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Intelligent transport systems — Lane departure warning systems — Performance requirements and test procedures

Systèmes intelligents de transport — Systèmes d'avertissement de départ de ruelle — Exigences de performance et méthodes 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 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 on 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 the following URL: 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 17361:2007), of which it constitutes a minor revision with the following modifications:

— Clause 2 has been updated;

— Annex A has been deleted;

— reference to Annex A has been changed to ISO 11270 in 3.2;

— inequality signs have been updated to Unicode.

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Introduction

Lane departure warning systems (LDWSs) are based on fundamental traffic rules. The main focus of an LDWS is to help the driver keep the vehicle in the lane on highways and highway-like roads. Accordingly, a warning is issued to alert the driver in case of lane departure caused by, for example, inattention. LDWSs are not intended to issue warnings with respect to collisions with other vehicles or to control vehicle motions.

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Intelligent transport systems — Lane departure warning systems — Performance requirements and test procedures

1 Scope

This document specifies the definition of the system, classification, functions, human-machine interface (HMI) and test methods for lane departure warning systems. These are in-vehicle systems that can warn the driver of a lane departure on highways and highway-like roads. The subject system, which may utilize optical, electromagnetic, GPS or other sensor technologies, issues a warning consistent with the visible lane markings. The issuance of warnings at roadway sections having temporary or irregular lane markings (such as roadwork zones) is not within the scope of this document. This document applies to passenger cars, commercial vehicles and buses. The system will not take any automatic action to prevent possible lane departures. Responsibility for the safe operation of the vehicle remains with the driver.

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 terminological databases for use in standardization at the following addresses:

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

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

3.1
lane
area of roadway that a vehicle would be expected to travel along in the absence of any obstruction without the driver's desire to change the path of travel

3.2
visible lane marking
delineators intentionally placed on the borderline of the *lane* (3.1) that are directly visible by the driver while driving (i.e. not covered by snow, etc.)

Note 1 to entry: ISO 11270:2014, Annex B gives country-specific visible lane-marking definitions.

3.3
incidental visible road feature
visible patterns on the road surface that were not explicitly intended to delineate the boundaries of the *lane* (3.1) but which are indicative of the position of the lane

Note 1 to entry: These include such features as pavement seams or edges, kerbs, and tracks or ruts left by previous vehicles.

3.4
lane boundary
borderline of the *lane* (3.1), situated at the centre of a *visible lane marking* (3.2) or, in the absence of a visible lane marking, determined by *incidental visible road features* (3.3) or other means such as GPS, magnetic nails, etc.

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3.5
default lane width
predetermined width given to a *lane* (3.1) when a *visible lane marking* (3.2) exists only on one side of the lane and no other lane boundaries are detected by the system

3.6
departure
situation in which the outside of one of the front wheels of a vehicle or of the leading part of an articulated vehicle (or, in the case of a three-wheeled vehicle, the outside of one of the wheels on the axle with the widest track) is crossing a specified line

3.7
lane departure
point of *departure* (3.6) across the *lane boundary* (3.4)

3.8
rate of departure
V
subject vehicle's approach velocity at a right angle to the *lane boundary* (3.4) at the *warning issue point* (3.10)

3.9
time to line crossing
TTLC
calculated time to *lane departure* (3.7)

EXAMPLE The simplest method of calculating TTLC is to divide the lateral distance, *D*, between the predetermined part of the vehicle and the *lane boundary* (3.4) by the *rate of departure*, *V*, (3.8) of the vehicle relative to the *lane* (3.1).

3.10
warning issue point
measured location and time at which a warning starts to be issued

3.11
warning threshold
location where the warning is issued on the road, which corresponds to a warning trigger point set in the system

Note 1 to entry: In the case of *TTLC* (3.9), the warning threshold shifts depending on the *rate of departure* (3.8).

Note 2 to entry: The warning threshold is placed within the *warning threshold placement zone* (3.12) (see Figure 1).

3.12
warning threshold placement zone
zone between the earliest and the *latest warning lines* (3.17) within which the *warning threshold* (3.11) is placed

Note 1 to entry: There is one warning threshold placement zone around the left *lane boundary* (3.4) and one around the right lane boundary (see Figure 1).

3.13
warning condition
condition in which *departure* (3.6) across the *warning threshold* (3.11) occurs

Note 1 to entry: See Figure 2.

3.14
repeatability
ability of a certain percentage of warnings issued by the system to consistently fall within a given range

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3.15
false alarm
alarm that is issued when the *warning conditions* (3.13) have not been fulfilled

3.16
earliest warning line
innermost limit of the *warning threshold* (3.11)

3.17
latest warning line
outermost limit of the *warning threshold* (3.11)

3.18
no warning zone
zone between the two *earliest warning lines* (3.16)

3.19
suppression request
driver request or system feature intended to prevent a *lane departure warning* (3.20) if an intended *lane departure* (3.7) is detected

3.20
lane departure warning
warning given to the driver in accordance with the lane departure warning condition in the absence of *suppression requests* (3.19)

3.21
system incapable
state of the system in which it is unable to warn the driver of a *lane departure* (3.7) due to temporary conditions

3.22
status indication
indication of system status

EXAMPLE On/off, failure and incapable.

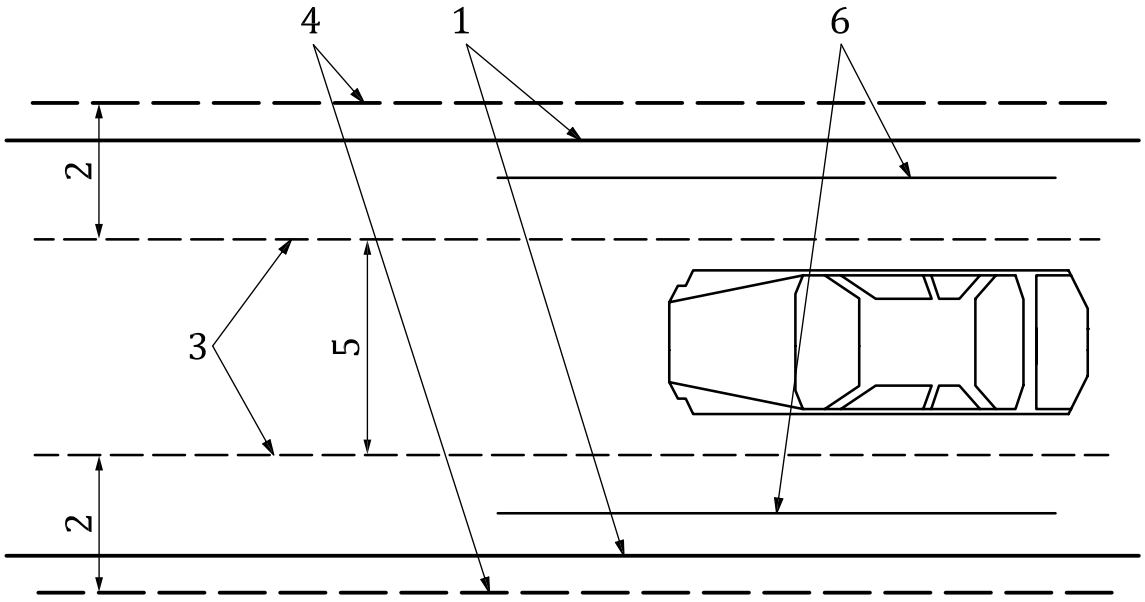
3.23
haptic warning
warning that stimulates the driver's sense of touch, vibration, force and motion

EXAMPLE Steering wheel motion, steering wheel vibration, seat vibration and pedal vibration.

3.24
curve cutting
act of driving to the inner side of a curve, which can lead to an intentional *lane departure* (3.7)

3.25
visibility
distance at which the illuminance of a non-diffusive beam of white light with a colour temperature of 2 700 K is decreased to 5 % of its original light source illuminance

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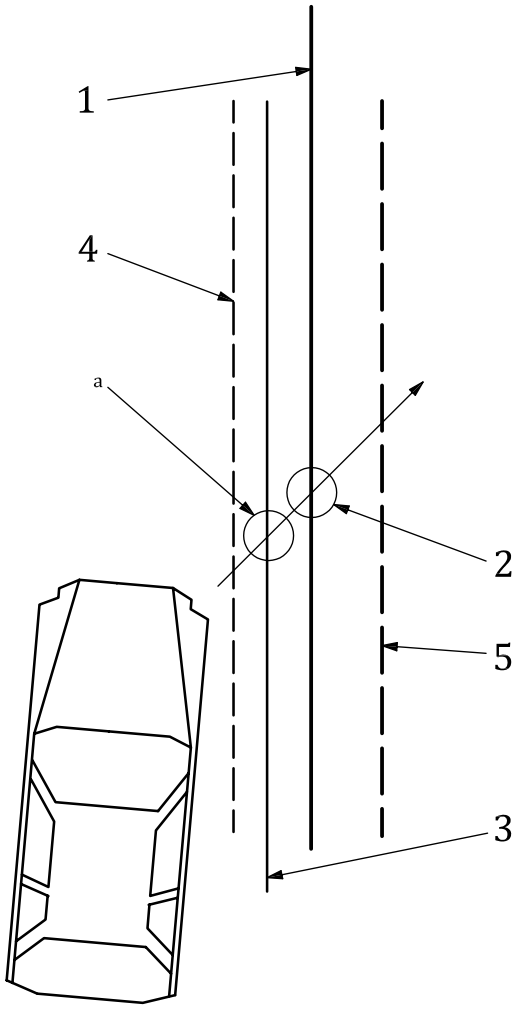


Key

1 lane boundary (see 3.4)
2 warning threshold placement zone (see 3.12)
3 earliest warning line (see 3.16)
4 latest warning line (see 3.17)
5 no warning zone (see 3.18)
6 warning threshold (for reference only) (see 3.11)

Figure 1 — Concept of warning thresholds and warning threshold placement zones

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Key

1 lane boundary (see 3.4)
2 lane departure (see 3.7)
3 warning threshold (see 3.11)
4 earliest warning line (see 3.16)
5 latest warning line (see 3.17)
a When warning condition is fulfilled here and there is no suppression request, a lane departure warning is issued.

Figure 2 — Warning issue definitions

4 Specifications and requirements

4.1 System functions

The functional elements of a lane departure warning system shall be in accordance with Figure 3.

The suppression request, vehicle speed detection, driver preference and other additional functional elements are optional.

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