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Intelligent transport systems — Automated braking during low-speed manoeuvring (ABLS) — Requirements and test procedures

Systèmes de transport intelligents — Freinage automatique lors de manœuvres à basse vitesse (ABLS) — Exigences et procédures d'essai

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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

Existing ISO International Standards for automated emergency braking, such as ISO 22839 (Forward vehicle Collision Mitigation System) or ISO 19237 (Pedestrian Detection and Collision Mitigation System), are focused on collision mitigation or avoidance at moderate vehicle speeds in the forward direction, typically using front sensors such as radar. The implementation and utilization of additional perception sensors all(i.e. around the entire vehicle enables) creates the possibility of advanced collision mitigation and avoidance systems, notably covering the whole area aroundsurrounding the vehicle.

Low-speed collisions during parking and especially during reversing manoeuvres represent a high share of road traffic accidents. This share contains, including both accidents not only with material damage leading to high monetary expenses[2] but also,[3] and accidents leading to injuries or even fatalities of human road users. This document addresses thesesuch collisions occurring during low-speed manoeuvres.

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Intelligent transport systems — Automated braking during low-speed manoeuvring (ABLS) — Performance Requirements and test procedures

1 Scope

This document provides minimum requirements and test procedures for automated braking at velocities below 2,8 m/s (10 km/h) with the specific aim of avoiding or mitigating collisions with pedestrians, other road users (e.g. vehicles) and stationary objects, including infrastructure elements (e.g. walls, pillars). These collisions mainly occur during reversing manoeuvres, but this document also addresses collisions in other directions during low-speed manoeuvring.

Automated braking during low-speed manoeuvring (ABLS) requires information about the position and motion of the object, the motion of the subject vehicle, and the driver actions. It then determines if the evaluated situation represents a collision risk. If an imminent collision risk exists, ABLS will automatically activate a brake action to avoid or at least mitigate the collision.

The document does not define test objects, but refers to the ISO 19206 series for test objects to be used.

The human driver is assumed to perform or at least supervise all driving manoeuvres because the ABLS application is restricted to support only systems of SAE Level 0 — 2. Evasive steering manoeuvres are not within the scope of this document.

This document applies to light vehicles[4] only. Vehicles equipped with trailers are not within the scope of this document.

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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 17386:2023, *Intelligent transport systems — Manoeuvring aids for low-speed operation (MALSO) — Performance requirements and test procedures*

ISO 19206-2:2018, *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 20900:2023, *Intelligent transport systems — Partially-automated parking systems (PAPS) — Performance requirements and test procedures*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17386, ISO 19206-2, ISO 20900, ISO 17386 and the followingsfollowing 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/obphttps://www.iso.org/obp

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

3.1
ABLS function
function capable of reducing the velocity of the vehicle to avoid or mitigate a collision during low-speed manoeuvring

3.2
ABLS types
Typestypes A to C which are related to the automation level of the driving function supported by ABLS

3.3
low-speed manoeuvring
LSM
driving manoeuvre of a vehicle at a velocity ≤ 2,8m8 m/s (10km10 km/h) mainly intended to park the subject vehicle

Note 1 to entry: Within the context of this document, continuous forward driving (e.g. in congested situations likesuch as a traffic jam) where the velocity can potentially drop temporarily below 2,8m8 m/s (10km10 km/h) is not considered as low-speed manoeuvring.

3.4
vulnerable road usersuser
VRU
humanshuman such as pedestrians and cyclistsa pedestrian or cyclist, independent of age and size

3.5
subject vehicle
SV
vehicle under test in which ABLS is implemented

3.6
parked vehicle
PV
static vehicle that represents the boundary of an adjacent parking space or the obstacle within the driving path

3.7
manual driving
manoeuvre where the driver is in control of longitudinal and lateral movement of the vehicle and which corresponds to SAE Level 0 (no automation)

3.8
assisted parking system
APS
system which supports the driver during parking by controlling the lateral movement/steering of the vehicle and which corresponds to SAE Level 1 (Driver Assistance)

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Note 1 to entry: Refer to: See ISO 16787:2017 describing for further information on APS.

3.9
partially automated parking system
PAPS
system which supports the driver during parking by controlling both the longitudinal and lateral movement of the vehicle and which corresponds to SAE Level 2 (Partial Automation)

Note 1 to entry: Refer to: See ISO 20900:2023 describingfor further information on PAPS.

3.10
parking
parking in
manoeuvring into a parking space (park in)

3.11
leaving
parking out
manoeuvring out of a parking space (park out)

3.12
object
item representing any kind of thing or creature

3.13
obstacle
object in or close to the driving path of the subject vehicle (SV) which is deemed to be collision-relevant

Note 1 to entry: All vunerablevulnerable road users are considered as collision-relevant obstacles if they are in or close to the SV driving path.

Note 2 to entry: It It is assumed that an obstacle can either be damaged by the subject vehicleSV or has a certain size which can cause damages to the subject vehicleSV within the situation of a collision.

3.14
toddler target
TT
test device representing a two-year-old toddler according to the ISO/TS 19206-9 series to test:—[1], used for testing ABLS

4 Basic system functionality

The ABLS function shall avoid or mitigate a collision during low-speed manoeuvring (LSM. Based on the detection of objects the). The risk of a collision is determined and ifbased on the detection of objects. If necessary, the ABLS function automatically initiates a braking to avoid or to mitigate a collision. If the driver does not intervene to override the function, ABLS continues the braking until the vehicle comes to a full stop.

This document concerns the achievement of collision avoidance via deceleration of the subject vehicle (SV) regardless of the specific braking method. Evasive steering intervention to avoid a collision is not considered within this document.

[1] Under preparation. Stage at the time of publication: ISO/AWI TS 19206-9:2023.

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