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Intelligent transport systems — Pedestrian detection and collision mitigation systems (PDCMS) — Performance requirements and test procedures

Systèmes de transport intelligents — Systèmes de détection des piétons et de prévention des collisions (PDCMS) — Exigences de performance et procédures d'essai

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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 document 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 204, *Intelligent transport systems*.

This second edition cancels and replaces the first edition (ISO 19237:2017), which has been technically revised.

The main changes are as follows:

— clarification that a hazardous situation is not limited to a pedestrian crossing a straight road through the addition of road curvature requirements;

— reduction in minimum subject vehicle velocity;

— new requirement that all PDCMS be capable of twilight and night-time activation, which was previously optional.

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

The fatality and severe injury rates of traffic accidents involving pedestrians are significantly high, resulting in the loss of many lives.

Pedestrian detection and collision mitigation systems (PDCMS) reduce the severity of pedestrian collisions that cannot be avoided and can reduce the likelihood of fatality. By a collision warning (CW) and automatically activating emergency braking, PDCMS assist in slowing a vehicle when a collision is likely.

Functional elements of a PDCMS are shown in Figure 1.

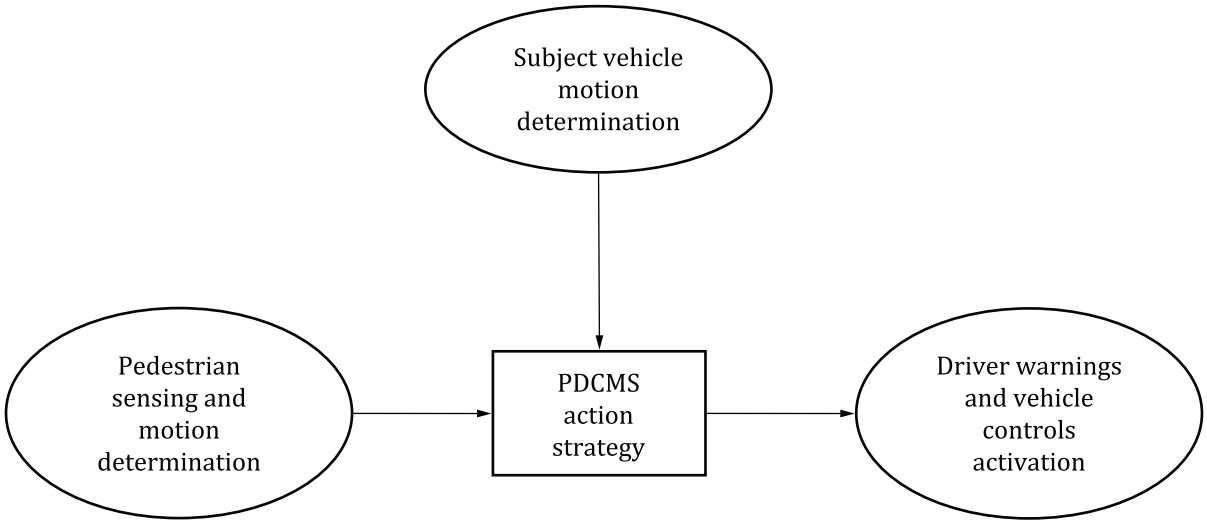


Figure 1 — Functional elements of pedestrian detection and collision mitigation systems (PDCMS)

A PDCMS detects pedestrians ahead of time, determine if detected pedestrians represent a hazardous condition, and warn the driver if a hazard exists. A PDCMS estimates if the driver has an adequate opportunity to respond to the hazard. If there is inadequate time available for the driver to respond, and if appropriate criteria are met, a PDCMS determines that a collision is imminent. Based upon this assessment, a PDCMS will activate CWs and vehicle brakes to mitigate collision severity. This document, while not a collision avoidance standard, does not preclude a manufacturer from implementing collision avoidance with a PDCMS.

System designers and other users can apply the provisions of this document to stand-alone PDCMS or to the integration of the PDCMS functions into other driving assistance and support systems.

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Intelligent transport systems — Pedestrian detection and collision mitigation systems (PDCMS) — Performance requirements and test procedures

1 Scope

This document specifies the concepts of operation, minimum functionality, system requirements, system interfaces and test procedures for pedestrian detection and collision mitigation systems (PDCMS), which can reduce the likelihood of fatality and severity of injury. A PDCMS requires information about range to pedestrians, motion of pedestrians, motion of the subject vehicle (SV), driver commands and driver actions. It specifies the behaviours that are required for PDCMS, and the system test criteria necessary to verify that a given implementation meets the requirements of this document. Implementation choices are left to system designers wherever possible.

Systems that include other countermeasures such as evasive steering are not within the scope of this document.

Responsibility for the safe operation of the vehicle remains with the driver.

This document applies to light duty passenger vehicles. It does not apply to other vehicle categories such as heavy vehicles or motorcycles. PDCMS are not intended for off-road use.

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 1176, *Road vehicles — Masses — Vocabulary and codes*

ISO 19206-2, *Road vehicles — Test devices for target vehicles, vulnerable road users and other objects, for assessment of active safety functions — Part 2: Requirements for pedestrian targets*

ISO/CIE 19476, *Characterization of the performance of illuminance meters and luminance meters*

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
collision warning
CW
warning system that alerts the driver of a potential collision with a *pedestrian* (3.9) in the forward path of the subject vehicle

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3.2
driver override
driver-initiated suppression of an *emergency braking* (3.3) or *collision warning* (3.1) countermeasure

3.3
emergency braking
EB
countermeasure for pedestrian detection and collision mitigation systems that responds to the detection of an imminent *pedestrian collision* (3.10) by automatically activating braking to quickly reduce the relative velocity

3.4
heavy vehicle
single vehicle or combination of vehicles defined as Category 1-2 or Category 2 in the United Nations Economic and Social Council World Forum for Harmonization of Vehicle Regulations (WP.29) TRANS/WP.29/1045[2]

3.5
impact point of position
lateral contact position from the *subject vehicle (SV)* (3.11) point of view or expected lateral contact position at the front of the SV when the SV collides with a *pedestrian* (3.9) or when a collision is expected

3.6
light duty passenger vehicle
vehicle according to category M1 (≦8 passenger seats except driver seat) in the United Nations Economic and Social Council World Forum for Harmonization of Vehicle Regulations (WP.29) TRANS/WP.29/78/Rev.2[1]

3.7
minimum speed reduction
smallest drop in speed that a pedestrian detection and collision mitigation system is able to achieve when activated

3.8
minimum velocity
v_{min}
minimum *subject vehicle* (3.11) speed for which a pedestrian detection and collision mitigation system is capable of activating a countermeasure

3.9
pedestrian
human being on the road or near the road

3.10
pedestrian collision
collision between a *subject vehicle* (3.11) and a *pedestrian* (3.9)

3.11
subject vehicle
SV
vehicle equipped with a pedestrian detection and collision mitigation system

3.12
target pedestrian
TP
pedestrian (3.9) that is positioned within the field of view of the sensor and that can be impacted by the *subject vehicle* (3.11)

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