

## Intelligent transport systems – Acceleration control for pedal error (ACPE) – Performance requirements, and test procedures

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DPAS stage r2.03~~

ISO/DPAS 19486

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Systèmes de transport intelligents — Contrôle de l'accélération en cas d'erreur de pédale (ACPE) — Exigences de performance et procédures d'essai

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Published in Switzerland


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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](http://www.iso.org/directives)).

~~Attention is drawn~~ISO draws attention to the possibility that ~~some of the elements~~implementation of this document may ~~be involve~~ the ~~subject~~use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of ~~any claimed~~ patent rights, in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). 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](http://www.iso.org/patents)).~~

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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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC\_204, *Intelligent transport systems*.

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](http://www.iso.org/members.html).

## Introduction

~~Recently, the number of elderly drivers has increased, and~~In recent years, accidents caused by operating errors ~~are becoming~~have become an increasing problem. "Pedal errors" are one of the causes that often lead to major accidents. A typical "pedal error" case is when a driver accidentally presses the accelerator pedal as hard and deeply as a brake pedal when braking hard, even though the driver's true intention was to press the brake to slow down or stop.

If the driver was not being aware of this mistake, the vehicle will accelerate unintentionally, potentially resulting in ~~crashing into a store window when starting from a parking lot, or with the vehicle ahead when starting from a traffic light, which are very common.~~an accident.

In ~~developed~~various countries including, for example Japan, ~~it~~there is ~~concerned~~concern that societal changes such as the number of elderly drivers is expectedan aging population could potentially lead to ~~be growing, such accident cases~~an increase in such accidents. Dealing with this circumstance has become an urgent issue for automobile manufacturers, and they are expected to take action as soon as possible.

NOTE 1 The relationship between age and frequency of pedal error accidents is explored in Annex A.

This document specifies the functional requirements for an acceleration control for pedal error (ACPE), system, which helps to prevent collisions caused by pedal errors and reduces damage.

~~Accidents caused by pedal errors occur when the driver continues to press the accelerator pedal while starting the vehicle or at low speeds, misunderstanding that he/she is pressing the brake in mind and not being aware that the wrong pedal is being pressed.~~

Such a system ~~that~~ notifies the driver at an early stage of the manoeuvre, and suppresses vehicle acceleration. This is very effective because it ~~delays the time to collision, and reduces the impact load at a collision, for example on building walls or shop windows, whereas not only~~ encourages the driver to operate correctly ~~but~~and also mitigates the damage in the event of an accident: by delaying the time to collision, and reducing the impact load at a collision.

~~In Japan, where accidents caused by elderly people pressing the wrong pedal have become a major highly-profiled social problem.~~

~~But unfortunately~~However, with current technology, it is impossible to determine the driver's true intentions. This is because it is not possible to directly determine whether the driver is pressing the accelerator correctly or incorrectly.

Therefore, this document describes a system that suppresses acceleration when an obstacle is detected in the immediate direction of the vehicle's travel ~~but~~and the driver presses the accelerator pedal faster and deeper than usual, judging. Such a situation suggests that the driver is likely to have pressed the accelerator pedal by mistake.

~~On the other hands~~an Automatic emergency braking system (AEB) ~~has already been available in the market that aims to avoid and mitigate collisions whereas their is already available in the market, with the relevant system requirements have been available~~specified in ISO 22839 (FVCMS: Forward Vehicle Collision Mitigating System) [1]. However, because ~~the~~ driver operation is given the top priority in such a system, acceleration suppression ~~can't~~cannot be activated when the driver presses the accelerator pedal, even ~~by mistake~~if pressed in error. In addition, the sensors used for AEB are specialized for detecting objects at a relatively ~~longer~~greater distance, ~~and~~ it is difficult to detect nearby building walls and windows, which are the main targets of ACPE. Therefore, AEB is unlikely to function in the crash cases ~~that targeted by~~ ACPE ~~targets to~~ savesystems.

~~On the other hand, this~~This document does not preclude acceleration suppression for distant obstacles. It is desirable to simultaneously reduce unnecessary system activations that impede the driver's true intention to accelerate, and ~~at the same time to~~ be able to activate the system even for obstacles ~~in farther~~at a greater distance, depending on the ~~circumstance~~circumstances in every country. ~~Furthermore, as the technology progresses to prevent more accident cases caused by pedal error, evolution~~

NOTE 2 The inclusion of document to upgrade to standards (TS/IS) is anticipated vulnerable road users (VRUs) as target obstacles and the extension of target distance are potential points for development in future revisions of this document.

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# Intelligent transport systems – Acceleration ~~Control~~control for Pedal ~~Error~~pedal error (ACPE) – Performance ~~Requirements~~requirements and ~~Test Procedure~~test procedures

## 1 Scope

This document specifies the functional requirements and test procedures ~~to confirm compliance with the requirements for the Acceleration Control for Pedal Error. The system controls for an acceleration and supports damage mitigation in a collision with obstacles in cases when the driver presses the acceleration control for pedal instead of the brake pedal by mistake. Obstacles in scope of this document are structures such as vehicles or walls.~~error (ACPE) system. This document applies to the systems installed in light vehicles (category M1 and N1);<sup>[2]</sup> and it does not apply to those installed in large vehicles or motorcycles.

~~Note: The technical standard including VRUs as target obstacles and extension of target distance will be developed for next step.~~

## 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 19206-1, *Road vehicles — Test devices for target vehicles, vulnerable road users and other obstacles*objects, for assessment of active safety functions — Part 1: Requirements for passenger vehicle rear-end targets

ISO 19206-3, *Road vehicles — Test devices for target vehicles, vulnerable road users and other obstacles*objects, for assessment of active safety functions — Part 3: Requirements for passenger vehicle 3D targets

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain ~~terminological~~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 <http://www.electropedia.org/>

### 3.1 ~~3.1~~

#### **obstacle**

~~objects~~object such as ~~vehicles~~a vehicle or ~~wall~~wall, which ~~are~~is present in the travelling direction of the subject vehicle and ~~become~~becomes a potential ~~obstacle~~object to be collided with

### 3.2 ~~3.2~~

#### **full stroke**

position of the accelerating pedal ~~position~~ pressed 90-% or more

## 4 Requirements

### 4.1 Basic requirements

The APCE system shall have the following basic functions:

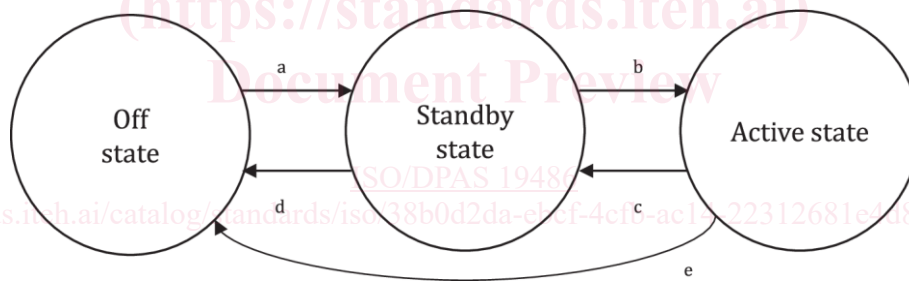
- ~~—~~ ~~▪~~ ~~Detection~~detection of the presence of an obstacle;
- ~~—~~ ~~▪~~ ~~Detection~~detection of driver's sudden acceleration command;
- ~~—~~ ~~▪~~ ~~Control~~ability to control output torque (acceleration);
- ~~—~~ ~~▪~~ ~~Notification~~notification of system operation to the driver.

The system may have the following functions:

- ~~▪~~ ~~—~~ ~~Braking~~braking control;
- ~~▪~~ ~~—~~ ~~System~~system On/Off function by the driver.

### 4.2 State transition

~~Figure 1~~Figure 1 below shows system states and state transition conditions for this system.



~~From Off state to Standby state.~~

~~a~~

- ~~b~~ ~~From Standby state to Active state.~~
- ~~c~~ ~~From Active state to Standby state.~~
- ~~d~~ ~~From Standby state to Off state.~~
- ~~e~~ ~~From Active state to Off state.~~

**Key**

- a) ~~From Off state to Standby state~~
- b) ~~From Standby state to Active state~~
- e) ~~From Active state to Standby state~~
- d) ~~From Standby state to Off state~~