Industry Standards Committee

Chairman	
Shri Shrikant R. Marathe	Director The Automotive Research Association of India, Pune
Members	Representing
Representative from	Ministry of Road Transport & Highways (Dept. of Road Transport & Highways), New Delhi
Representative from	Ministry of Heavy Industries & Public Enterprises (Department of Heavy Industry), New Delhi
Shri S. M. Ahuja	Office of the Development Commissioner, MSME, Ministry of Micro, Small & Medium Enterprises, New Delhi
Shri T. V. Singh	Bureau of Indian Standards, New Delhi
Director Shri D. P. Saste (Alternate)	Central Institute of Road Transport, Pune
Dr. M. O. Garg	Indian Institute of Petroleum, Dehra Dun
Shri C. P. Ramnarayanan	Vehicles Research & Development Establishment, Ahmednagar
Representatives from	Society of Indian Automobile Manufacturers
Shri T.C. Gopalan	Tractor Manufacturers Association, New Delhi
Shri K.N.D. Nambudiripad	Automotive Components Manufacturers Association of India, New Delhi

Member Secretary
Mrs. Rashmi Urdhwareshe
Sr. Deputy Director
The Automotive Research Association of India, Pune

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