AIS-056

AUTOMOTIVE INDUSTRY STANDARD

Automotive Vehicles - Methods of Enhancing Comfort in Rider Cabin

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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

January 2009

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 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.

The concept of formulating a standard for enhancing the comfort level in Rider Cabins of N3 fully built cabins was initially mooted during beginning of 2003, taking into consideration the plight of drivers operating under extreme climatic conditions and being prone to accidents owing to fatigue generated, lack of concentration etc.

From point of view of arriving at base data, study trials were undertaken by ARAI spanning seven states, during Summer Seasons, on OE built vis-à-vis custom built cabins of HCV models of M/s Tata Motors Ltd. and Ashok Leyland Ltd., during 2004-05, with active participation of ARAI, Tata Motors Ltd. and Ashok Leyland Ltd. officials.

However, the findings thereof on the ambient temperature aspects were found to be much higher side, taking benchmarking of comfort zone temperature of 10° to 37.8° C as recommended by American Society of Heating, Refrigeration & Air-conditioning Engineering (ASHRAE).

Pursuant to the above, second study trial was undertaken, again on HCV models of M/s Tata Motors Ltd. and Ashok Leyland Ltd., during May-June, 2006, with the objective of quantifying the effect of thermally insulating materials for enhancing thermal comfort, viz. by provision of engine insulation inside the cabin, provision of louvers, provision on tinted glasses and provision of side mounted fans.

However, the results thereof were not found to be quantifiable and to some extent subjective in nature.

Finally, though considerable studies were conducted on thermal comfort, no consensus was arrived on methodology of measurement and limits of comfort levels in Indian tropical conditions. Besides, comfort being a subjective feeling based on not only human element but on transient climatic conditions, it was thought best not to mandate this standard. Thus, it was concluded to come up with a Guideline Standard.

The Automotive Industry Standards Committee responsible for preparation of this standard is given in Annex I.

Automotive Vehicles – Methods of Enhancing Comfort in Rider Cabin

1. SCOPE

1.1 This standard specifies the guidelines for improving thermal comfort inside the fully built cabins of N3 category vehicles.

1.2 Fully built cabins of N3 category, fitted with air conditioner system, are deemed to comply with the recommendatory requirements of this standard.

2. DEFINITION

N3 Category Vehicle "Means a vehicle used for the carriage of goods and having a GVW exceeding 12 ton" (Ref. AIS-053: Automotive Vehicles – Types – Terminology)

3. REQUIREMENTS

a) Any one or more of the recommendations, from the lists recommended in clause nos. 3.1, 3.2 and 3.3 are required to be integrated in the truck cabin design.

b) The list provided under clauses 3.1, 3.2 and 3.3 is not an exhaustive list.

c) It may be possible to have different construction / solutions to reduce heat inside the cabin.

3.1 Provision of Heat Insulation Material

The following areas shall be provided with heat insulating materials to reduce the transfer to heat into the cabin:

3.1.1. Engine Compartment

3.1.2. **Cabin Flooring**

Examples of suitable materials, recommended locations and suitable fixing methods are tabulated herewith for ready reference:

Floor and Engine Hood Insulation

Description	**Location**	**Recommended Specifications**		**Recommended method of fixing**
		Thickness (mm)	**Density (g/m^2)**	
Felt	Inside Cabin : a. Floor b. Engine Hood	15 - 20	1000 - 1200	Kept loose on floor or mechanical fixing
EVA (Ethylene Vinyl Acetate) Sheet		2 - 5	3000 - 4000	Using suitable adhesive
Rubber mat / melt pad		5 - 10	-------	Kept loose on floor or mechanical fixing
Dimpled PU foam *	Outside Cabin / Engine compartment	20 - 50	2000 - 5000	Using suitable adhesive
Glass wool or polyester sheet or felt		2 - 5	1000 - 1200	Mechanical fitment

* Caution Note : Thickness should not exceed 50 mm to mitigate the risk of engine overheating

3.1.3. **Cabin Roof**

3.1.4. **Cabin Bulkhead (Firewall), Side and Rear Walls**

3.1.5**. Door Panels**

The heat insulating material so provided should be fire retardant.

Examples of suitable materials, recommended locations and suitable fixing methods are tabulated herewith for ready reference:

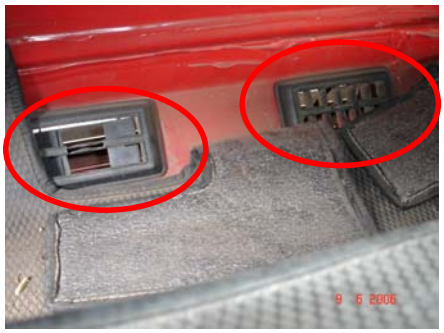
Cabin Roof, Door Pads and Side Wall Insulation

Description	Location	Recommended Specifications		Recommended method of fixing
		Thickness (mm)	Density	
Poly Urethane (PU) foam sandwich	Roof / Sidewalls	10 - 25	28 - 32 kg/m^3	Using suitable adhesive / Velcro
Molded roof lining / Polypropylene (PP) trims		1.5 - 8	-----	Mechanical fixing (eg. Plastic plugs)
Polyester wadding	Door Pads	3 - 10	100 - 150 gsm	Mechanical fixing (eg. Plastic plug, screw)

3.2 Provision of Adequate Ventilation

The cabin shall be provided with the following provisions to improve cabin ventilation:

3.2.1. **Air cutouts** – for example on bulkhead, on dash, on A-Post, etc.



3.2.2. **Sliding / Winding / Hinged windows**

3.2.3. **Forced air ventilation** – for example blowers, etc

Examples of suitable materials, recommended locations and suitable fixing methods are tabulated herewith for ready reference:

Provision of natural / forced ventilation of cabin

Description	Location	Recommended Openings (mm^2 min.)
Ram air cutouts	Driver / co-driver foot or dashboard level	Area equivalent to (100 x 60)
Forced air outlets	At dashboard / windshield	
Quarter glass / hinged window	A / B Pillar or door or near foot	Area equivalent to (200 x 100)
Sliding glass	A / B Pillar or rear wall of cabin	Area equivalent to (400 x 300)
Wider windows (winding / sliding type)	Driver / co-driver foot or dashboard level	Area equivalent to (650 x 450)

3.2.4. **Roof Hatch**

3.3. Provision to Minimize Heat Ingress due to Solar Radiation

The cabin shall be provided with the following provision to minimize the heat ingress:

3.3.1 Windscreen glass shall be provided with tint or film coating.

For such provision, light transmittance requirements for compliance to IS 2553-Part 2 are required to be met. Further, the provisions thus made shall not hinder the driver's visibility area i.e. area 'A' and 'B' as specified under AIS-011.

Examples of suitable materials, recommended locations and suitable fixing methods are tabulated herewith for ready reference:

Windshield with Tint Band

Description	Location	Recommended Specifications
Tint band or sun-film coating	Windshield top surface. Tinted or film coated band must not lie in the driver visibility area i.e. area 'A' and area "B', as per AIS-011	Tint color : Green or Green + Green / Blue or Grey Tint width : 150 - 200 mm Light Transmittance : 70 % minimum

ANNEX 1

(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 Shipping, 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 Chandan Saha	Office of the Development Commissioner, Small Scale Industries, Ministry of Small Scale Industries, New Delhi
Shri Rakesh Kumar	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
Dr. C. L. Dhamejani	Vehicles Research & Development Establishment, Ahmednagar
Representatives from	Society of Indian Automobile Manufacturers
Shri T.C. Gopalan Shri Ramakant Garg (Alternate)	Tractor Manufacturers Association, New Delhi
Shri K.N.D. Nambudiripad	Automotive Components Manufacturers Association of India, New Delhi
Shri Arvind Gupta	Automotive Components Manufacturers Association of India, New Delhi

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

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