



BSI Standards Publication

**Road vehicles — Measurement techniques
in impact tests — Instrumentation**

This is a preview of "BS ISO 6487:2015+A1:...". [Click here to purchase the full version from the ANSI store.](#)

National foreword

This British Standard is the UK implementation of ISO 6487:2015+A1:2017. It supersedes BS ISO 6487:2015, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee AUE/7, Automobile occupant restraint systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2017
Published by BSI Standards Limited 2017

ISBN 978 0 580 95984 4

ICS 43.020

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 1 August 2015.

Amendments/corrigenda issued since publication

Date	Text affected
31 October 2017	Implementation of ISO amendment 1:2017

This is a preview of "BS ISO 6487:2015+A1:...". [Click here to purchase the full version from the ANSI store.](#)

Sixth edition
2015-08-01

Road vehicles — Measurement techniques in impact tests — Instrumentation

Véhicules routiers — Techniques de mesurage lors des essais de chocs — Instrumentation



Reference number
ISO 6487:2015(E)

© ISO 2015

This is a preview of "BS ISO 6487:2015+A1:...". [Click here to purchase the full version from the ANSI store.](#)



COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

This is a preview of "BS ISO 6487:2015+A1:...". Click here to purchase the full version from the ANSI store.

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Performance requirements	3
4.1 CFC specifications and performance requirements.....	3
4.2 Phase delay time of a data channel.....	5
4.3 Time.....	5
4.3.1 Timebase.....	5
4.3.2 Relative time delay.....	6
4.4 Transducer transverse sensitivity ratio of a rectilinear transducer.....	6
4.5 Calibration.....	6
4.5.1 General.....	6
4.5.2 Accuracy of reference equipment for calibration.....	6
4.5.3 Calibration procedures and uncertainties.....	6
4.5.4 Sensitivity coefficient and nonlinearity.....	8
4.5.5 Calibration of frequency response.....	8
4.6 Environmental effects.....	8
4.7 Choice and designation of data channel.....	8
4.8 Choice of reference coordinate system.....	9
4.9 Impact velocity measurement.....	9
4.10 ATD temperature measurement.....	9
Annex A (informative) Example of Butterworth four-pole phaseless digital filter (including initial conditions treatment) algorithm	10
Annex B (informative) Recommendations for enabling requirements of this International Standard to be met	14
Annex C (informative) Temperature measurements systems	16
Bibliography	17

This is a preview of "BS ISO 6487:2015+A1:...". Click here to purchase the full version from the ANSI store.

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 36, *Safety aspects and impact testing*.

This sixth edition cancels and replaces the fifth edition (ISO 6487:2012), which has been technically revised.

This is a preview of "BS ISO 6487:2015+A1:...". [Click here to purchase the full version from the ANSI store.](#)

Introduction

This International Standard is the result of a willingness to harmonize the previous edition, ISO 6487:2012, and SAE International's Recommended Practice, SAE J211-1.

It presents a series of performance requirements concerning the whole measurement sequence of impact shocks.

These requirements may not be altered by the user and all are obligatory for any agency conducting tests to this International Standard. However, the method of demonstrating compliance with them is flexible and can be adapted to suit the needs of the particular equipment used by a testing agency.

This approach affects the interpretation of requirements. For example, there is a requirement to calibrate within the working range of the channel, i.e. between F_L and $F_H/2,5$. This cannot be interpreted literally, as low-frequency calibration of accelerometers requires large displacement inputs beyond the capacity of virtually any laboratory.

It is not intended that each requirement be taken as necessitating proof by a single test. Rather, it is intended that any agency proposing to conduct tests to this International Standard guarantee that if a particular test could be and were to be carried out, then their equipment would meet the requirements. This proof would be based on reasonable deductions from existing data such as the results of partial tests.

On the basis of studies carried out by technical experts, no significant difference has been identified between the characteristics of the load transducer when using static as opposed to dynamic calibration methods. This new edition helps to define the dynamic calibration method for force and moment data channels in accordance with the current knowledge base and studies available.

The temperature of the anthropomorphic test device (ATD) used in a collision test needs to be monitored to confirm that it has been used within the acceptable temperature range prescribed for the whole ATD or body segment. The objective is to prevent temperature from being a variable that will influence the ATD response. The actual ATD temperature can be influenced by various factors including ambient air, high-speed photography lighting, sunshine, heat dissipation from transducers, and ATD in-board data acquisition systems. In order to respond to these objectives, the new edition specifies the performance requirements for the ATD temperature measurement.

This International Standard defines the requirements of an impact test for which the measurement uncertainties can only be partially calculated.

To summarize, this International Standard enables users of impact test results to call up a set of relevant instrumentation requirements by merely specifying this International Standard. Their test agency then has the primary responsibility for ensuring that the requirements of this International Standard are met by their instrumentation system. The evidence on which they have based this proof assessment will be available to the user upon request. In this way, fixed requirements guaranteeing the suitability of the instrumentation for impact testing can be combined with flexible methods of demonstrating compliance with those requirements.

This is a preview of "BS ISO 6487:2015+A1:...". [Click here to purchase the full version from the ANSI store.](#)

This is a preview of "BS ISO 6487:2015+A1:...". Click here to purchase the full version from the ANSI store.

Road vehicles — Measurement techniques in impact tests — Instrumentation

1 Scope

This International Standard gives requirements and recommendations for measurement techniques involving the instrumentation used in impact tests carried out on road vehicles. Its requirements are aimed at facilitating comparisons between results obtained by different testing laboratories, while its recommendations will assist such laboratories in meeting those requirements. It is applicable to instrumentation including that used in the impact testing of vehicle subassemblies. It does not include optical methods which are the subject of ISO 8721 .

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2041 , *Mechanical vibration, shock and condition monitoring — Vocabulary*

ISO 3784 , *Road vehicles — Measurement of impact velocity in collision tests*

ISO 4130 , *Road vehicles — Three-dimensional reference system and fiducial marks — Definitions*

ISO/TR 27957 , *Road vehicles — Temperature measurement in anthropomorphic test devices — Definition of the temperature sensor locations*

SAE J211-1, *Instrumentation for impact test — Part 1: Electronic instrumentation*

3 Terms and definitions

For the purposes of this document, the following terms and definitions given in ISO 2041 and the following apply.

3.1

data channel

all the instrumentation from, and including a single transducer (or multiple transducers, the outputs of which are combined in some specified way), to, and including any analysis procedures that may alter the frequency content or the amplitude content of data

3.2

transducer

first device in a *data channel* (3.1) used to convert a physical quantity to be measured into a second quantity (such as an electrical voltage) which can be processed by the remainder of the channel

3.3

channel amplitude class

CAC

designation for a *data channel* (3.1) that meets certain amplitude characteristics as specified by this International Standard

Note 1 to entry: The CAC number is numerically equal to the upper limit of the measurement range which is equivalent to data channel full scale.