
**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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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 12, *Passive safety crash protection systems*.

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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