ISO/TS 5083:2025-04 (E)

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

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