AUTOMOTIVE SYSTEMS ENGINEERING
STANDARDS AND REGULATIONS

Robert Stroud
27 June 2025

PT/1390/138019/

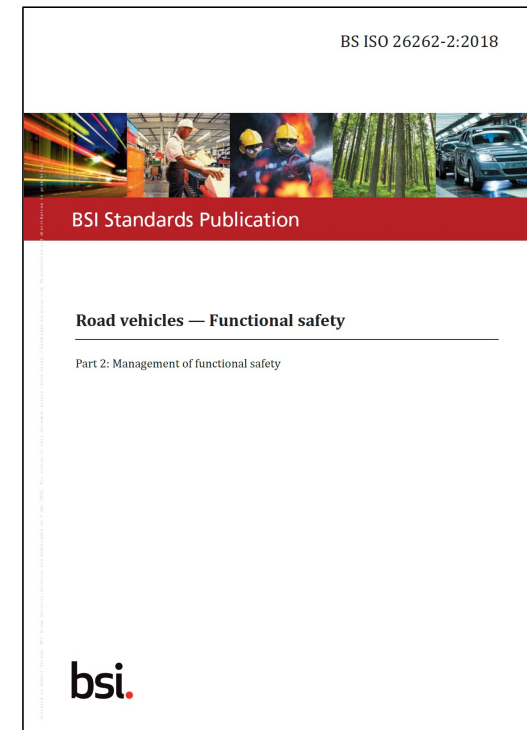"The nice thing about standards is that there are so many to choose from"

STANDARDS

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ISO 26262 – FUNCTIONAL SAFETY

- ISO 26262 covers functional safety for road vehicles (excluding mopeds)

- Adaptation of IEC 61508 to address sector-specific needs of road vehicles

- Provides a reference for the automotive safety life cycle based on V-model

- Uses an automotive-specific risk-based approach to determine automotive safety integrity levels (ASILs)

- Introduces the concept of a safety element out of context (SeeOC)

BS ISO 26262-2:2018

BSI Standards Publication

Road vehicles — Functional safety

Part 2: Management of functional safety

bsi.

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ISO/SAE 21434 – CYBERSECURITY ENGINEERING

- ISO/SAE standard on cybersecurity engineering for road vehicles

- Provides a foundation for common understanding of cyber security

- Defines a common language for communicating and managing cyber security risk

- Specifies engineering requirements for cyber security risk management throughout the vehicle life cycle

BS ISO/SAE 21434:2021

BSI Standards Publication

Road vehicles — Cybersecurity engineering

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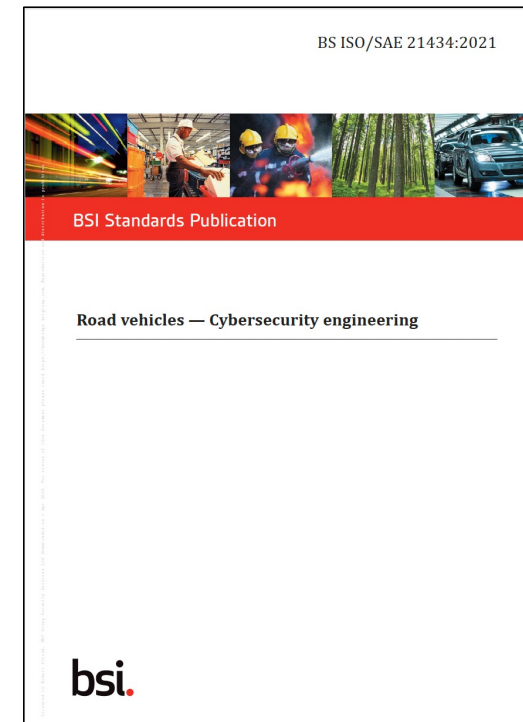
ISO 21448 – SAFETY OF THE INTENDED FUNCTIONALITY

- Distinguishes between two kinds of hazard:
  - hazards due to failures and
  - hazards due to insufficiencies of specifications or performance

- Some systems can function normally but create hazardous situations

- Defines SOTIF as
  - "The absence of unreasonable risk resulting from hazardous behaviours related to functional insufficiencies"

- Proposes measures to address SOTIF at different phases of the life cycle

- Complements ISO 26262

BS ISO 21448:2022

BSI Standards Publication

Road vehicles — Safety of the intended functionality

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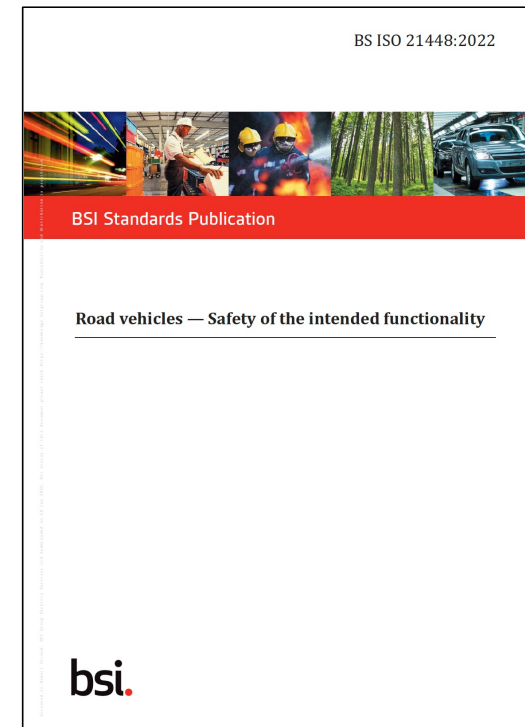
PD ISO/TR 4804 – SAFETY AND CYBERSECURITY FOR AUTOMATED DRIVING SYSTEMS

- Systematically develops dependability to support safety by design

- Brings together
  - PD ISO 21448 – Safety of the intended functionality
  - ISO 26262 series – Functional Safety
  - ISO/SAE 21434 – Automotive Cybersecurity
  - Capabilities of automated driving

- Defines minimal risk conditions and minimal risk manoeuvres

- Identifies five key challenges for verification and validation of automated driving systems and proposes solutions

PD ISO/TR 4804:2020

BSI Standards Publication

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

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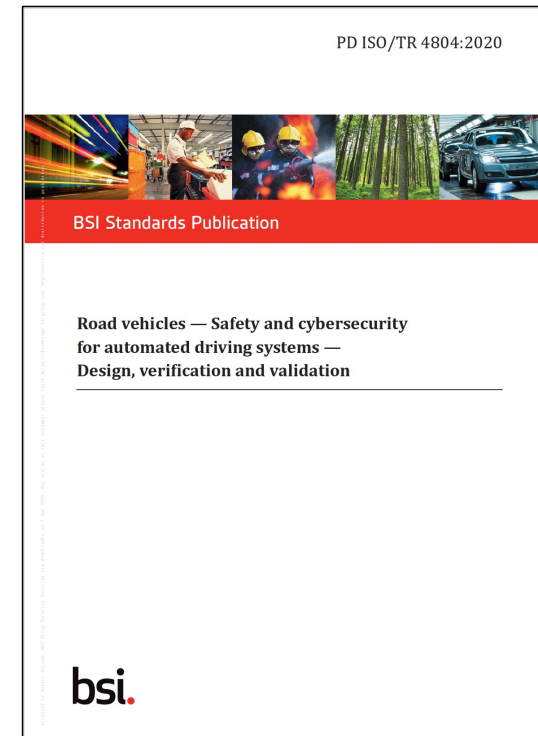
"Agreement concerning the adoption of uniform technical provisions for wheeled vehicles"

REGULATIONS

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WORLD FORUM FOR HARMONIZATION OF VEHICLE REGULATIONS

- Established in June 1952

- Operates on the principle of type approval and reciprocal recognition:
  - "Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles [...] and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions"

- Six working groups, including:
  - Automated and Connected Vehicles (GRVA)

https://unece.org/transport/vehicle-regulations/world-forum-harmonization-vehicle-regulations-wp29

World Forum for Harmonization of Vehicle Regulations (WP.29)

Abbreviation	WP.29
Formation	1952
Type	Working Party
Legal status	Active
Head	Antonio Erario (2021-)
Parent organization	UNECE Inland Transport Committee
Website	UNECE Transport - WP29

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PARTICIPATING COUNTRIES
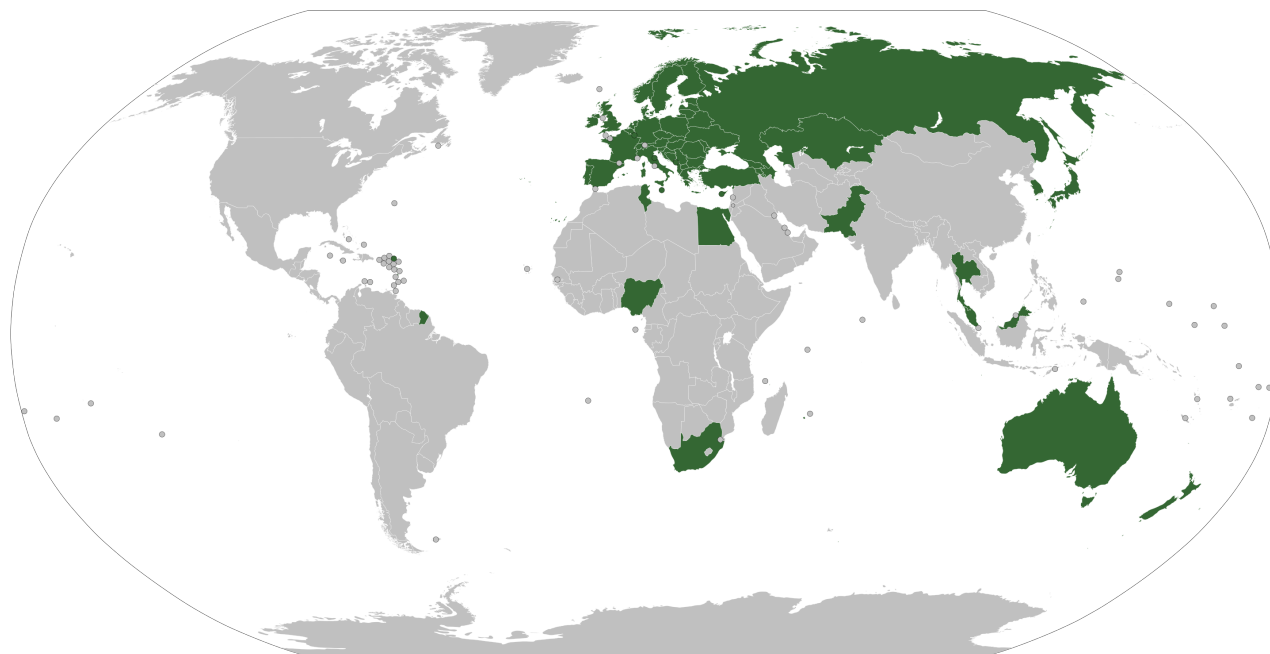
https://en.wikipedia.org/wiki/World_Forum_for_Harmonization_of_Vehicle_Regulations

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WHAT ABOUT US AND CANADA?

- The United States and Canada have their Federal Motor Vehicle Regulations and do not recognize UN type approvals

- US / Canada operate on the principle of self-certification rather than type approval

- Manufacturers certify that their vehicles or equipment meet all relevant federal regulations

- No prior verification is required by a governmental agency or authorised testing entity before the vehicle or equipment can be imported, sold, or used

- If reason develops to believe the certification was false or improper, authorities may conduct tests and order a recall and/or other corrective and/or punitive measures

https://en.wikipedia.org/wiki/World_Forum_for_Harmonization_of_Vehicle_Regulations#Self-certification

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UN REGULATIONS FOR AUTOMATED/AUTONOMOUS AND CONNECTED VEHICLES
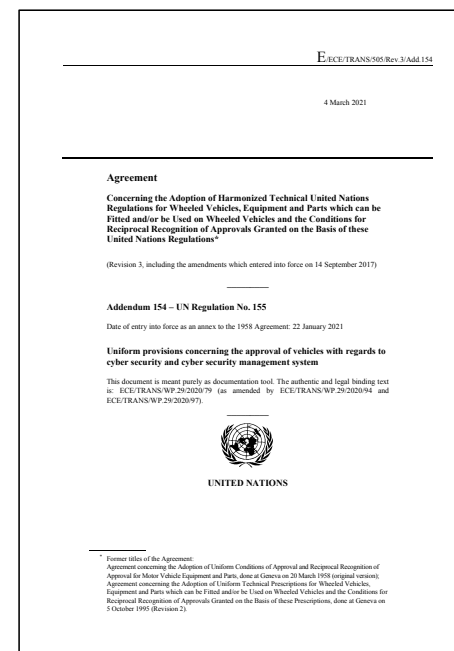
- UN Regulation No. 155 – Cybersecurity

- UN Regulation No. 156 – Software Updates

- UN Regulation No. 157 – Automated Lane Keeping Systems

- Guidelines for Validating Automated Driving Systems

- Considerations on Artificial Intelligence in the context of road vehicles

https://unece.org/transport/road-transport/reference-documents

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UN REGULATION ON AUTOMOTIVE CYBER SECURITY

- Came into effect in January 2021

- Deals with type approval of vehicles with regards to cyber security

- Requires manufacturers to have a cyber security management system

- Requires evidence of cyber security risk management for each new vehicle type

- Identifies a comprehensive list of threats, vulnerabilities and mitigations that must be considered

E/ECE/TRANS/505/Rev.3/Add.154

4 March 2021

Agreement

Concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Regulations*

(Revision 3, including the amendments which entered into force on 14 September 2017)

Addendum 154 – UN Regulation No. 155

Date of entry into force as an annex to the 1958 Agreement: 22 January 2021

Uniform provisions concerning the approval of vehicles with regards to cyber security and cyber security management system

This document is meant purely as documentation tool. The authentic and legal binding text is: ECE/TRANS/WP.29/2020/79 (as amended by ECE/TRANS/WP.29/2020/94 and ECE/TRANS/WP.29/2020/97).

UNITED NATIONS

* Former titles of the Agreement:
Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958 (original version);
Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, done at Geneva on 5 October 1995 (Revision 2).

https://unece.org/transport/documents/2021/03/standards/un-regulation-no-155-cyber-security-and-cyber-security

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"A positive declaration intended to give confidence"

ASSURANCE VS COMPLIANCE

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OPEN QUESTIONS

- What evidence needs to be provided to satisfy the regulation?

- How should this evidence be presented?

- How does the regulator check that the evidence is sufficient?

- Is compliance with a standard enough to satisfy the regulation?

- Should compliance with a standard be enough to satisfy the regulation?

- Does satisfying the regulation provide sufficient assurance that the system is adequately safe / secure?

- Should satisfying the regulation provide sufficient assurance that the system is adequately safe / secure??

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