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BSI Standards Publication

Road vehicles — Injury risk curves for the evaluation of occupant protection in side impact tests

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National foreword

This Published Document is the UK implementation of ISO/TR 12350:2013. It supersedes PD ISO/TR 12350:2004 which is withdrawn.

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.

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Véhicules routiers — Courbes de risque de blessures pour l'évaluation de la protection des occupants en choc latéral

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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.

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).

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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 12, *Passive safety crash protection systems.*

This second edition cancels and replaces the first edition (ISO/TR 12350:2004), which has been technically revised.

TECHNICAL REPORT ISO/TR 12350:2013(E)

Road vehicles — Injury risk curves for the evaluation of occupant protection in side impact tests

1 Scope

This Technical Report provides injury risk curves to assess occupant protection in side impact tests. The curves are given for the WorldSID 50th, a mid-size adult male side impact dummy. Injury risk curves for other side impact dummies could be added as soon as the necessary material is available and processed as described in this Technical Report. These dummies are used during tests carried out according to ISO 10997 or which are under investigation by regulatory bodies and consumer testing organizations.

2 Methodology

2.1 Selection of PMHS sample to be used for the construction of the injury risk curves

An in-depth review of the postmortem human subjects (PMHS) tests available in the literature and in the NHTSA database (http://www-nrd.nhtsa.dot.gov/database/aspx/nrdb/querytesttable.aspx) was performed. The listed tests were analysed in order to determine if they could be accurately repeated with dummies and included in the construction of injury risk curves.

This clause summarizes the series of tests that were conducted by body region and type of loading. Reasons for including or excluding each particular test series are detailed. The PMHS characteristics are provided in the form of related electronic documents available through the ISO website and detailed in Clause 4. The detailed descriptions of the PMHS configurations allowing the reproduction of the test with a dummy are presented in Annex A to Annex F, as well as the reasons for inclusion or exclusion.

The rigid and padded head impactor tests conducted by Calspan[18] were included and are detailed in Annex A. The head impactor tests of the Highway Safety Research Institute (HSRI)[51] were excluded because the impact speeds were not known. The head impactor tests of the University of Michigan Transportation Research Institute (UMTRI) (NHTSA database) were excluded because the impactor characteristics were not known.

The whole body drop tests with head impact conducted by Wayne State University (WSU)[22], those conducted by the Association Peugeot-Renault (APR) without helmet, and the head drop tests conducted by Medical College of Wisconsin (MCW)[56] were included and are detailed in Annex A. The whole body drop tests with head impact conducted by APR with helmet were excluded because the helmet properties were unknown.

The shoulder impactor tests performed by APR[2], INRETS[14] [15] [17], and WSU[26] [30] were included. The shoulder impactor tests conducted by Ohio State University (OSU) on a rigid bench were also included[3] [4]. These configurations are detailed in Annex B. The oblique shoulder impactor tests performed by OSU on a 1996 Ford Taurus seat were excluded because the characteristics of the seat were unknown.

All, but one, of the thorax impactor tests conducted by HSRI[43] [44] [45] were included. The single-impact WSU thorax impactor test[54] [55] was also included. The UMTRI[34] [35] and OSU[49] thorax impactor tests were included when the level of load was deemed to be below the threshold of rib fracture (700 N), such that the fractures could be attributed to the final high-speed impact. These test configurations are detailed in Annex C. The 76T038 HSRI test was excluded because the data were questionable. The HSRI tests 77T079 and 77T080 were excluded because it does not seem realistic to have 18 rib fractures for 2 165 N of impact force. All the WSU and INRETS[16] multi-impact tests, as well as some UMTRI tests (83E085, 83E086, 83E106, 83E107, 83E108) and OSU tests (0505OTH25L01, 0505LTH25R01, 0506OTH25R01, 0506LTH25L01, 0601LTH25L01, 0601OTH25R01), were excluded because it was not possible to determine which impact caused each injury.