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Road vehicles — Test devices for target vehicles, vulnerable road users and other objects, for assessment of active safety functions —

Part 4: Requirements for bicyclist targets

Véhicules routiers — Dispositifs d'essai pour véhicules cibles, usagers de la route vulnérables et autres objets, pour l'évaluation de fonctions de sécurité active —

Partie 4: Exigences pour cibles de cyclistes

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 33 *Vehicle dynamics and chassis components*.

A list of all parts in the ISO 19206 series can be found on the ISO website.

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

ADAS (Advanced Driver Assistance Systems) and active safety systems are designed to support decision-making for the driver, extend the driver's awareness of the traffic situation with advanced warnings, improve the behaviour of the vehicle, and even take over vehicle control in an emergency situation. The goal is to completely avoid an accident or at least reduce the severity of an accident.

The surrogate target is an essential component in the evaluation of ADAS/active safety functions and different levels of automated driving systems, in all situations where a collision with the target may occur.

The characteristics of targets need to be trustworthy and a vehicle target needs to be recognized as a real vehicle by the various sensing technologies.

This document addresses the specification of bicyclist test targets. The bicyclist targets specified are representative of adult and child sizes.

A bicyclist test target needs to represent the characteristics of the rider and bicycle yet provide safety for the subject vehicle and test operators in the event that contact is made between the tested vehicle and the bicyclist target. Crashworthiness and durability requirements for the bicyclist target require that the material and construction of the bicyclist target are adapted to fit the purposes.

Test cases usually address both stationary and moving targets and, as such, the physical construction of the target may accommodate a target carrier system capable of mimicking realistic motions. This document includes requirements on the target carrier system as applicable.

Targets described in the ISO 19206 series can be used for system development or applied in conjunction with existing standards, or standards under development, for assessment of ADAS and active safety functions of vehicles.

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Road vehicles — Test devices for target vehicles, vulnerable road users and other objects, for assessment of active safety functions —

Part 4: Requirements for bicyclist targets

1 Scope

This document specifies the properties and performance requirements of a bicyclist target (BT) that represents a human bicyclist in terms of shape, movement, reflection properties, etc. for testing purposes. The BT is used to assess the system detection and activation performance of active safety systems.

This document establishes the detection requirements for a BT in terms of sensing technologies commonly in use at the time of publication of this document, and where possible, anticipated future sensing technologies. It also establishes methodologies to verify the target response properties to these sensors, as well as some performance requirements for the target carrier.

The BT according to this document is also representative for electrically assisted pedal bicycles (pedal electric cycle, pedelec).

This document does not address the test procedures in terms of speeds, positions, or timing of events. Performance criteria for the active safety system being tested are also not addressed.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 8855, *Road vehicles — Vehicle dynamics and road-holding ability — Vocabulary*

ISO 8608, *Mechanical vibration — Road surface profiles — Reporting of measured data*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8855 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
subject vehicle
SV
vehicle with active safety system to be tested

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3.2
bicyclist target
BT
test device representing a bicyclist on a bicycle used to test active safety systems

3.2.1
BT bicycle
part of the *bicyclist target* (3.2) consisting of the bicycle only

3.2.2
BT rider
part of the *bicyclist target* (3.2) consisting of the rider only

3.3
target carrier
mechanical or electro-mechanical system used to move the target according to a test protocol

Note 1 to entry: Target carrier can be self-contained within, or supporting the target structure or external devices connected with cables, beams, or similar structures. It can also be a self-propelled carrier.

Note 2 to entry: Target structure fixation is included in the target carrier. A commonly used fixation interface is shown in Annex G.

3.4
measurement equipment
equipment used to record the position of the *bicyclist target* (3.2) relative to the *subject vehicle* (3.1) to ensure that the test protocol is followed within prescribed tolerances and record data documenting the function of the active safety system and allowing its performance to be assessed

4 Abbreviated terms

BT	bicyclist target
CCD	charge-coupled device
CMOS	complementary metal oxide semiconductor
FIR	far infrared
LIDAR	light detection and ranging
NIR	near infrared
PMD	photonic mixer device
RCS	radar cross section
SV	subject vehicle

5 Bicyclist target specifications

5.1 Bicyclist target size

The bicyclist targets specified in this document are representative for adult and child sizes. References for subsequent requirements are based on sample measurements of different demographics and compiled into categories. The following human bicyclist sizes are relevant for this document:

— adult: 50-percentile male;

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