



Technical Specification

ISO/TS 5083

Road vehicles — Safety for automated driving systems — Design, verification and validation

*Véhicules routiers — Sécurité des systèmes de conduite
automatisée — Conception, vérification et validation*

**First edition
2025-04**

iTech Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/TS 5083:2025

<https://standards.iteh.ai/catalog/standards/iso/b0e17c08-7ba2-4fb1-80d5-45fb0aa73f7e/iso-ts-5083-2025>

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/TS 5083:2025

<https://standards.iteh.ai/catalog/standards/iso/b0e17c08-7ba2-4f61-80d5-45fb0aa73f7e/iso-ts-5083-2025>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2025
All rights reserved.

ISO publications, in their entirety or in fragments, are owned by ISO. They are licensed, not sold, and are subject to the terms and conditions set forth in the ISO End Customer License Agreement, the License Agreement of the relevant ISO member body, or those of authorized third-party distributors.

Unless otherwise specified or required for its implementation, no part of this ISO publication may be reproduced, distributed, modified, or used in any form or by any means, electronic or mechanical, including photocopying, scanning, recording, or posting on any intranet, internet, or other digital platforms, without the prior written permission of ISO, the relevant ISO member body or an authorized third-party distributor.

This publication shall not be disclosed to third parties, and its use is strictly limited to the license type and purpose specified in the applicable license grant. Unauthorized reproduction, distribution, or use beyond the granted license is prohibited and may result in legal action.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	vi
Introduction	ix
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviated terms	7
5 Document overview and motivation	7
5.1 Purpose	7
5.2 Overall goals of this document	7
5.3 Application of this document	7
5.4 Safety life cycle	8
5.4.1 Purpose	8
5.4.2 General	8
5.5 Description of ADS safety case	8
5.5.1 Purpose	8
5.5.2 General	8
5.5.3 How this document supports a layered structure of an ADS safety case	9
5.5.4 Perspective from the ADS-equipped vehicle	11
5.6 Role of the ADS within safe vehicle operation	12
5.6.1 Purpose	12
5.6.2 General	12
5.6.3 Task dependency of ADS safety	12
5.6.4 Time dependency of ADS safety	13
5.6.5 Examples	14
5.7 Application of other standards	15
5.7.1 Purpose	15
5.7.2 Classification of standards	15
5.7.3 Applying the related (safety) standards	16
5.8 Safety principles of ADS	17
5.8.1 Purpose	17
5.8.2 ADS safety principles	17
6 Safety strategy	18
6.1 Defining the ADS feature	18
6.1.1 Objectives	18
6.1.2 Requirements and recommendations	18
6.1.3 Example solution: ADS feature description with capabilities	19
6.2 Defining the risk acceptance criteria	20
6.2.1 Objectives	20
6.2.2 Requirements and recommendations	20
6.2.3 Example solution: Absence of unreasonable risk and risk acceptance criteria	21
6.2.4 Example solution: Selection and use of risk acceptance criteria	21
6.2.5 Example solution: Defining a risk acceptance criterion	21
6.2.6 Example solution: Quantitative risk balance	21
6.2.7 Example solution: A quantitative risk acceptance criterion	21
6.3 Defining safety requirements	21
6.3.1 Objectives	21
6.3.2 Requirements and recommendations	21
6.3.3 Example solution: Quantitative risk acceptance criterion and incident classification approach	22
6.3.4 Example solution: Safety capabilities	22
6.3.5 Example solution: ADS external assumptions with respect to injury risk	22
7 Safety by design	22

7.1	ADS design.....	22
7.1.1	Objectives.....	22
7.1.2	Requirements and recommendations.....	22
7.1.3	Example solution: A design for adapting tactical decisions to variations in the operational capabilities.....	23
7.1.4	Example solution: Elements defining the design.....	23
7.2	ADS external design, prerequisites and assumptions.....	23
7.2.1	Objectives.....	23
7.2.2	General.....	23
7.2.3	Requirements and recommendations.....	30
7.2.4	Example solution: Training for users.....	30
7.2.5	Example solution: Instructions to first responders.....	31
7.2.6	Example solution: Organizational aspects of a robo taxi service.....	31
7.2.7	Example solution: Organizational aspects of an L4 hub-to-hub transport service.....	31
7.3	ADS verification.....	31
7.3.1	Objectives.....	31
7.3.2	General.....	31
7.3.3	Requirements and recommendations.....	31
7.3.4	Example solution: Verification of elements.....	32
7.3.5	Example solution: The layered approach facilitating verification of safety arguments.....	32
7.4	Verification and confirmation of aspects external to the ADS.....	32
7.4.1	Objectives.....	32
7.4.2	General.....	32
7.4.3	Requirements and recommendations.....	32
8	Validation.....	33
8.1	Objectives.....	33
8.2	General.....	33
8.3	Requirements and recommendations.....	33
8.4	Example solution: Metrics.....	33
8.5	Example solution: Validation through computation of collision rates.....	34
8.6	Example solution: Generating evidence for injury risk assumptions external to the ADS.....	34
9	Operation of the ADS-equipped vehicle.....	34
9.1	Objectives.....	34
9.2	General.....	34
9.2.1	Overview.....	34
9.2.2	Field monitoring including data collection.....	35
9.2.3	Cybersecurity monitoring related to safety of ADSs.....	35
9.2.4	Change management during the operational phase.....	35
9.2.5	Inspection, maintenance and repair.....	37
9.2.6	Management of crashes and incidents.....	37
9.3	Requirements and recommendations.....	37
10	Verification and validation requirement considerations.....	38
10.1	General.....	38
10.2	Example solution: Verification and validation.....	38
	Annex A (informative) Example application of the concepts of this document.....	39
	Annex B (informative) Safety for artificial intelligence (AI) – Application to automated driving systems.....	48
	Annex C (informative) List of related standards.....	65
	Annex D (informative) Safety principles for ADS.....	69
	Annex E (informative) Safety strategy example solutions.....	73
	Annex F (informative) Safety by design and verification example solutions.....	98
	Annex G (informative) Validation example solutions.....	129

Annex H (informative) Verification and validation example solutions	136
Bibliography	152

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO/TS 5083:2025](https://standards.iteh.ai/catalog/standards/iso/b0e17c08-7ba2-4f61-80d5-45fb0aa73f7e/iso-ts-5083-2025)

<https://standards.iteh.ai/catalog/standards/iso/b0e17c08-7ba2-4f61-80d5-45fb0aa73f7e/iso-ts-5083-2025>

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).

ISO draws attention to the possibility that the implementation of this document may involve the 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, 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. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 32, *Electrical and electronic components and general system aspects*.

This first edition cancels and replaces the first edition (ISO/TR 4804:2020), which has been technically revised.

The main changes are as follows:

- a fully revised scope;
- the inclusion of objectives and requirements for normative clauses of the document;
- a revised presentation of the overarching safety strategy applicable to ADS development (including the addition of clarifications on assumptions and requirements that are to be allocated externally to the ADS);
- connections to cybersecurity concerns; and
- a revision of annexes with example applications and further considerations of artificial intelligence safety.

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.

Licensing and use terms

The ISO publications, as well as any updates and/or corrections, and any intellectual property or other rights pertaining thereto, are owned by ISO. ISO publications are licensed, not sold. Nothing in this document shall operate to assign or transfer any intellectual property rights from ISO to the user. The ISO publications are protected by copyright law, database law, trademark law, unfair competition law, trade secrecy law, or any other applicable law, as the case may be. Users acknowledge and agree to respect ISO's intellectual property rights in the ISO publications.

The use of ISO publications is subject to the terms and conditions of the applicable licensing agreement.

ISO publications are provided under different licensing agreement types ("License Type") allowing a non-exclusive, non-transferable, limited, revocable right to use/access the ISO publications for one or more of the following purposes described below ("Purpose"), which may be internal or external in scope. The applicable Purpose(s) must be captured in the licensing agreement.

a) License Type:

- i. a single registered end-user license (watermarked in the user's name) for the specified Purpose. Under this license the user cannot share the ISO Publication with anyone, including on a network;
- ii. a network license for the specified Purpose. The network license may be assigned to either unnamed concurrent end-users or named concurrent end-users within the same organization.

b) Purpose:

- i. Internal Purpose: internal use only within user's organization, including but not limited to own implementation ("Internal Purpose").

The scope of permitted internal use is specified at the time of purchase or through subsequent agreement with ISO, the ISO member body in the user's country, any other ISO member body or an authorized third-party distributor, including any applicable internal reproduction rights (such as internal meetings, internal training programs, preparation of certification services, integration or illustration in internal manuals, internal training materials, and internal guidance documents). Each internal use must be explicitly specified in the purchase order, and specific fees and requirements will apply to each permitted use.

- ii. External Purpose: external use, including but not limited to:

- testing services
- inspection services
- certification services
- auditing services
- consulting services
- training services
- software development and other digital platform or software-enabled digital services; and

any other services or activities conducted by the user or users' organization to third parties, whether for commercial or non-commercial purposes ("External Purpose").

The scope of permitted external use is specified at the time of purchase or through subsequent agreement with ISO, the ISO member body in user's country, any other ISO member body or an authorized third-party distributor, including any applicable external reproduction rights (e.g. in publications, products, or services marketed and sold by user/user's organization). Each external use must be explicitly specified in the purchase order, and specific fees and requirements will apply to each permitted use.

Unless users have been granted reproduction rights according to the above provisions, they are not granted the right to share or sub-license the ISO publications in- or outside their organization for either Purpose. If users wish to obtain additional reproduction rights for ISO publications or their content, users may contact ISO or the ISO member body in their country to explore their options.

In case the user or the user's organization is granted a license for the External Purpose of providing any of the following services to third parties:

- testing services
- inspection services
- certification services