INTERNATIONAL STANDARD

ISO 15830-2

Third edition
2022-12

Road vehicles — Design and performance specifications for the WorldSID 50th percentile male side-impact dummy —

Part 2: Mechanical subsystems

Véhicules routiers — Conception et spécifications de performance pour le mannequin mondial (WorldSID), 50e percentile homme, de choc latéral —

Partie 2: Sous-systèmes mécaniques

Reference number
ISO 15830-2:2022(E)

© ISO 2022



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, 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
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

© ISO 2022 – All rights reserved

Contents

Page

Foreword ..... **v**
Introduction ..... **vii**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Mechanical requirements for WorldSID **2**
4.1 Head 2
4.1.1 General description 2
4.1.2 Specifications 2
4.1.3 Validation 3
4.2 Neck 3
4.2.1 General description 3
4.2.2 Specifications 3
4.2.3 Validation 3
4.3 Thorax/abdomen/shoulder 4
4.3.1 General description 4
4.3.2 Specifications 4
4.3.3 Validation 4
4.4 Arms 5
4.4.1 General description 5
4.4.2 Specifications 5
4.5 Lumbar spine and pelvis 6
4.5.1 General description 6
4.5.2 Specifications 6
4.5.3 Validation 6
4.6 Upper legs and knees 6
4.6.1 General description 6
4.6.2 Specifications 6
4.7 Lower legs, ankles, and feet 6
4.7.1 General description 6
4.7.2 Specifications 7
4.8 Clothing 7
4.8.1 General description 7
4.8.2 Specifications 7
4.9 Whole dummy 7
4.9.1 General description 7
4.9.2 Specifications 7
4.9.3 Validation 8
5 Validation test procedures **10**
5.1 Head 10
5.1.1 Principle 10
5.1.2 Apparatus 10
5.1.3 Sensors 10
5.1.4 Preparation 10
5.1.5 Procedure 12
5.1.6 Calculation procedures and expression of results 13
5.1.7 Test reports 13
5.2 Neck 13
5.2.1 Lateral flexion 13
5.2.2 Torsion 17
5.3 Thorax/abdomen/shoulder/pelvis full body tests 20
5.3.1 Full body test setup 20

© ISO 2022 – All rights reserved

5.3.2 Shoulder test 24
5.3.3 Thorax test 26
5.3.4 Abdomen test 28
5.3.5 Pelvis test 31
5.4 Whole body dimensions 33
5.4.1 Principle 33
5.4.2 Apparatus 33

Annex A (informative) **Optional WorldSID whole body dimension measurement procedure with mechanical tools** **44**

Annex B (informative) **Single rib test** **47**

© ISO 2022 – All rights reserved

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.

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 ISO documents 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 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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 36, *Safety and impact testing*.

This third edition cancels and replaces the second edition (ISO 15830-2:2013), which has been technically revised.

The main changes are as follows:

— in Figure 1 head CG location has been changed to head reference mark location;

— body segment assembly mass specifications have been changed;

— clothing mass specification has been changed;

— in Table 1 specifications of head resultant acceleration have been changed for frontal and lateral drops;

— in Table 3 new neck torsion specifications were added for new neck torsion validation test procedure;

— in Table 4 new specification for decay time in shoulder validation test has been added;

— calculation procedure for neck validation has been changed;

— in Table 5 thorax specifications have been changed and validation test procedure specifies a new pendulum face;

— thorax with arm specifications and validation test procedure have been removed;

— full arm description and specifications have been removed;

— in Table 7 specifications for pelvis acceleration and pendulum force have been changed and a new specification for pubic force has been added;

— in Table 9 specifications and CMM procedure for whole body dimensions have been added;

© ISO 2022 – All rights reserved

— drawing list has been removed;

— in Annex B new procedure for optional single rib test has been added.

A list of all parts in the ISO 15830 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2022 – All rights reserved

Introduction

The purpose of the ISO 15830 series is to document the design and specifications of this side-impact dummy in a form suitable and intended for worldwide use.

In 1997, the WorldSID 50th percentile adult male dummy development was initiated, with the aims of defining a global-consensus side-impact dummy, with more humanlike anthropometry, improved biofidelity, and increased injury monitoring capabilities, suitable, for example, for regulatory use. Participating in the development were research institutes, dummy and instrumentation manufacturers, governments and vehicle manufacturers from around the world.

This document is intended to document information and design changes which have become available since the publication of the second edition of the ISO 15830 series (2013-05-15).

In order to apply the ISO 15830 series properly, it is important that all four parts be used together.

© ISO 2022 – All rights reserved

Road vehicles — Design and performance specifications for the WorldSID 50th percentile male side-impact dummy —

Part 2: Mechanical subsystems

1 Scope

This document specifies requirements for mechanical components, specifications and validation tests for the WorldSID 50th percentile side-impact dummy, a standardized anthropomorphic dummy for near-side-impact tests of road vehicles.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

ISO 15830-1, *Road vehicles — Design and performance specifications for the WorldSID 50th percentile male side-impact dummy — Part 1: Vocabulary and rationale*

ISO 15830-3:2022*Road vehicles — Design and performance specifications for the WorldSID 50th percentile male side-impact dummy — Part 3: Mechanical requirements for electronic subsystems*

ISO 15830-4:2022*Road vehicles — Design and performance specifications for the WorldSID 50th percentile male side impact dummy — Part 4: User's manual*

ISO/TS 21002, *Road vehicles — Multidimensional measurement and coordinate systems definition*

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

SAE J1733, *Sign convention for vehicle crash testing*

SAE J2570, *Performance specifications for anthropomorphic test device transducers*

SAE J2856, *User's manual for 50th percentile male Hybrid III dummy*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15830-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

© ISO 2022 – All rights reserved