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

Part 3: Electronic subsystems

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

Partie 3: Sous-systèmes électroniques

[Revision of first edition (ISO 15830-3:2005)]

ICS 43.020

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Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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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.

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 15830-3 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 12, *Passive safety crash protection systems*.

This second edition cancels and replaces the first edition (ISO 15830-3:2005) which has been technically revised. Technical amendments have been incorporated throughout all four parts, resulting from extensive experience with the standard and design changes.

ISO 15830 consists of the following parts, under the general title *Road vehicles — Design and performance specifications for the WorldSID 50th percentile male side impact dummy*:

— *Part 1: Terminology and rationale*

— *Part 2: Mechanical subsystems*

— *Part 3: Electronic subsystems*

— *Part 4: User's manual*

Introduction

This second edition of ISO 15830 has been prepared on the basis of the existing design, specifications and performance of the WorldSID 50th percentile adult male side impact dummy. The purpose of ISO 15830 is to document the design and specifications of this side impact dummy in a form suitable and intended for worldwide regulatory use.

In 1997, ISO/TC22/SC12 initiated the WorldSID 50th percentile adult male dummy development, with the aims of defining a global-consensus side impact dummy, having a wider range of human-like anthropometry, biofidelity and injury monitoring capabilities, suitable for regulatory use. Participating in the development were research institutes, dummy and instrumentation manufacturers, governments, and vehicle manufacturers from around the world.

With regard to potential regulatory, consumer information or research and development use of ISO 15830, users will need to identify which of the permissive (i.e. optional) sensors and other elements defined in Part 3 are to be used in a given application.

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

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

Part 3:
Electronic subsystems

1 Scope

This part of ISO 15830 specifies requirements for electronic components of the WorldSID 50th percentile side impact dummy, a standardized anthropomorphic dummy for side impact testing of road vehicles. It is applicable to impact tests involving

— passenger vehicles of categories M_1 and goods vehicles of categories N_1

— impacts to the side of the vehicle structure

— impact tests involving the use of an anthropometric dummy as a human surrogate for the purpose of evaluating compliance with vehicle safety standards

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, *Road vehicles - Measurement techniques in impact tests - Instrumentation*

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

ISO 15830-2, *Design and performance specifications for the WorldSID 50th percentile adult male side impact dummy — Part 2: Mechanical subsystems*

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

SAEJ211-1:2007, *Instrumentation for impact test – Part 1 – Electronic instrumentation*

SAEJ2570:2001, *Performance specifications for anthropomorphic test device transducers*

SAEJ1733, *Sign convention for vehicle crash testing*

UN/ECE/TRANS/WP 29/78, *Consolidated resolution on the construction of vehicle (R E 3)*

3 Terms and definitions

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

4 Electrical subsystems requirements

4.1 Permissible sensors

4.1.1 General

NOTE All sensors are specified as “permissible” (i.e., optional), because the decision to use or not to use a given sensor is to be left to the individual relevant regulatory authorities, consumer information organisations and research or test laboratories. In this way, a given regulation (or laboratory protocol) can indicate which of the permissible sensors described in this International Standard must be used in a given test. It should also be noted that different connector configurations may be found in different WorldSID assemblies.

The following sensors may be installed in the dummy. If installed, they shall comply with the specifications given in Table 1. If these sensors are not installed, then structural or mass replacements shall be installed in the dummy.

4.1.2 Locations and specifications

Table 1 — Permissible WorldSID sensor locations and specifications

Body region	Sensor	Sensor specification	Mounting specification	Maximum number of channels
Head	Linear accelerometer	4.1.3.2	ISO 15830-2, 4.1	3
Head	Rotational accelerometer	4.1.3.3	ISO 15830-2, 4.1	3
Head	Tilt sensor (about x and y axes)	4.1.3.4	ISO 15830-2, 4.1	2
Head	Upper neck load cell	4.1.3.5	ISO 15830-2, 4.1	6
Neck	Lower neck load cell	4.1.3.5	ISO 15830-2, 4.2	6
Neck	T1 linear accelerometer	4.1.3.2	ISO 15830-2, 4.2	3
Shoulder	Rib linear accelerometer	4.1.3.2	ISO 15830-2, 4.3	3
Shoulder	IR-TRACC	4.1.3.6	ISO 15830-2, 4.3	1
Shoulder	Load cell (F_x, F_y, F_z)	4.1.3.7	ISO 15830-2, 4.3	3
Full arm	Upper arm load cell	4.1.3.8	ISO 15830-2, 4.4	6
Full arm	Lower arm load cell	4.1.3.8	ISO 15830-2, 4.4	6
Full arm	Elbow load cell (M_x, M_y)	4.1.3.9	ISO 15830-2, 4.4	2
Full arm	Elbow angular displacement	4.1.3.10	ISO 15830-2, 4.4	1
Full arm	Elbow linear accelerometer	4.1.3.2	ISO 15830-2, 4.4	3
Full arm	Wrist linear accelerometer	4.1.3.2	ISO 15830-2, 4.4	3
Thorax	Upper rib linear accelerometer	4.1.3.2	ISO 15830-2, 4.3	3
Thorax	Middle rib linear accelerometer	4.1.3.2	ISO 15830-2, 4.3	3
Thorax	Lower rib linear accelerometer	4.1.3.2	ISO 15830-2, 4.3	3
Thorax	Upper rib IR-TRACC	4.1.3.6	ISO 15830-2, 4.3	1
Thorax	Middle rib IR-TRACC	4.1.3.6	ISO 15830-2, 4.3	1
Thorax	Lower rib IR-TRACC	4.1.3.6	ISO 15830-2, 4.3	1
Spine	T4 linear accelerometer	4.1.3.2	ISO 15830-2, 4.3	3
Spine	T12 linear accelerometer	4.1.3.2	ISO 15830-2, 4.3	3
Spine	Rotational accelerometer (about x- and z-axes)	4.1.3.3	ISO 15830-2, 4.3	2
Spine	Tilt sensor (about x- and y-axes)	4.1.3.4	ISO 15830-2, 4.3	2

Body region	Sensor	Sensor specification	Mounting specification	Maximum number of channels
Abdomen	Upper rib linear accelerometer	4.1.3.2	ISO 15830-2, 4.3	3
Abdomen	Lower rib linear accelerometer	4.1.3.2	ISO 15830-2, 4.3	3
Abdomen	Upper rib IR-TRACC	4.1.3.6	ISO 15830-2, 4.3	1
Abdomen	Lower rib IR-TRACC	4.1.3.6	ISO 15830-2, 4.3	1
Lumbar spine/pelvis	Lumbar load cell	4.1.3.11	ISO 15830-2, 4.6	6
Lumbar spine/pelvis	Pelvis linear accelerometer	4.1.3.2	ISO 15830-2, 4.6	3
Lumbar spine/pelvis	Pubic load cell (F_y)	4.1.3.12	ISO 15830-2, 4.6	1
Lumbar spine/pelvis	Sacro-iliac load cell	4.1.3.13	ISO 15830-2, 4.6	12
Lumbar spine/pelvis	Tilt sensor (about x- and y-axes)	4.1.3.3	ISO 15830-2, 4.6	2
Upper leg	Femoral neck load cell (F_x, F_y F_z)	4.1.3.14	ISO 15830-2, 4.7	3
Upper leg	Mid femur load cell	4.1.3.14	ISO 15830-2, 4.7	6
Upper leg	Knee lateral outboard contact force load cell	4.1.3.16	ISO 15830-2, 4.7	1
Upper leg	Knee lateral inboard contact force load cell	4.1.3.16	ISO 15830-2, 4.7	1
Upper leg	Knee angular displacement	4.1.3.17	ISO 15830-2, 4.7	1
Lower leg	Upper tibia load cell	4.1.3.15	ISO 15830-2, 4.8	6
Lower leg	Lower tibia load cell	4.1.3.15	ISO 15830-2, 4.8	6
Lower leg	Ankle angular displacement	4.1.3.18	ISO 15830-2, 4.8	3
Spine box	Air temperature sensor	4.1.3.19	ISO 15830-2, 4.3	1

4.1.3 Sensor specifications and mass

4.1.3.1 General

All load cells, accelerometers and angular displacement transducers shall comply with SAE J2570, and load cells shall comply with the capacities and sign conventions in Annex A.

Sensor sign convention should comply with SAE J1733 and all deviations shall be noted.

4.1.3.2 Tri-axial linear accelerometers

— If measured, tri-axial linear accelerations shall be measured using Endevco accelerometer, model 7268C-2000M1[1)].

— Tri-axial linear accelerometer assemblies shall have a mass of 8 g ± 1 g (not including cable).

4.1.3.3 Rotational accelerometers

— If measured, rotational accelerations shall be measured using Endevco accelerometer, model 7302BM4[2)].

1) Accelerometer model 7268C-2000M1 is a product supplied by Endevco Corp. San Juan Capistrano, California, USA. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Alternative products may be used if they can be shown to lead to the same results.

— Rotational accelerometers shall have a mass of 35 g ± 4 g (not including cable).

4.1.3.4 Tilt angle sensors

4.1.3.4.1 Head tilt sensor

— If measured, head tilt angles shall be measured using either IES tilt sensor, model IES/1401 AT[3)], or MSC Automotive Gmbh tilt sensor, model 260D/GP-X[4)].

— Head tilt sensors shall have a mass of less than 25 g (not including cable).

4.1.3.4.2 Thorax and pelvis tilt sensor

— If measured, thorax and pelvis tilt angles shall be measured using either IES tilt sensor, model IES/1401 T[5)], or MSC Automotive Gmbh tilt sensor, model 260D/GP-X [4)].

— Thorax and pelvis tilt sensors shall have a mass of less than 25 g (not including cable).

4.1.3.5 Universal neck load cell

— If measured, upper and lower neck forces and moments shall be measured using Humanetics (formally Denton) load cell, model W50-71000[6)].

— Upper and lower neck load cells shall have a mass of 346 g ± 20 g (not including attachment bolts or plug) or 361 g ± 25 g (including mating plug and 450 mm of cable).

4.1.3.6 Infra-Red Telescoping Rod for the Assessment of Chest Compression (IR-TRACC)

— If measured, rib deflections shall be measured using Humanetics (formally FTSS) IR-TRACC, model IF-363[7)].

— IR-TRACCs shall have a mass of 117 g ± 15 g (including the connector and 300 mm of cable).

2) Accelerometer model 7302BM4 is a product supplied by Endevco Corp. San Juan Capistrano, California, USA. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Alternative products may be used if they can be shown to lead to the same results.

3) Head tilt sensor model IES/1401 AT is a product supplied by Humanetics (formerly Robert A. Denton Inc.), Rochester Hills Michigan, USA. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Alternative products may be used if they can be shown to lead to the same results.

4) Tilt sensor model 260D/GP-X is a product supplied by MSC Automotive Gmbh. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Alternative products may be used if they can be shown to lead to the same results.

5) Thorax and pelvis tilt sensor model IES/1401 T is a product supplied by Humanetics (formerly Robert A. Denton Inc.), Rochester Hills Michigan, USA. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Alternative products may be used if they can be shown to lead to the same results.

6) Load cell model W50-71000 (see ISO 15830-2, Annex C) is a product supplied by Humanetics (formerly Robert A. Denton Inc.), Rochester Hills Michigan, USA. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Alternative products may be used if they can be shown to lead to the same results.

7) IR-TRACC model IF-363 (see ISO 15830-2, Annex C) is a product supplied by Humanetics (formerly First Technology Safety Systems, Inc., Plymouth Michigan, USA. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Alternative products may be used if they can be shown to lead to the same results.