

**Draft
AIS-160**

**SAFETY REQUIREMENTS FOR
CONSTRUCTION EQUIPMENT
VEHICLE(S)**

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.

This standard covers requirements for safety components of Construction Equipment Vehicles (CEV). These requirements are proposed to be regulated for the first time in the country. Accordingly, this standard is divided in two parts. The requirements covered in part 1 will be mandated in first phase and the part 2 will be mandated subsequently.

The AISC panel and the Automotive Industry Standards Committee (AISC) responsible for preparation of this standard are given in Annex-A and Annex-B respectively.

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AIS-160: Safety Requirements for Construction Equipment Vehicle(s)

PART 1

- 1.0 **SCOPE:** This AIS is applicable for Construction Equipment Vehicle (CEVs) as defined in CMVR 2 sub rule ca.
- 1.2 Requirements as specified in Clause Nos. 3.8 to 3.16 of this part, shall only be applicable for CEV's which are covered under IS/ISO: 6165:2012.
- 1.3 Requirements as specified in Clause Nos. other than those specified in 1.2, shall be applicable to all CEV's.
- 2.0 **GENERAL REQUIREMENTS :**
- 2.1 Basic Types, Identification and Terms and Definitions of Construction Equipment's Vehicles shall be as per IS/ISO: 6165:2012 and Rule 2 of CMVR, as amendment from time to time.
- 2.2 Units for dimensions, performance, capacities and measurement accuracies used in testing and certification of Construction Equipment's Vehicles may be as per IS/ISO: 9248:1992, as amendment from time to time.
- 2.3 Definition of dimensions and codes for the base machine of all type of Construction Equipment's Vehicles may be as per IS: 11114-2:2006 /ISO6746-1:2003, as amendment from time to time.
- 2.4 Definition of dimensions and codes of the equipment and attachments of all type of Construction Equipment's Vehicles may be as per IS: 11114-3:2006 / ISO 6746-2:2003, as amendment from time to time.
- 3.0 **PROVISIONS ON SAFETY:**
- 3.1 External rear view mirror of the vehicle shall be as per AIS-001 (Part 1) or (Part 2)(Rev.1):2011.
- 3.2 Internal Mirror (if fitted) shall be as per AIS-001 (Part 1) or (Part 2)(Rev.1):2011..
- 3.3 Common / Specific Symbols for operator controls and other displays shall be as per IS/ISO: 6405-1: 2017 and IS/ISO: 6405-2: 2017. The mandatory requirements shall be as per AIS-071 (Part 1).
- 3.4 Machine Safety Labels shall be as per IS/ISO: 9244:2008.
- 3.5 Visual Display Requirements shall be as per AIS-071 (Part 1 and 2) except for CEV's covered under the scope of IS/ISO: 6165:2012, which will be as per clause 3.13 of this part.
- 3.6 Operator Station and Maintenance Areas shall be as per IS/ISO: 12508:1994.
- 3.7 Non-metallic Fuel Tanks shall be as per IS/ISO: 21507:2010.
- 3.8 Minimum Access Dimensions shall be as per IS: 10689:1993/ ISO: 2860:1992, as applicable.
- 3.9 Access Systems for steps, primary access, alternate exit path and opening, maintenance opening, handrail and handholds shall be, as per IS/ISO: 2867:2011, as applicable.
- 3.10 Guards - Barrier Guards, Fenders, Fan Guards, Thermal Guards, and Hose Guards shall be as per IS/ISO: 3457:2003.
- 3.11 Visual Display Requirements shall be as per IS/ISO: 6011:2003.
- 3.12 Machine mounted audible travel alarms and forward horn shall be IS/ISO:9533-2010.
- 3.13 Operator Controls shall be as per IS/ISO: 10968:2004.
- 3.14 Performance requirements for Articulated Frame Lock shall be as per as per IS/ISO: 10570:2004.

- 3.15 Lift Arm Support Device shall be as per IS/ISO: 10533:1993/Amd 1:2005.
- 3.16 Dimensions and requirements for Operator's Seat shall be as per IS/ISO: 11112:1995.

PART 2

- 1.0 **SCOPE:** This AIS is applicable for construction equipment vehicle (CEVs) as defined in CMVR rule 2 sub rule ca.
- 1.2 Requirements as specified in Clause Nos. 3.3 to 3.13 of this part, shall only be applicable for Construction Equipment Vehicles which are covered under IS/ISO: 6165:2012.
- 1.3 Requirements as specified in Clause Nos. other than those specified in 1.2, shall be applicable to all Construction Equipment Vehicles,
- 2.0 **GENERAL REQUIREMENTS :**
- 2.1 Basic Types, Identification and Terms and Definitions of Construction Equipment's Vehicles shall be as per IS/ISO: 6165:2012 and Rule 2 of CMVR, as amendment from time to time.
- 2.2 Units for dimensions, performance, capacities and measurement accuracies used in testing and certification of Construction Equipment's Vehicles may be as per IS/ISO: 9248:1992, as amendment from time to time.
- 2.3 Definition of dimensions and codes for the base machine of all type of Construction Equipment's Vehicles may be as per IS: 11114-2:2006 /ISO6746-1:2003, as amendment from time to time.
- 2.4 Definition of dimensions and codes of the equipment and attachments of all type of Construction Equipment's Vehicles may be as per IS: 11114-3:2006 / ISO 6746-2:2003, as amendment from time to time.
- 3.0 **PROVISIONS ON SAFETY:**
- 3.1 Electro Magnetic Compatibility (EMC) shall be as per ISO 13766 (Part 1):2018 and ISO 13766 (Part 2):2018.
- 3.2 Seat Belt and Seat belt anchorages shall be as per IS/ISO: 6683:2005.
- 3.3 Roll over Protective Structure (ROPS) shall be as per IS/ISO 3471:2008 as applicable.
- 3.4 Roll Over Protective Structure (ROPS) which shall be provided for excavators shall be as per IS/ISO 12117-2:2008 as applicable.
- 3.5 Tip over protection structure (TOPS) for compact excavators shall be as per ISO 12117:1997, as applicable.
- 3.6 Performance and Tests of Rubber Tracked / Padded Crawler Machines for Braking Systems shall be as per IS/ISO10265:2008.
- 3.7 Seat Index Point shall be as per ISO 5353:1995/ IS 11113:1999.
- 3.8 Physical Dimension of Operator and Minimum Operator Space shall be as per IS/ ISO 3411:2007.
- 3.9 Falling Object Protective Structure (FOPS) shall be as per IS/ISO 3449:2005 as applicable.
- 3.10 Operator Field on View shall be as per IS/ISO 5006: 2017.
- 3.11 Installation requirement of rear view mirrors shall be as per ISO:14401-1:2009 and IS/ISO:14401-2:2009.
- 3.12 Zones of Comfort and Reach for Controls shall be as per ISO 6682:1986/IS 11252:1993.
- 3.13 Evaluation of Operator Seat Vibrations for suspended seats if fitted, shall be as per IS/ISO 7096:2000.

ANNEX- A

(See Introduction)

**COMPOSITION OF AISC PANEL ON SAFETY REQUIREMENTS FOR
CONSTRUCTION EQUIPMENT VEHICLE(S)***

Convener	
Mr. A. A. Badusha	The Automotive Research Association of India (ARAI)
Members	Representing
Mr. K. B. Patil	The Automotive Research Association of India (ARAI)
Mr. Saurabh Dalela	JCB India Ltd.,
Mr. Karthik Kaliappan	John Deere India Pvt Ltd.
Mr. K.Vijay	Ajax Fiori Engineering (I) Pvt. Ltd
Mr. K. Reji Jose	Caterpillar India Ltd.
Mr. Bhaskaran Venkataramani	Caterpillar India Ltd.
Mr. Vivek Rawat	JCB India Ltd.,
Mr. Suresh Kumar M.	Larsen & Toubro Limited
Mr. Rajeev Shalia	Case Construction Equipment
Mr. G. Rajendra.	Mahindra & Mahindra Construction Equipment Division
Mr. M. Rajendran	Komatsu India Pvt. Ltd.
Mr. R. Ashok	Volvo Construction Equipment Ltd.,
Mr. S. G. Roy	Indian Earthmoving & Construction Industry Association Ltd.

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

ANNEX - B (See Introduction)	
COMMITTEE COMPOSITION * Automotive Industry Standards Committee	
Chairperson	
Mrs. Rashmi Urdhwareshe	Director The Automotive Research Association of India, Pune
Members	Representing
Representative from	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	Vehicles Research and Development Establishment, Ahmednagar
Director	Indian Rubber Manufacturers Research Association
Representatives from	Society of Indian Automobile Manufacturers
Shri R. P. Vasudevan	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)