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Road vehicles — Injury risk functions for advanced pedestrian legform impactor (aPLI)

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National foreword

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CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
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Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols and abbreviated terms **3**
4.1 Symbols 3
4.2 Abbreviated terms 4
5 IPFs for the aPLI **4**
5.1 General 4
5.2 Thigh 6
5.3 Leg 7
5.4 Knee 8
Annex A (informative) **Rationale regarding background and methodology to develop IPFs for the aPLI** **11**
Annex B (informative) **Adjustment of IPFs for real-world relevance** **105**
Annex C (informative) **Supplemental data** **135**
Annex D (informative) **Influence of PMHS test data (dfbetas > 0,3) against IPFs for human** **136**
Bibliography **154**

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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 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.*

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.

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Introduction

This document has been prepared on the basis of the existing injury probability functions (IPFs) to be used with the advanced pedestrian legform impactor (aPLI) standard build level B (SBL-B). The purpose of this document is to document the IPFs for the aPLI in a form suitable and intended for worldwide harmonized use.

In 2014, development of the aPLI hardware and associated IPFs started, with the aim of defining a globally accepted next-generation pedestrian legform impactor with enhanced biofidelity and injury assessment capability, along with its IPFs, suitable for harmonized use. Participating in the development were research institutes, dummy and instrumentation manufacturers, governments, and car manufacturers from around the world.

IPFs for the aPLI specified in this document predict injury probability to specific regions of the lower limb of a pedestrian that corresponds to maximum values of injury metrics obtained by the aPLI in a subsystem test, as described in References [1] and [2]. As the IPFs do not provide any threshold values, users will need to determine target injury probability, based on their specific needs, to define injury assessment reference values to be used for their test protocol.

It is also important to note that the subsystem test procedure (STP) for pedestrian protection may not be representative of pedestrian accidents for specific injury metrics, depending on their sensitivity to pedestrian impact conditions such as lower-limb posture and muscle tone. The IPFs for the aPLI have been validated against accident data and some ideas to compensate for the discrepancy against accident data are presented in Annex B.

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Road vehicles — Injury risk functions for advanced pedestrian legform impactor (aPLI)

1 Scope

This document provides definitions, symbols and injury probability functions (IPFs) for the thigh, leg and knee intended to be used with the advanced pedestrian legform impactor (aPLI), a standardized pedestrian legform impactor with an upper mass for pedestrian subsystem testing of road vehicles. They are applicable to impact tests using the aPLI at 11,1 m/s involving:

— vehicles of category M1, except vehicles with a maximum mass above 2 500 kg and which are derived from N1 category vehicles and where the driver's position, the R-point, is either forward of the front axle or longitudinally rearwards of the front axle transverse centreline by a maximum of 1 100 mm;

— vehicles of category N1, except where the driver's position, the R-point, is either forward of the front axle or longitudinally rearwards of the front axle transverse centreline by maximum of 1 100 mm;

— impacts to the bumper test area defined by References [1] and [2];

— pedestrian subsystem tests involving use of a legform for the purpose of evaluating compliance with vehicle safety standards.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/

3.1
adult
person who is sixteen years old or older

3.2
advanced pedestrian legform impactor
aPLI
modified pedestrian legform impactor which incorporates a mass representing the inertial effect of the upper part of a pedestrian body to enhance biofidelity and *injury assessment capability* (3.10) of conventional pedestrian legforms

3.3
biofidelity
aspect of the *advanced pedestrian legform impactor (aPLI)* (3.2) capability to represent the impact response of human subjects

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