



BSI Standards Publication

Procedure to construct injury risk curves for the evaluation of road user protection in crash tests

National foreword

This Published Document is the UK implementation of ISO/TS 18506:2014.

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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ISBN 978 0 580 83771 5

ICS 43.020

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 September 2014.

Amendments issued since publication

Date	Text affected
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**Procedure to construct injury risk
curves for the evaluation of road user
protection in crash tests**

*Procédure de construction des courbes de risques pour l'évaluation de
la protection des usagers de la route dans les essais de choc*





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Published in Switzerland

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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.

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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*.

Procedure to construct injury risk curves for the evaluation of road user protection in crash tests

1 Scope

The aim of this Technical Specification is to provide a procedure to develop injury risk curves for biomechanical samples. These samples are often heavily censored and limited in size, such that specific steps and checks are required when developing injury risk curves. Moreover, several statistical methods were historically used to build injury risk curves. The curves resulting from the different methods could be rather close or fairly different, depending on the biomechanical samples. It is therefore of major importance to recommend a consensual method to be used. Otherwise, injury thresholds candidates to be included into regulations could be highly influenced by the statistical method used. These different methods were compared in a statistical simulation study^[10]. The conclusions of this study were used to recommend the survival analysis.

This Technical Specification identifies steps to be followed to develop injury risk curves. It recommends preliminary checks, statistical method, and recommendation process of the injury risk curve. Guidelines on the type of the samples to be used (cadaver, animal, or dummy), as well as the variables to be used, and the injury severity level are beyond the scope of this Technical Specification.

2 Terms and definitions

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

2.1

injury risk curve

curve giving the probability, for a defined population and for a given input, to sustain a specified severity of injury

2.2

injury risk function

mathematical function that relates a value of an injury criterion and possible additional factors (variables) to a risk of sustaining an injury of a certain level

2.3

injury criterion

physical parameter which correlates well with a scale of injury severity of the body region under consideration

2.4

injury value

value of an injury criterion

2.5

injury mechanism

mechanical behavior leading to an injury

2.6

abbreviated injury scale

AIS

scale allowing for the classification of injury severity

2.7

variable

parameters which contribute to the prediction of the injury severity