

Connected and Autonomous Vehicle Technology Trials Guidance

UK Gov Requirements



DfT Code of Practice: Automated Vehicle Trialling

Localised Requirements/Guidance



TfL Connected and Autonomous Vehicles: Guidance for London Trials

Highways England GG-104: Requirements for safety risk assessment

Standards



BS PAS 1880
BS PAS 1881
BS PAS 1882
BS PAS 1883
BS PAS 1884

BS PAS 11281
ISO 26262

Industry Guidance



Zencic Safety Case Framework Guidance Edition
- safety case creators - safety case reviewers

DG Cities Autonomous and Connected Vehicle: Trials on the Public Highway

TRL Assuring the safety of connected and automated vehicle trials
- Local Authorities - Trialling Organisations - Insurers

DfT Code of Practice: Automated Vehicle Trialling

Publish Date

February 2019

Audience

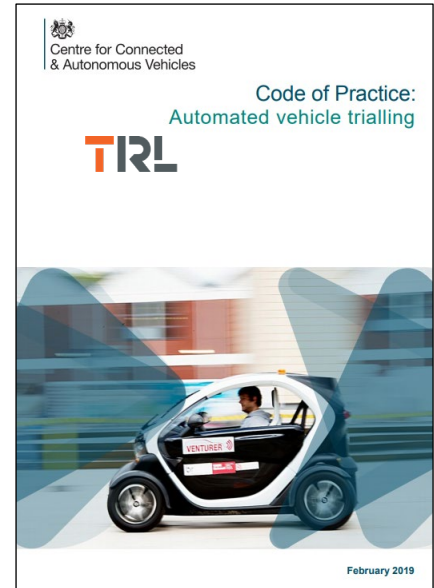
- Organisations or individuals planning to trial or pilot automated vehicle technologies and services.
- Local authorities, highways authorities, emergency services, licensing authorities and others looking for guidance on how to engage with trialling organisations.

Compliance Status

Includes legal requirements, advisory guidance and best practice

[LINK to PDF](#)

This Code of Practice outlines the national legal framework and expectations of those wishing to trial CAVs in the UK. It seeks to facilitate trialling a wide range of road vehicles, from smaller automated pods and shuttles, through to more conventional vehicle types such as passenger, goods, and public service vehicles. The guidance includes recommendations on how to maintain safety and minimise potential risks, covering both the vehicle and the safety driver requirements, in addition to engaging with relevant bodies, authorities and the public.





TfL Connected and Autonomous Vehicles: Guidance for London Trials

Publish Date

July 2019

Audience

Trialling organisations operating in London

Compliance Status

Compulsory requirements for organisations trialling in London

[LINK to PDE](#)

This guidance aims to promote responsible and safe CAV trials in London. It outlines TfL's expectations of organisations planning trials, to facilitate consistency amongst trialling organisations. The guidance includes requirements that trialling organisations must provide to TfL, standards and permissions that must be sought and seeks to increase transparency with the public.

Introduction

Thank you for downloading the TfL Connected and Autonomous Vehicles: guidance for London trials. This has been written in consultation with London Councils and the London boroughs.

The DfT's [CCAV Code of Practice: Automated vehicle trialling](#) (February 2019) – the CCAV Code of Practice outlines the national legal framework and expectations of those interested in trialling CAVs in the UK. We fully support the CCAV Code of Practice and expect all CAV trialling organisations to adhere to it in its entirety.

The CCAV Code of Practice says that trialling organisations should engage with all relevant organisations with responsibility for the trial area at the earliest opportunity. In the case of London, there are multiple organisations with responsibilities, including the London boroughs. With CAV trials increasing in London, this guide sets out on behalf of those stakeholders, TfL's expectations of those considering CAV trials in London in addition to what is stated in the CCAV Code of Practice.

Due to our legal duties, responsibilities and commitment to delivering the Mayor's Transport Strategy, we are engaging with CAV trialling organisations to understand the mix of opportunities, risks and challenges they present. It's essential, therefore, and the London boroughs, have the information we need to fulfil our duties and responsibilities, and that we have the opportunity to ensure trials develop in a way that is consistent with the Mayor's Transport Strategy policies and proposals, which includes the promotion of walking, cycling and public transport.

It is expected that all organisations trialling CAVs in London will adhere to this guide, in conjunction with all appropriate legislation and codes of practice.

Working together

We, along with London Councils and the London boroughs, want to establish collaborative and consistent ways of working with all organisations interested in trialling CAVs in London. We work closely with [London's 32 boroughs and the City of London](#) to integrate transport planning and operations across the Capital and fulfil our respective duties when it comes to keeping London moving and ensuring the safety of our networks and customers. We will continue to work together in this way to manage CAV trials in London with TfL providing an initial point of contact, coordinating with the relevant boroughs when more information is known. As a public authority we will provide fair and impartial information to all, with the purpose of ensuring that safety remains a top priority and the best interests of all Londoners have been reflected in your plans. We will also ensure anyone considering CAV trials in London understands and is prepared for it.

Localised Requirements/Guidance



Highways England GG-104: Requirements for safety risk assessment

Publish Date

June 2018

Audience

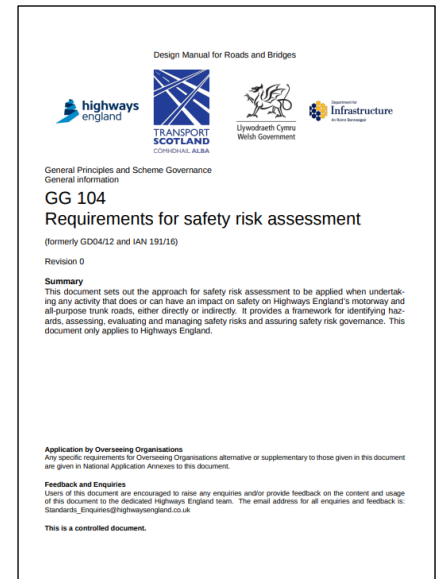
Highways England and any of its suppliers

Compliance Status

This document is a Highways England standard, which must be followed by those working on Highways England projects. It is not a legal requirement, but compliance is advised for all trials and testing on the strategic road network.

Document available in DMRB

This guidance sets out the framework and approach to safety risk assessment for any activity that may impact on safety on Highways England's roads. Activities with direct influence on safety risk include designing, constructing and maintaining assets. Activities with an indirect influence on safety risk include revising Highways England's requirements of all procedures and policies. This document provides a framework for identifying hazards, assessing, evaluating and managing safety risks and assuring safety risk governance.





BSI PAS 1880 – Guidelines for developing and assessing control

Publish Date

April 2020

Audience

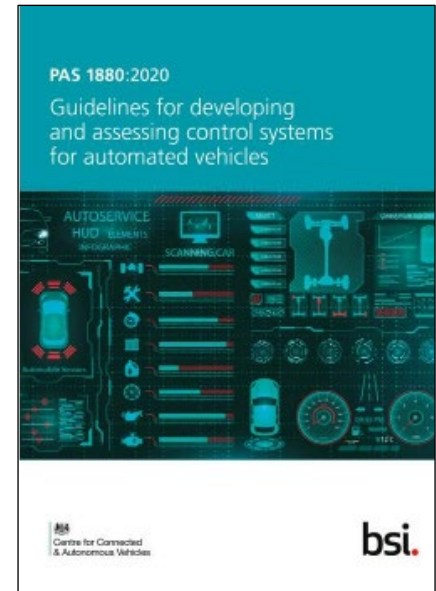
Manufacturers and developers of AVs & their sub-assemblies and components, trialling organisations and test/validation activities

Compliance Status

Voluntary Standard

[LINK to PDF](#)

The control system in an automated driving system (ADS) is what distinguishes an AV from a human-driven vehicle. This guidance describes how the control system design in an ADS is influenced by the ODD (operational design domain) definition. It provides a set of initial guidelines for developers of control systems for the safe, secure and effective deployment of AVs. The guidance covers key areas that need to be considered during vehicle design and gives examples of the types of evidence that can be used to demonstrate that the design is appropriate for an AV. The focus is on AVs with no driver present.





BS PAS 1881 – Assuring the safety of automated vehicle trials and testing

Publish Date

February 2020

Audience

Trialling organisations, including private developers and original equipment manufacturers (OEMs), developing safety cases for automated vehicle trials and testing

Compliance Status

Voluntary Standard

[LINK to PDF](#)

This standard builds on DfT code of practice and intends to support the safe testing and trialling of CAVs. It specifies the minimum requirements for an operational safety case, reflecting good practice in the industry and demonstrating that CAV trials can be undertaken safely. BS PAS 1881 creates a standardised and consistent approach to safety case development for trialling organisations to adopt and outlines the relationship between the ODD definition and the safety case requirements. This PAS is applicable to all test track and public domains, and all levels of driving automation systems.

Co-Authored by TRL.





PAS 1883 – Operational Design Domain (ODD) taxonomy for automated driving system (ADS)

Publish Date

August 2020

Audience

- Trialling organisations, manufacturers and developers of Level 3 & 4 ADS and suppliers of components and subcomponents
- Insurers, regulators, service providers and national/local/regional government

Compliance Status

Voluntary Standard

[LINK to PDF](#)

The ODD describes the environment in which an automated driving system (ADS) is designed to function safely. This standard provides requirements for the minimum hierarchical taxonomy for specifying an ODD, in order to enable the safe deployment of an ADS. This PAS is applicable to Level 3 & 4 ADS.





BSI PAS 11281 – Connected Automotive Ecosystems. Impact of Security on Safety

Publish Date

December 2018

Audience

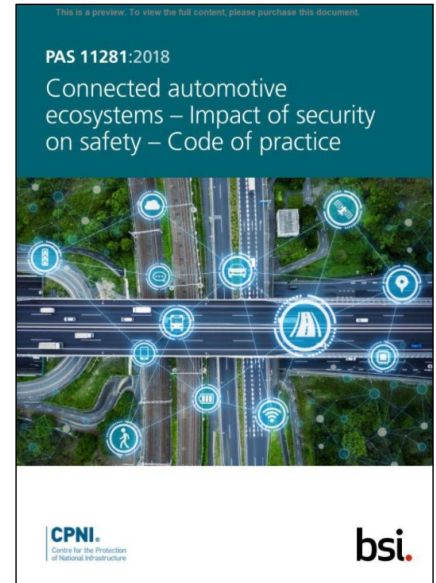
- Manufacturers of vehicles and vehicle subsystems,
- Maintenance organisations
- Infrastructure operators
- Owners of large vehicle fleets and digital service providers

Compliance Status

Voluntary Standard

[LINK to PDF](#)

This standard aims to help organisations in the CAV ecosystem ensure that security-related risk in their products, services or activities don't pose an unacceptable risk. It gives recommendations for managing security risks that might compromise safety in a connected automotive ecosystem (the vehicle, infrastructure, communication channels between vehicle and infrastructure, data and information).





ISO 26262: Road Vehicles – Functional Safety

Publish Date

December 2018

Audience

- OEMs and their suppliers and developers

Compliance Status

Voluntary Standard

LINK: Available to purchase only from BSI

ISO 26262 is a risk-based safety standard, that applies to electric and/or electronic systems in vehicles. The goal is to ensure safety throughout the lifecycle of automotive equipment and systems. It includes information on design, implementation or testing of the software that is likely to be required in AVs, as well as guidance on driver assistance, propulsion and vehicle dynamic control systems. The focus is on vehicles in which there is always a driver present.

1. Vocabulary		
2. Management of functional safety		
2.4 Overall safety management	2.4 Project dependent safety management	2.5 Safety management regarding production, operation, service and decommissioning
3. Concept phase		
4. Product development at the system level		
7. Production, operation, service and decommissioning		
3.5 Issue definition	4.2 General topics for the product development at the system level	7.5 Planning for production, operation, service and decommissioning
3.6 Hazard analysis and risk assessment	4.3 Technical safety concept	7.6 Production
3.7 Functional safety concept	4.4 Safety validation	7.7 Operation, service and decommissioning
5. Product development at the hardware level		
6. Product development at the software level		
8. Supporting processes		
9. Automotive safety integrity level (ASIL)-oriented and safety-oriented analyses		
10. Guidelines on ISO 26262		
11. Guidelines on application of ISO 26262 to semiconductor		



PAS 1882: Data collection and management for automated vehicle trials

Publish Date

March 2021

Audience

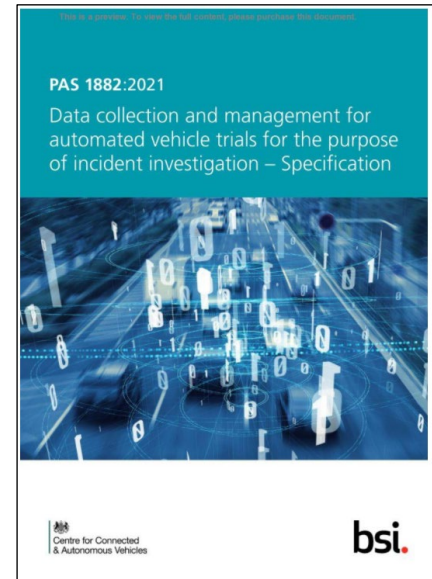
- Trialling organisations.
- Emergency services
- Insurers
- Legal service providers
- Road/highway authorities

Compliance Status

Voluntary Standard

[LINK to PDF](#)

This standard specifies requirements for the collection, storage and sharing of information during automated vehicle trials and advanced trials in the UK, for the purpose of promoting best practice in incident investigation. It covers single-vehicle trials and interacting-vehicle trials, in both connected and non-connected (vehicle only) environments. The purpose is to ensure consistency in the information collected across trialling organisations, ensure they collect information that may be required by police or insurers in the case of incidents, and to improve the safety of CAV trials.





BS PAS 1884: Safety Operators in Automated Vehicle Testing and Trialling

Publish Date

November 2021

Audience

- Trialling organisations that train or utilize safety operators
- Local authorities
- Insurers
- Testbeds
- Highway authorities

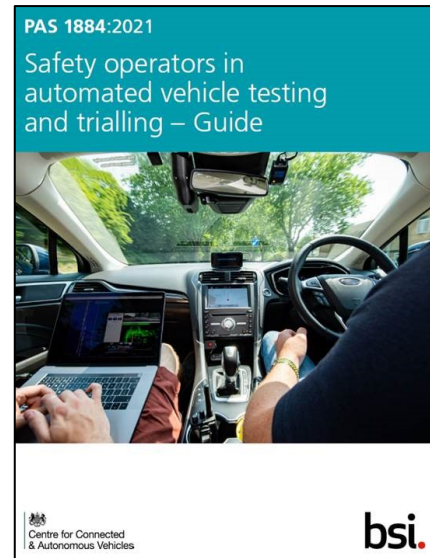
Compliance Status

Voluntary Standard

[LINK to PDF](#)

This guidance provides recommendations on the selection, training and refresher training of both in-vehicle safety drivers and remote operators within visual line of the sight of the automated vehicle.

Co-Authored by TRL.





Zenzic Safety Case Framework: The guidance edition (safety case creators)

Publish Date

February 2021

Audience

- Creators of safety cases (trailing organisations)

Compliance Status

Best Practice

This framework outlines best practice for building safety cases for CAV testing and development across CAM UK testbeds, which scale to fit the complexity of the ODD. It provides CAM Testbed UK with initial high-level requirements for each of the Safety Case Framework headings to ensure a consistent approach is adopted, which is aligned with other current guidance. It covers areas including the vehicle and ADS, the ODD, risk assessment, route assessment, security, system safety, engaging with stakeholders and continuous improvement.

The aim is to unify the requirements for test beds. This document does not add new requirements for safety assurance, but rather provides a holistic view of how separate standards (covered previously) interlink to form a safety case. In addition, there are examples and templates that illustrate best practice, which should help to enable smooth transition between testing facilities.





Zenzic Safety Case Framework: The guidance edition (safety case reviewers)

Publish Date

February 2021

Audience

- Any organisation with an interest in the safety of trial operations.
- Test facilities
- Insurers
- Highway authorities
- Road operators

Compliance Status

Best Practice

This framework outlines best practice for building safety cases for CAV testing and development across CAM UK testbeds, which scale to fit the complexity of the ODD. It provides CAM Testbed UK with initial high-level requirements for each of the Safety Case Framework headings to ensure a consistent approach is adopted, which is aligned with other current guidance. It outlines the role of the reviewer and also covers areas including the vehicle and ADS, the ODD, risk assessment, route assessment, security, system safety, engaging with stakeholders and continuous improvement.

The aim is to unify the requirements for test beds. This document does not add new requirements for safety assurance, but rather provides a holistic view of how separate standards (covered previously) interlink to form a safety case. In addition, there are examples to illustrate best practice, which should help to enable smooth transition between testing facilities.





DG Cities Autonomous and Connected Vehicle – Trials on the Public Highway

Publish Date

July 2021

Audience

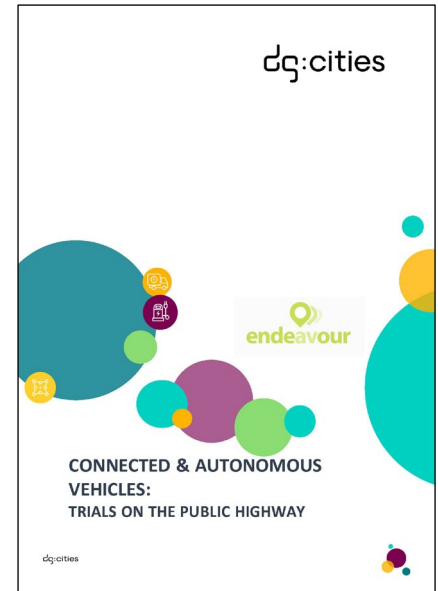
- Local authorities
- Trialling organisations who must meet local authority requirements

Compliance Status

Best Practice

[LINK to PDF](#)

The purpose of the document is to answer key questions related to trialling on public roads and signpost the current guidance and codes of practice. It outlines the information which local authorities should expect to receive from trialling organisation, prior to the trial, in order to comply with best practice, such as a safety case, risk assessment and emergency response plan. It also gives high-level guidance for during and after the trial period.





TRL Assuring the safety of connected and automated vehicle trials – Local Authorities

Publish Date

July 2021

Audience

- Local authorities involved in CAV trialling in the UK

Compliance Status

Advisory Recommendations

[LINK to PDF](#)

The purpose of this guidance is to help local authorities identify their role in facilitating CAV trials in their area and provide uniform guidance on how to ensure the requirements for safety assurance are being met and the CAV trials are being conducted safely. This guidance will help local authorities who wish to start facilitating CAV trials and those who wish to align their current approaches with other local authorities to ensure consistency of requirements across the UK.





TRL Assuring the safety of connected and automated vehicle trials : Trialling organisations

Publish Date

July 2021

Audience

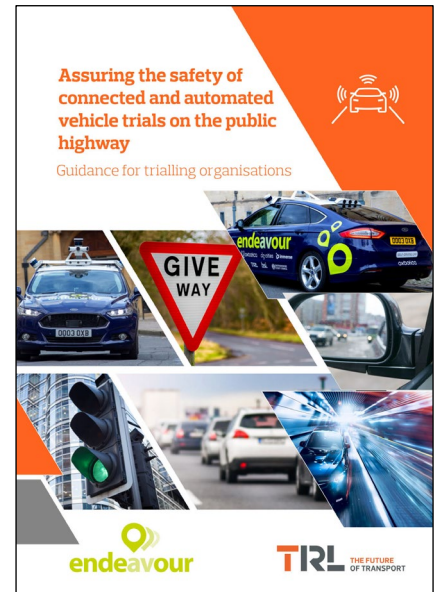
- Trialling organisations involved in CAV trialling in the UK

Compliance Status

Advisory Recommendations

[LINK to PDF](#)

Trialling Organisations are responsible for a trial's safety and must be able to demonstrate to external stakeholders that the trial is safe. This document does not aim to provide an overview of safety assurance. Instead, it aims to address some identified gaps in trialling organisation's knowledge and provide guidance on what is expected from them, useful considerations when implementing these processes and examples of best practice. The topics explored include stakeholder engagement, emergency response planning and ethics.





TRL Assuring the safety of connected and automated vehicle trials : Insurers

Publish Date

July 2021

Audience

This document is aimed at insurers involved in testing and trialling CAVs within the UK.

Compliance Status

Advisory Recommendations

[LINK to PDF](#)

After reviewing the trialling organisation's safety case, the insurer must decide whether they are going to take on the risk of the trial, and therefore need an understanding of safety assurance. The aim of this document is to provide high-level guidance about BSI PAS 1881, which will become increasingly important to insurers as they underwrite CAV trials and eventually type-approved CAVs in deployment. The document sets out a suggested process for insurers to follow when considering underwriting CAV trials. It also includes some case studies which highlight examples of where elements of this process have previously been well executed.

