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Road Vehicles — Test scenarios for automated driving systems — Specification for operational design domain

Véhicules routiers — Scénarios d'essai pour les systèmes de conduite automatisée — Spécification du domaine de conception opérationnelle

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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).

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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 22, *Road vehicles*, Subcommittee SC 33, *Vehicle dynamics, chassis components and driving automation systems testing*.

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 move towards automated driving systems (ADSs) is being driven by the many potential benefits of the technology, such as increased safety, reduced traffic congestion, lowered emissions and potentially increased mobility for those unable to drive. In order to realize these benefits, it is essential that the ADS technology is introduced safely.

The development of automated vehicle technology has received wide public attention, with countries worldwide focusing on:

— ensuring that the introduction of ADSs for testing/trialling purposes and for commercial operations is done safely, securely and legally; and

— building public and consumer trust and acceptance of the technology.

A key aspect of the safe use of automated vehicle technology is defining its capabilities and limitations and clearly communicating these to the end user, leading to a state of "informed safety". The first step in establishing the capability of an ADS is the definition of its operational design domain (ODD). In addition to safe operation, the ODD definition is also important for conformity with laws and regulations and compliance with vehicle goals, e.g. mobility and comfort needs.

The ODD represents the operating conditions within which an ADS can perform the dynamic driving task (DDT) safely during a trip. This document focuses on a taxonomy and format for the ODD definition for a given ADS to create a common understanding of the ODD.

The ODD taxonomy and definition format specified in this document will enable ADS manufacturers to specify, implement and communicate minimum safety requirements in their designs, and allow end users (e.g. insurers, national, local, and regional government), operators and regulators to reference a minimum set of ODD attributes and performance requirements in their procurements. It will also enable ADS manufacturers, developers and suppliers of components and subcomponents to define the operating capability and assemble sets of evidence that will improve confidence in the safety of the resulting product (such as component specifications) and in the data obtained from test and verification activities.

While there are a number of different testing, trialling and deployment environments, this document provides a generic taxonomy for defining each of these environments. For a scenario-based verification methodology for ADS, a hierarchical taxonomy for ODD definition and a definition format also enables an efficient scenario creation and scenario parametrisation. Such a definition format standard is in development – ASAM OpenODD.

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Road Vehicles — Test scenarios for automated driving systems — Specification for operational design domain

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1 Scope

This document specifies the requirements for the hierarchical taxonomy for specifying operating conditions which enable the definition of an operational design domain (ODD) of an automated driving system (ADS). This document also specifies requirements for the definition format of an ODD using the taxonomy. The ODD comprises specific conditions (which include the static and dynamic attributes) within which an ADS is designed to function.

This document is mainly applicable to level 3 and level 4 ADS. An ODD for level 5 ADS is unlimited (i.e. operation is possible everywhere).

This document can be used by organizations taking part in developing safety cases for automated vehicles, in particular, for organizations conducting trials, testing and commercial deployment. This document can also be used by manufacturers of level 3/4 ADS to define the ADS' operating capability. It may also be of interest to insurers, regulators, service providers, national, local and regional governments to enable them to understand possible ADS deployments and capabilities.

This document does not cover the basic test procedures for attributes of the ODD. It does not cover the monitoring requirements of the ODD attributes.

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/SAE PAS 22736, *Taxonomy and definitions for terms related to driving automation systems for on-road motor vehicles*

ISO 34501, *Road vehicles — Test scenarios for automated driving systems — Vocabulary*

ISO 34502, *Road vehicles — Test scenarios for automated driving systems — Scenario based safety evaluation framework*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/SAE PAS 22736 and ISO 34501 and the following 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
dynamic element
movable object or actor in the ODD within the DDT timeframe

Note 1 to entry: Adapted from Reference [5].

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