Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

austriatech
contact point automated mobility

Code of Practice

Tests of Automated Driving on public Roads

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Introduction

The Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) supports tests for automated driving on public roads. The legal basis for these kinds of tests has been created (KFG, AutomatFahrV) and further adaptations are expected. However, the general Austrian road traffic regulations (StVO 1960) must be followed in any case.

This document is designed to support and provide clarity to vehicle manufacturers and testing organisations on their path from system development to mass production. The following guidelines establish a framework and define the measures to be taken to ensure safety during tests on public roads.

The guidelines presented in this Code of Practice are not legally binding but are rather intended to promote responsible testing. These guidelines of the Code of Practice serve as a supplementary guide to testing organisations in addition to all appropriate statutory provisions, official procedures and other requirements. In all cases, adherence to the Code of Practice guidelines does not exempt the responsible parties from any liability.

Vehicle manufacturers must ensure that automated vehicle technologies have undergone extensive testing and sufficient development before going into mass production. Testing must initially take place on a private test ground, track, and simulation. The tests must demonstrate and ensure that the operator can manually override and take over the automated driving mode at any time to ensure the necessary safety during testing.

Once the reliability of the systems has been proven, further test drives on public roads will be necessary to test all situations that may arise in real life. However, such tests may only be carried out if it has been ensured that they are associated with minimal risks and if they are in any case necessary to address the respective research question, as it can only be answered by tests on public roads.

Subject of Regulation

This Code of Practice contains rules for testing automated motor vehicles of all levels of automation on roads, which are publicly accessible. The current regulations are intended to ensure safety and minimise potential risks.

Through careful testing it will be possible to develop automated vehicles that will, in the future, demonstrate exemplary driving characteristics in real road traffic and thereby help improve safety for all road users.

Scope

This Code of Practice is to be used when testing

- automated motor vehicles,
- in the presence of an operator who can intervene at any time and take control of the motor vehicle, and
- on roads, which are publicly accessible.

This Code of Practice does not apply to tests

- on private test grounds or tracks

Definitions

The terminology below shall be used from the time of application and in all subsequent documents throughout the whole process.

Technical Terms

Behavioural Competencies / Driving Behaviour / Driving Skills	The necessary capabilities of an automated vehicle to act, react and operate safely and reliably in typical traffic situations, in the respective functional scope, on the defined test track.
Cybersecurity	Cybersecurity contains a holistic approach for the protection of systems, networks, and applications against digital attacks of any kind. The necessary guidelines are defined in the UN Cybersecurity Regulation R155.
Deployment	The process starting with the selection of a potential route for an automated vehicle and ending with the deployment

	of the vehicle. This includes analysing the route and focusing on challenging conditions such as slope, obstacles, mapping, operator training and final inspection.
Event Data Recorder (EDR)	Designates a function or device in a vehicle which records dynamic time series data of the vehicle in order to be able to evaluate this data for the period of time immediately before, during, and after a malfunction, accident, etc. A distinction can be made between EDR for conventional vehicles (EDR-CV) and EDR for automated vehicles (EDR-AV).
Advanced Driver Assistance System (ADAS)	Driver assistance systems are systems that support the driver in driving the vehicle or can take over driving tasks, partially or sometimes even completely automated, but can be overridden at any time.
Obstacle	A person/object/usage blocking the intended driving track of the test vehicle short-term or long-term.
Motor Vehicle	A vehicle intended for road use or used on roads that is powered by technologically released energy and is not tied to tracks, even if its driving power is taken from overhead lines.
Manual Control	In this Code of Practice, manual control of an automated vehicle is understood to mean personal and direct control by a person – during manual control the automated systems are deactivated and do not intervene in the control of the vehicle.
Route Analysis and Risk Assessment	One-time analysis of the test track and risk assessment taking into account the characteristics of the test vehicle before the start of the test operation. This analysis serves to evaluate and document the existing conditions: - Infrastructure - Necessary preparations on the track and/or vehicle - Identified critical points and necessary measures
Test Vehicle	Automated vehicle used for test drives, which has a clearly defined range of functions.
Vehicle Competences	The necessary technical equipment of an automated vehicle to act, react and operate safely and reliably in typical traffic situations, in the respective functional scope, on the defined test track.

Organisational Terms

Automation Levels	Describes the various stages of automated driving.
Operator	The person (test driver) who has been trained accordingly, who is in the vehicle during a test (or in its close proximity for certain use cases) to ensure safety and who can stop the vehicle manually if necessary or take over control manually after a stop.
Test Assistance	The person or group of persons who supports the operator or the test management in the execution of the test. For example, they may be responsible or partially responsible for monitoring digital display data, or they may supervise the system or public traffic in other ways.
Testing Organisation	Person, company or institution on whose behalf the automated vehicle test is conducted, or which conducts the test itself.
Test Track / Test Area	Clearly defined area in which the automated vehicle may be tested (on roads which are publicly accessible). The relevant road sections must be clearly identified in the test application.

Accidents / Incidents / Events

Accident	Any undesirable or unintentional sudden external event, or a particular chain of such events, or technical malfunctions that have harmful consequences. Accident with personal damage: An accident with personal injury occurs if, as a result of the tests with automated shuttles on the defined test track, persons were injured or killed and at least one vehicle under test was involved. Accident with material damage: A road traffic accident with material damage occurs if the tests of an automated shuttle on a predefined route result in material damage and at least one test vehicle was involved.
Critical Situation	A sudden, unplanned event that did not result in personal injury or material damage, but would have had the potential to cause an accident if one of the road users involved had not acted or reacted immediately.

Technical Malfunction	Malfunction or failure of the automated system during the test drive, failure in the automated driving systems so that operational safety is no longer ensured (e.g. mechanical defect, software error, etc.).
Operational Malfunction	Non-technical related negative effects on the operation (e.g. illness/injury of a passenger).
Irregularities	All situations in which the vehicle does not behave according to the route programming, but which do not constitute an accident or critical situation.
Planned Disengagement	Planned disengagement from automated driving mode by the vehicle or the operator. Planned disengagements do not have to be stated in the test report.
Unplanned Disengagement	Unplanned termination of automated driving mode by the vehicle or the operator. Triggers for an unplanned disengagement may be operational reasons (e.g.: obstacle on the road) or a critical situation (see definition).

General Provisions

Safety Precautions

The responsibility for safe testing of automated vehicles on public roads always lies with the testing organisation. The sole compliance with the regulations of this Code of Practice is not considered sufficient to ensure safe testing.

In any case, all existing international, European, federal and state regulations, ordinances and directives concerning road traffic and, in particular, the road police and motor vehicle regulations must be complied with, unless an exception has been granted by means of a certificate within the Automated Driving Ordinance (AutomatFahrV)[1].

Furthermore, all other reasonable and necessary measures must be taken to help ensure the safety of the test and to minimise existing and potential safety risks.

The testing organisation shall ensure that, prior to testing automated motor vehicles on public roads,

- the operator has a valid driving licence for the motor vehicle to be tested,
- the operator has sufficient training for the system(s) to be tested,
- a risk analysis of the planned tests and the systems (hardware and software) required for this purpose has been carried out and, on the basis of this analysis, appropriate risk-minimising measures have been taken and the possible harmful effects of the test on other road users have been assessed in order to avoid such damage as far as possible,
- a route analysis and risk assessment has been carried out and risk-minimising precautions and measures have been taken to identify route-specific obstacles and to counteract them as far as possible at an early stage, before the start of the test.

Route Analysis and Risk Assessment

Before submitting a test application for test drives on public roads, testing organisations are obliged to subject the planned test track(s) to a careful route analysis and risk assessment. The route analysis and risk assessment serves to minimise route-specific obstacles and risks.

[1] Ordinance of the Federal Minister of Transport, Innovation and Technology on Framework Conditions for Automated Driving (Ordinance on Automated Driving - AutomatFahrV), BGBl. II No. 287/2024

The Contact Point Automated Mobility provides a template for the route analysis and risk assessment. The standardised processing and documentation is intended to increase traceability in the assessment of the test application by the competent authority. Testing organisations are not obliged to use the template provided by the Contact Point Automated Mobility for the route analysis and risk assessment, but in any case, an equivalent result must be provided. In addition, a summary of the route analysis and risk assessment must be prepared, which serves as an overview of the identified risks, mitigation measures and general findings from the process carried out. The template provided by the contact point must be used for this summary in order to ensure completeness and uniformity. The results are to be submitted to the Contact Point Automated Mobility together with the application documents.

Persons conducting the route analysis and risk assessment must have specialist knowledge in the field of road traffic - irrespective of their education (civil engineer, sociologist, etc.). In addition, knowledge in the field of safety management for road infrastructure, in particular regarding the performance of safety inspections according to Directive 2008/96/EC Article 6, is recommended. This ensures that the necessary knowledge exists to evaluate the infrastructure in regard of aspects relevant to road safety. The necessary knowledge may be acquired, e.g. by attending a corresponding training course (RSA/RSI technical seminar) or as part of other training or studies. Certification as RSA/RSI assessor is not necessary. Fulfilling the above criteria should ensure that the route analysis and risk assessment takes into account as many relevant route-related aspects as possible.

Insurance

The mandatory legal insurances for every vehicle registered for traffic also apply to the testing of automated motor vehicles on roads, which are publicly accessible. Consequently, liability insurance coverage must exist during the test. Anyway, a voluntarily higher insurance, above the minimum insurance sum provided by law, is recommended in order to cover any test risks. All other necessary (compulsory) insurances must also be concluded prior to the tests.

Cooperation with Competent Authorities and Institutions

For all test drives, the locally responsible state governor must be informed once in advance in writing about the planned test drives, which use cases are to be tested, on which roads, in which time periods and with which vehicles.

This especially applies to tests on the low-ranking road network – here the responsible state government authorities need to be informed no later than one month before the beginning of the test drives about which use cases, on which roads, in which time period and with which vehicles are to be tested. The respective state government authority then has the opportunity to

raise concerns within one month after receiving this information. Only after this time period has expired the test certificate can be issued by the BMK.

If a test scenario requires a certain infrastructure or testing conditions (e.g. special traffic light circuits, signs, etc.), it is necessary to coordinate with the relevant bodies (ASFINAG, municipalities, etc.) at an early planning stage and obtain their approval. The need for a certain infrastructure for the realisation of a test scenario does not oblige road maintainers to make the required infrastructure available to the testing organisations. Testing organisations have no right to a certain infrastructure. Infrastructural changes may only be made with the consent of the relevant authorities (ASFINAG, municipality, etc.). Furthermore, it must be clarified who is responsible for the implementation of the infrastructure change.

In case of test drives on expressways and highways, the responsible road maintenance authorities must not only be informed, but must also be involved in the planning and preparation of the test project early.

The respective contact addresses can be found directly on the application form. When informing the state governors and road maintenance authorities about the planned test drives, the contact point (automatisierung@austriatech.at) must be copied in CC.

External Communications

Testing organisations should create a communication strategy that:

- Informs the general public about the potential benefits of automated motor vehicles.
- Provides general information about scheduled tests.
- Provides information about the impact of tests on other road users as well as information on measures being taken to mitigate the negative impacts.
- Addresses the particular concerns of local roadway users. Special attention should be given to vulnerable groups such as people with disabilities, cyclists, motorcyclists, children and horseback riders.

The information and education campaign should not only serve the testing organisation. The testing organisation should make information material available upon request to local groups and smaller local authorities in the interest of a proactive information policy. Since many of these institutions do not have the ability to independently prepare information about automat-

ed and connected vehicles, the provision of information brochures and educational materials can be especially helpful in publicising the potential for automated and connected vehicles.

Cooperation with Rescue, Fire Brigade and Police

When carrying out tests, it is highly recommended that testing organisations inform and cooperate with all appropriate local rescue, fire brigade and police services. Testing organisations should provide all relevant technical information on the characteristics of the systems being tested to rescue organisations and fire brigades so they can prepare adequately for all possible incidents. The test vehicle's licence plate number must be made available to the local police well before starting the test.

Dealing with occurring events during the Testing Phase

Potentially imperilling situations or irregularities during the operation must be documented and stated to the BMK as well as to the Contact Point during the closing review.
This applies to situations, like accidents, critical situations, technical and operational malfunctions, as described in the definitions for accident / incidents / events.

All situations and events must be disclosed and discussed during the closing review.

In case of an accident with material or personal damage, the process for the course of action after an accident with an automated motor vehicle must be applied and a detailed accident statement must be compiled.

Contact Point Automated Mobility

The Contact Point Automated Mobility has been established at AustriaTech GmbH. The Contact Point is the official facility for questions about automated driving in Austria and supports the Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) in the process of developing legal regulations in accordance with the Motor Vehicles Act.

Before carrying out test drives with automated motor vehicles on roads, which are publicly accessible, an application form "Application for Testing" must be submitted to the contact point. This starts the process of issuing a test certificate.

The Contact Point Automated Mobility supports and advises applicants and test operators throughout the entire process.

In addition, the Contact Point is the point of contact for potential testing organisations who would like to propose additional test scenarios that cannot be tested on the current legal basis, in particular the Automated Driving Ordinance.

The Contact Point can be reached by: automatisierung@austriatech.at.

Test Reports

For a gain in knowledge of the public authorities and for securing a goal-oriented addressing of future fields of development, testing organisations are obligated to transmit test reports to the BMK and the contact point regularly. Through these, the testing institutions inform about the progress of the tests and describe their assessment about current developments regarding automated driving.

Test reports must be compiled for a period of 6 months and transmitted to the BMK and the Contact Point one month after the end of the given period at the latest. For test proposals with a duration under 6 months, a report must be transmitted one month after the end of the validity period at the latest.

After the end of the given period a closing review with the BMK and the Contact Point must be held. This closing review follows a discussion guide, which is available for the operating organisations beforehand.

Requirements for Operators and Testing Organisations

The operator must monitor the test vehicle at all times during the testing of automated motor vehicles on public roads. The operator must be able to override the automated systems at all times and whenever necessary.

The operator is always responsible for the safety of the test implementation, regardless of whether the test vehicle is in manual or automated mode. The operator must have sufficient knowledge of the system being tested and must be able to properly assess the systems' performance and limitations in order to recognise the need for intervention and/or taking over manual control of the test vehicle.

The testing organisation is responsible for maintaining sufficient risk and process management and must ensure an appropriate training program for operators. Furthermore, it must be ensured that the operators have a valid driving licence for the vehicle to be tested (car, bus, truck, etc.).

The testing organisation must be aware that the provisions of the 1967 Motor Vehicle Act apply to test vehicles, with exception of those with a certificate that has been issued on the basis of the AutomatFahrV for an individual case. Furthermore, the regulations of the 1960 road traffic regulations apply to tests taking place on roads, which are publicly accessible. In any case, the vehicle must have an emergency device for deactivating or overriding the system in case of a critical situation.

Testing organisations must ensure that the terms and definitions of the Code of Practice are being used properly. The table in Chapter "Definitions" serves as the base for a uniform understanding between the testing facility and BMK / AustriaTech as well as between testing organisations. This can prevent misunderstandings and loss of information. In a scientific context, a predefined terminology facilitates the development of information material and knowledge transfer.

Driving Licence Requirements

The operator must possess a valid driving licence for the vehicle being tested if the test is carried out on roads, which are publicly accessible. This requirement also applies when testing the fully automated system. In addition, the operator should have several years of driving experience with the type of vehicle being tested (car, shuttle, truck, etc.) and should be trained for the respective test case. Persons who are in the probationary period may not be deployed as operators. Expiring driver's licences must be renewed in a timely manner and submitted to the contact point unsolicited.

Testing organisations should not consider persons as operators whose driving history shows an increased risk profile or whose driving behaviour could be considered as having above-average risk.

Operator Training and Briefing

Operators need a level of knowledge and skills, beyond those of normal drivers. For example, must they fully understand the capabilities and limits of the systems being tested and of the vehicle being tested so they are able to correctly assess their condition during the test, and to intervene and/or terminate the test in a timely manner, if necessary. This knowledge has to be acquired through extensive experience with tests performed on private test tracks or sites and in simulation.

The testing organisations are responsible for developing appropriate processes and procedures to ensure that their operators have received the necessary training and have sufficient competences to safely perform the testing.

On the one hand, the driving training must include appropriate operator training and, on the other hand, an adequate briefing into the specific test project and the specific (local) conditions.

The operator training must cover all potentially dangerous situations in which the operator may need to intervene and/or terminate the test. The specific steps for taking over manual control of the vehicle must be part of this training. The operators must, without exception, be familiar with every single step of taking over the control from the automated system. The certificate for the training of the operators needs to be issued by an independent body or the vehicle manufacturer and has to be submitted with all application documents.

In addition, the trained operators must receive an adequate briefing into the specific test project. This briefing should be specifically customised to the planned use case, the test track, the test vehicle, the related driving manoeuvres, and the environmental conditions in order to exclude additional risks in road traffic as far as possible. The testing organisation must provide confirmation that appropriate briefing has been carried out.

Test Duration

The operator must pay sufficient attention during the entire test period to be able to intervene in the test sequence at any time by taking over manual control of the vehicle in critical situations.

Testing organisations are responsible for ensuring that operators are always fully alert during the test. In order to avoid fatigue and gaps in alertness, the testing organisation should set maximum time periods for operators to work during test days, and also specify the maximum total duration for a test period.

Operator Behaviour

Testing organisations should define a clear code of conduct for the operators and ensure that these rules are being followed.

The code of conduct should in all cases include a strict ban on alcohol consumption, with a blood alcohol limit of 0.0 ‰, which goes beyond legal provisions. The code of conduct should be designed to maintain perfect judgment ability and avoid any impairment of the operator.

Operators should be aware of their impact on other road users and, for example, maintain the line of vision during testing, that is appropriate in normal driving situations.

In the event of an accident, test operators must immediately comply with all necessary steps as described in the document provided on the procedure following an accident involving automated vehicles. This document therefore describes the process, procedure and responsibilities following an accident.

In case of an accident, test organisations are obligated to immediately inform the BMK as well as the Contact Point Automated Mobility and are not allowed to continue with their tests until the accident has been fully resolved. The BMK clears the approval for further tests (after the accident has been resolved).

Requirements for the Vehicle and the System being Tested

General Vehicle Requirements

Any testing organisation that aims at testing automated motor vehicles on public roads must ensure that their test vehicles comply with the applicable legal requirements, in particular the Motor Vehicles Act and any other applicable regulations. The Contact Point Automated Mobility must be informed about possible changes on vehicles that are already registered.

All test vehicles must be roadworthy and safe to operate and comply with all applicable regulatory requirements.

During the entire test run, the operator must be able to manually override the automated control system of the test vehicle at any time in order to regain control of the test vehicle.

Maturity of the Technologies being Tested

Testing organisations wishing to test automated vehicles on public roads must be able to demonstrate that the systems to be tested in the test vehicles have been adequately tested, both in simulation and on private test tracks and private test grounds, in situations comparable to the test project and under different conditions.

As part of the required risk management (e.g. using RCA, FMEA or similar), testing organisations must define processes that describe which tests must be successfully completed and at what frequency on private test tracks or test grounds and in simulation to ensure that other road users are not exposed to any additional risk when testing on roads, which are publicly accessible. In any case, it must be ensured that during test drives in automated driving mode the operator is able take over manual control of the test vehicle at any time. The testing organisations must keep test records on compliance with the internal processes for carrying out the necessary internal tests and, if necessary, present them.

The vehicle sensors and other control systems have to be sufficiently developed to adequately respond to all road users likely to be affected in the test scenario. The systems should pay particular attention to vulnerable road users such as people with disabilities, pedestrians, cyclists, motorcyclists, children and horseback riders.

Data Recording

All test vehicles must be equipped with data recording devices. The recorded data has to include all data from the test vehicle's sensors and control systems as well as all other data that provides information about the test vehicle's movement. This requires the recording of certain data immediately before, during and after an accident event using a Data Storage System for Automated Driving (DSSAD) and an Event Data Recorder for Automated Vehicles (EDR-AV). While the DSSAD is essentially a "driving mode memory", the EDR is an event data memory for accident data from the vehicle, which contains information on driving dynamics, occupant safety systems shortly before and after the detected impact or rollover, and crash intensity, among other things.

The recorded data should make it possible to determine who or what had control over the test vehicle when an incident has occurred. The data must be stored securely and handed over to the competent authorities in legible, annotated form upon request. The same applies to "critical situations". Test operators are expected to co-operate with the investigating authorities without exception.
The requirements of the UN-ECE and the European Commission regarding data recording in automated vehicles must always be taken into account.

Test vehicles can also be equipped with a video and audio recording system. However, such a system does not release the testing organisations from their obligation to record the aforementioned data by means of a data-recording device. In any case data protection regulations must be taken into account.

Data Privacy

The testing of automated motor vehicles may involve the processing of personal data. For example, data on the passenger´s position in the test vehicle during the test and how they behave can be collected and analysed. Individuals such as the operator or test assistant must be identifiable. The processing of personal data falls under the corresponding European and national data protection regulations. The testing organisation is therefore obliged to comply with the corresponding legal requirements and to handle data lawfully, securely and under the principle of proportionality. Personal data may not be stored longer than it is necessary for testing. Test operators should comply with the provisions of the GDPR and the DSG.

Functional Security

The functional safety of the vehicle or the tested system must be guaranteed at all times during the entire test operation. In particular, the requirements of ISO 26262 and SOTIF (Safety of the

Intended Functionality) must be complied with. ISO 26262 deals with concepts, procedures and measures for malfunctions resulting from random hardware faults or systematic hardware or software faults and addresses fault analyses and analytical methods of reliability engineering. SOTIF defines complementary procedures for faults resulting from the limitation of functionality. The aim is to ensure that the test vehicle fulfils the highest safety, reliability, and performance criteria.

Avoidance of unauthorised Access

The test vehicle as well as the used IT systems and prototypes must be sufficiently protected from unauthorised access, particularly via web. This aspect must be considered specifically on behalf of the risk management.

To avoid external attacks upon the vehicle or its systems, aspects of cybersecurity must be considered. Cybersecurity consists of a holistic approach for the protection of systems, networks and applications against digital attacks of any kind. The necessary guidelines are defined in the UN Cybersecurity Regulation R155.

Transition / Human-Machine takeover or handover

It is extremely important for testing the safety of automated motor vehicles that the sequences for switching control from manual mode into the automated mode, and especially from the automated mode back to the manual mode, are clear and unambiguous.

The tested system must

- be comprehensible to the operator in its functioning, especially its operating steps and termination operations,
- clearly tell the operator whether the vehicle is in manual or automated mode,
- give the operator sufficiently in advance notice when a change to manual mode is necessary and
- enable the operator at any time during the test drive to effortlessly take over manual control of the test vehicle and terminate the automated mode.

The risk involved in switching from automated mode to manual control mode must be as low as possible. Therefore, it is expected that especially the change from one mode to the other is an essential part of testing on a private test ground or test track or in simulation. The testing organisation should ensure that switching between modes is tested sufficiently before testing on public roads in order to eliminate risks or minimise them as much as possible.

Failure Warnings

The operators must be made aware of any malfunctions or errors of automated systems during the test via suitable technical warning devices.

Automatic braking and steering systems must be designed in such a way that, in the event of malfunctions, manual braking and steering is still possible.

Software Level

Automated systems are based on the interaction and the perfect functioning of various computers and electronic control modules. It is particularly important that:

- it is clearly documented which software (version) is used with which modifications in the test vehicle and
- the system software being tested, and its modifications have been extensively tested and documented. Typically, this process is started with simulations and then tests are carried out on test stands. Only after that the systems will be tested on private test grounds or tracks. After successful testing on private sites, tests can be carried out on roads, which are publicly accessible.