PD ISO/TR 14933:2012

BSI Standards Publication

Road vehicles — Test procedures for evaluating out-of-position vehicle occupant interactions with deploying side air bags

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee AUE/15, Safety related to vehicles.

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.

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Published by BSI Standards Limited 2013

ISBN 978 0 580 75869 0

ICS 43.020

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

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 28 February 2013.

Amendments issued since publication

Date	Text affected

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TECHNICAL REPORT

ISO/TR 14933

Second edition
2012-12-15

Road vehicles — Test procedures for evaluating out-of-position vehicle occupant interactions with deploying side air bags

Véhicules routiers — Méthodes d'essai pour l'évaluation des interactions d'un occupant en position anormale dans un véhicule avec les sacs gonflables latéraux en cours de déploiement

Reference number
ISO/TR 14933:2012(E)

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
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Published in Switzerland

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Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Definitions **1**
4 Tests **2**
4.1 General 2
4.2 Test device 2
5 Instrumentation **3**
5.1 General 3
5.2 Dummy test temperature 3
5.3 Electrical grounding 3
6 Air bag location/impacting object/other test matrix **3**
7 Test details **5**
7.1 Test procedures referenced in other ISO international standards 5
7.2 Child and small adult out-of-position static tests. 5
Bibliography **18**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 14933 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 10, *Impact test procedures*.

This second edition cancels and replaces the first edition (ISO/TR 14933:2001), which has been technically revised.

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Introduction

Side air bags (SAB) are inflatable devices intended to help reduce the risk of injury to the head and/or the chest and/or the pelvis of vehicle occupants adjacent to the impacted side of the vehicle. Side impact accident data indicate that the vehicle side is most likely to come into contact with a passenger car, a truck or a fixed object, such as a pole or tree[1)]. Accident data also indicate that serious-to-fatal injuries in side impact are most likely to occur to the head, neck, chest, abdomen, pelvis and extremities.

During its inflation process in an accident, an air bag generates a considerable amount of kinetic energy and, as a result, substantial forces can be developed between the deploying air bag and the nearby occupant. A considerable but unknown portion of the occupant population does not drive/ride in exactly the vehicle design position, but lean/rest in various ways against the armrest, door, glazing or other side panel of the vehicle, where air bag reaction forces may be even greater. These test procedures were developed to help improve the understanding of such interactions and to help aid in the assessment of future air bag designs.

This Technical Report describes the more common interactions, recognizing that the range of possible interactions is essentially limitless.

References[1] to[5] provide some background on human impact tolerance and criteria, while references[6] and[7] describe scaling techniques for different size occupants and references[8] to[10] offer interpretations of dummy responses relative to human injury potential that may be helpful in the evaluation.

1) The vehicle side may also come into contact with the ground during rollovers, but such contact is generally expected to be less severe than when coming into contact with the three main objects mentioned above.

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Road vehicles — Test procedures for evaluating out-of-position vehicle occupant interactions with deploying side air bags

1 Scope

This Technical Report outlines test procedures for evaluating the effects of the interactions between deploying side air bags (SAB) and vehicle occupants. The in-position test procedures are referred to in other ISO international standards, such as, full-vehicle pole crash tests (ISO 15829) and instrumented arm evaluations (ISO 15827). Out-of-position vehicle occupant test procedures are described in this Technical Report.

This Technical Report describes dummies, procedures, instrumentation and test configurations that can be used for investigating the interactions that occur between a deploying side air bag and a vehicle occupant in front and rear seats. Air bags may deploy from the door or side trim panel, the armrest, the seat back or cushion, the roof support pillars, and the roof rail area. Occupants can range in size from young children through very large adults. These test procedures are sufficiently broad to cover these areas. Static tests are used for these evaluations, since external forces do not accelerate the vehicle buck.

2 Normative references

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

ISO 6487:2012, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

ISO/TR 12349 (all parts):1999, *Road vehicles — Dummies for restraint system testing*

ISO/TR 15827:2007, *Road vehicles — Test procedures — Evaluating small female dummy arm and forearm interactions with driver frontal airbags and side airbags*

ISO/TR 15829:2004, *Road vehicles — Side impact test procedures for the evaluation of occupant interactions with side airbags by pole impact simulation*

SAE J211-1:2007, *Instrumentation for impact test — Part 1: Electronic instrumentation*

SAE J211-2:2008, *Instrumentation for impact test — Part 2: Photographic instrumentation*

3 Definitions

For the purposes of this document, the following definitions apply.

3.1
side air bag
SAB
air bag designed primarily to help reduce occupant injury potential where the significant collision force vector is lateral

3.2
head air bag
air bag that deploys between the occupant's head and the vehicle side structure or an external object that could contact the head

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