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

Part 3: Requirements for passenger vehicle 3D 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 3: Exigences pour cibles de véhicules particuliers 3D

Reference number
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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 must be trustworthy and a vehicle target must be recognized as a real vehicle by the various sensing technologies.

This document addresses the specification of vehicle 3D test targets.

It is important that a surrogate vehicle target represents a real vehicle in terms of detectability and movement from all directions. It should also provide safety for the subject vehicle and test operators if contact is made between the subject vehicle and the target. Crashworthiness and durability requirements for the vehicle target require that the material and construction of the vehicle 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 accommodates 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 3: Requirements for passenger vehicle 3D targets

1 Scope

This document specifies performance requirements for surrogate targets used to assess the system detection and performance of active safety systems.

This document specifies the properties of an omni-directional multi-purpose vehicle target for assessment of interaction in a variety of traffic scenarios.

This document specifies the properties of a vehicle target that will allow it to represent a passenger vehicle in terms of size, shape, reflection properties, etc. for testing purposes. This document addresses the detection requirements for a vehicle target in terms of sensing technologies commonly in use at the time of publication of this document, and where possible, anticipates future sensing technologies. It also addresses methodologies to verify the target response properties to these sensors, as well as performance requirements for the target carrier.

The vehicle targets specified in this document reflect passenger cars and, in particular, the smaller and more common B and C segment cars.

This document does not address the test procedures in terms of speeds, positions, or timing of events. Performance criteria for the active safety system 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
vehicle target
VT
test device representing a vehicle, whose purpose is to activate sensor systems

Note 1 to entry: Vehicle target consists of a *target structure* (3.2.1) and optionally a *target carrier* (3.2.2).

Note 2 to entry: This document addresses test devices representing a vehicle having the necessary features to be recognised from any direction (3D vehicle target).

3.2.1
target structure
physical structure whose purpose is to maintain the shape and provide the relevant sensor signature representing a vehicle

3.2.2
target carrier
mechanical or electro-mechanical system used to move and/or support the *target structure* (3.2.1) according to a test protocol

Note 1 to entry: Target carrier may 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 and target carrier may be integrated.

Note 3 to entry: Target structure fixation is included in the target carrier.

3.3
target axis system
axis system fixed in the reference frame of the target, so that the X_t axis is substantially horizontal and forward (with the target at rest), and is parallel to the target's longitudinal plane of symmetry, and the Y_t axis is perpendicular to the target's longitudinal plane of symmetry and points to the left with the Z_t axis pointing upward

Note 1 to entry: See Figure 2 for further explanation of the target axes X_t, Y_t, Z_t.

3.4
target coordinate system
coordinate system based on the *target axis system* (3.3) with the origin located at the *target reference point* (3.5)

Note 1 to entry: The position of the vehicle in the target coordinate system is described by coordinates x_t, y_t, z_t.

3.5
target reference point
point whose location relative to the external dimensions of the target, in its initial condition, remains constant

Note 1 to entry: to entry:

$x = 0, y = 0$ at the centroid of the area defined by a horizontal projection of the plan view of the target;

$z = 0$ at the ground plane.

3.6
measurement equipment
equipment used to record the position and motions of the *vehicle target* (3.2) relative to the *subject vehicle* (3.1)

Note 1 to entry: The measurement equipment is used to ensure that the test protocol is followed within prescribed tolerances and to record data documenting the function of the active safety system and allowing its performance to be assessed.

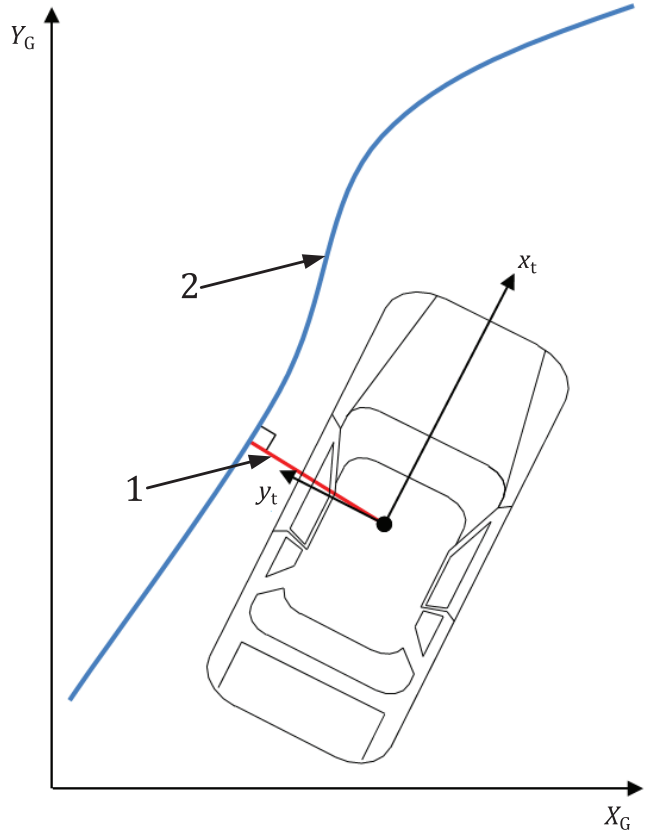
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3.7
planned path
X, Y coordinates that define the desired trajectory of the target vehicle

3.8
lateral path deviation
position error of the target vehicle relative to the *planned path* (3.7) measured perpendicular from the planned path direction

Note 1 to entry: See illustration in Figure 1.

Note 2 to entry: Y_G and X_G are the ground (fixed) coordinate axes in which the planned path is defined.



Key
1 lateral path deviation
2 planned path

Figure 1 — Lateral path deviation

4 Abbreviated terms

CCD charge-coupled device

CMOS complementary metal oxide semiconductor

FIR far infrared

LIDAR light detection and ranging

NIR near infrared

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