Normative legal regulating of vehicles with a high degree of automation of control: strategy and tactics for implementation in Russia

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Abstract. The article discusses the risks specific to vehicles with a high level of automation of control, and conditions the limits on the operating conditions of such vehicles. The article determines existing legal barriers to the implementation of autonomous vehicles. The article contains an analysis of foreign practice of regulating in the European Union, Japan and the United States and information about the UNECE activities aimed at enabling operation of vehicles with a high degree of automation control. Basing on the results of the analysis, the authors made proposals for removal of legal barriers. The article also contains proposals for the development of specific requirements for autonomous vehicles associated with their specific features of design.

1. Introduction
Modern digital technologies are increasingly embedded in transport sector, creating high economic and social effect. Automation of transport is becoming the main trend of the global market, creating competitive advantages to the owners of advanced technologies. The most promising areas, which can be implemented while achieving the highest level of automation of vehicle control, include:

- ensuring the transport of goods in a convoy of vehicles using communication system between themselves and with the elements of road infrastructure;
- providing operating of autonomous vehicles in complex and dangerous road and weather conditions;
- providing shuttle transportation of passengers in restricted areas (airports, exhibitions, sporting events);
- providing without additional assistance transportation of people belonging to the disabled social groups (people with physical disabilities, elderly).

The level of automation in control is a combination of conditions described in SAE J3016 [1], which presently is commonly recognized in the world. A high level of automation refers to a technology level at which the driver is not required to monitor executing control tasks by an automatic system under identified conditions or permanently (that is, when the driver, in principle, is not present).

Currently, all developed countries are characterized by the situation when the development of the regulatory framework is behind the implementation of innovative ideas in automation of vehicle control. At the same time, significant efforts are made to overcome that at the national level and at the level of the UN Economic Commission for Europe (UNECE).
The authors propose an approach towards creating a regulatory framework that would ensure the implementation of highly automated vehicles in Russia.

2. Risks specific for vehicles with a high level of automation
Vehicles with automatic control functions are characterized by the same risks as conventional vehicles. The first and foremost is the risk of a road accident and the severity of its consequences. The level of this risk depends on the active and passive vehicle safety. Other important risks: risk of fire and burning intensity, the risk of harm to human health and the environment, the risk of unauthorized use, the risk of interference in the work of the electronic equipment, the risk of electric shock.

Partial (or full) transfer of the vehicle control functions to an automated system creates a risk of accidents due to incorrect operation of that system. Experts widely discussed the incident with a deadly outcome with the Tesla vehicle, which, being in autopilot mode, was not recognized on a light background ambient light train moving along crossing trajectory.

It is possible to reduce the risk of accidents with automated vehicles the likelihood of their intersection with other objects could be reduced. For that the preferred approach would be organization of operations of such vehicles on lanes, dedicated or fenced from other vehicles or pedestrians.

While for automated vehicles the risk of accidents can be reduced through the use of automated control systems, there are other risks specific to this group of vehicles associated with the use of computer technologies: the error of geolocation and, as a result, the risk of accidents with elements of road infrastructure, loss of data, including data about the parameters of a vehicle motion, as well as personal data of a user; improper interaction with a driver (remote operator); loss of control of a vehicle due to technical failure or in connection with an unauthorized intervention in the control system. These risks require the development of special measures to safeguard the data, including those relating to the private life of a user, cyber security interface for operator’s interaction with an automatic control system.

Currently, the situation is complicated by the lack of practice of widespread use of vehicles with a high-level automation of control. At the same time:

- there is not enough experimental data on the mutual influence of the work of a large number of sensory systems in traffic conditions on public roads;
- the intelligent techniques to analyze traffic are not well developed, which is especially important in the urban transport environment;
- there are no standardized and massively proven communication systems between vehicles and between them and the infrastructure.

In addition, the existing road infrastructure including existing road traffic control systems and road environment are focused on a human driver.

3. Legal barriers to the implementation of vehicles with a high degree of automation
The 1968 Convention on Road Traffic [2] stipulates in Article 8: «Every moving vehicle or combination of vehicles shall have a driver… Every driver shall possess the necessary physical and mental ability and be in a fit physical and mental condition to drive. Every driver of a power-driven vehicle shall possess the knowledge and skill necessary for driving the vehicle. Every driver shall at all times be able to control his vehicle…». Article 13 of the said Convention stipulates: «Every driver of a vehicle shall in all circumstances have his vehicle under control so as to be able to exercise due and proper care and to be at all times in a position to perform all maneuvers required of him. He shall, when adjusting the speed of his vehicle, pay constant regard to the circumstances, in particular the lie of the land, the state of the road, the condition and load of his vehicle, the weather conditions and the density of traffic, so as to be able to stop his vehicle within his range of forward vision and short of any foreseeable obstruction. He shall slow down and if necessary stop whenever circumstances so require, and particularly when visibility is not good».

If an automated control system takes over part or all of the functions of a driver, the cited provisions of the 1968 Convention stop triggering. Without amending this Convention, the automation control systems, especially of high level, are illegitimate. The problem should be resolved at the international
level in the framework of the UNECE and the certain steps, which will be discussed below, have already been made in this direction.

The actual in the Russian Federation Road Traffic Regulations based on the 1968 Convention, do not allow the lack of a driver in a vehicle. A very extensive national law relating to the possession of vehicles and their operation, is not adapted to the situation when a driver, who is traditionally responsible for the behavior of his vehicle on the road and for damages caused by it, is not privy to the actions of his vehicle or may not be present. In this case, who should bear the responsibility for damage: a vehicle manufacturer, a manufacturer of an automated control system, a vehicle owner or an insurance company? The question currently remains open.

In addition, we note that in respect of vehicles with a high level of control automation at the regional (Eurasian Economic Union) or at the national level the relevant technical regulations are not developed and technical standards are absent. That is, such vehicles are currently, in fact, are in a legal vacuum. This situation, of course, has a chilling effect on the dissemination of technologies of automated control.

4. Foreign experience

In most economically developed countries, a number of automated control systems for vehicles is already offered on the market. Basically, those are systems with a low level of automation, however, the examples of vehicles with a high level of automation are already known. However, the experience of regulating in relation to such systems at present is not sufficient for the development of legal acts. Therefore, at the national level the guidance documents containing recommendations on the functioning and effectiveness of such systems are published. This is due to the fact that the rate of appearance in the market of new technologies of automated control significantly outperforms procedural terms of development, agreement and approval of regulatory acts.

The experience of the European Union (EU) is of interest. EU is developing a roadmap for the deployment of vehicles with a high degree of automation [3]. The road map GEAR 2030 aims at ensuring a consistent approach to the deployment of automated vehicles and the relevant legal framework of the EU. This roadmap includes:

1) general strategy development of automation technologies of vehicle control that should proceed in stages, with priority attention to traffic safety, for example, automated driving on motorways without intersections;

2) the list of activities, including: (a) analysis of the existing legal base defining conditions for the introduction of vehicles with automation control; (b) funding for coordinated research, innovative developments, large scale trials, etc.; (c) actions to ensure international cooperation and competitiveness;

A part of the general strategy is the inclusion of physical and digital traffic infrastructure in the overall technology of vehicles automated control with specific design parameters in terms of ensuring information exchange with other vehicles and traffic control. Social issues (for example, driver qualification, use of the personal data, interaction of a driver with a vehicle and other road users, ethical issues, environmental issues, social inclusion) and economic issues (impact on economic activity) should also be considered.

Document [3] states that at the current stage in EU legislation there are no significant legal obstacles for an upcoming appearance of conventionally automated vehicles (third level of automation [1]). Article 20 of the framework Directive 2007/46/EC of the European whole vehicle type approval [4] provides for the special compliance assessment procedure in respect of new technologies, which have not yet covered by developed regulatory requirements. It is noted that for higher levels of automation,

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4 The program GEAR 2030 (Competitive and sustainable growth of the automotive industry in the European Union up to 2030) focuses on three topics: adaptation of the production chain to the new global challenges; automated and connected vehicles; trade, international harmonization and global competitiveness. The program is developed by the eponymous high level working group formed on 19 October 2015.
as well as for ensuring information exchange with vehicles, changes in EU legislation may be required (in particular, traffic rules, traffic signs, driving license, road-worthiness, legal liability, insurance, protection against theft and cyber security, privacy and personal data protection, conformity assessment, etc.). The primary regulatory measures should include the introduction of systems for registration of parameters of vehicle movement (also known as «black boxes») for further investigation of road incidents. And the traffic rules should contain a provision that the driver must not misuse or confuse the automated control system.

Japan issued the guidelines for testing of automated vehicles on public roads (published in May 2016) and the criteria for permitting the use of public roads for testing of automated driving technologies with remote control (published in June 2017) [5]. According to these documents, a vehicle must meet the safety requirements, including specially approved for this vehicle. A person performing the functions of a driver must be on the driver's seat, observe the condition of the vehicle and the environment and, if necessary, in case of an emergency, take over the control. Testing of fully automated vehicles (without driver) is allowed to carry out on limited short sections of roads. Such vehicles shall remain under the supervision of a remote operator who, if necessary, must maintain control himself. The report [5] notes that by 2020 Japan should develop measures allowing for the motion of vehicles in a convoy when a driver actively controls just the first vehicle in a convoy.

The U.S. National Highway Traffic Safety Administration (NHTSA) published the «Federal policy on automated vehicles» [6]. This document sets out an ambitious approach to accelerate the uptake of vehicles with high level of automation. The speed of appearance of concerns that accompany the proliferation of such vehicles leads to the use of new approaches to ensuring the successful adoption of new technologies without creating new significant risks for safety, while providing new advantages in terms of safety with the disclosure of the entire existing capabilities in the future. For meeting this challenge, the necessary experience and knowledge have to be quickly acquired to keep pace with events, to expand the potential in the field of regulating, and increase the speed of making decisions. It is noted that this policy is a first step in regulating of automated vehicles, and is more of a guide rather than a technical rule intended for distribution to manufacturers and others the best practices of design, testing and implementation of such vehicles. In addition to the description of the mechanism of decision-making and allocation of responsibility under the laws of the United States, the policy contains a section concerning guidance on the providing for effectiveness of automated vehicles on the stages from their design and development to sales and operation on public roads. The «implementation» refers to operation of vehicles by persons who are not employees or agents of their designer, developer or manufacturer.

NHTSA expects that manufacturers and suppliers of highly automated vehicles will immediately begin to be guided by the adopted policy. Data obtained as a result of their activities, should be available for authorities, industry and the public to increase their knowledge and understanding of developing technologies. For that the policy recommends to manufacturers and other organizations on a voluntary basis provide to NHTSA reports on the observance of the provisions contained in the policy. With that, the legitimate interests of confidentiality and competitive advantages should be protected. Reports should contain safety assessment of each system of control of automated vehicles from the perspective of the measures contained in the policy, and the results of the tests performed to assess safety. The safety assessment should be conducted in the following areas:

- safety of control system;
- detection of objects and events and response to them;
- passive and post-accident safety;
- transition to the non-operational mode (minimal risk condition);
- cyber security (protection against unauthorized access and protection against failures of electronic systems);
- the human-machine interface;
- software;
- data recording and sharing;
• ensuring confidentiality measures;
• registration and certification;
• compliance with Federal, state and local laws;
• adherence of ethical measures;
• verification techniques;
• education and training of consumers.

5. Regulating at the international level
In actual conditions of globalization, the harmonization of policies is undertaken by developed countries for promotion of technologies of vehicle automated control for the purpose of minimizing non-tariff barriers. To optimize resources, a unified global approach is implemented to the formation of the regulatory framework. The leading role in that in the field of vehicles is played by the World Forum for Harmonization of Vehicle Regulations (WP.29), as well as the Global Forum for Road Traffic Safety (WP.1), within the framework of the Inland Transport Committee (ITC) of the UNECE. The Russian specialists are involved in activities of those forums.

The organizational structure of forums and working groups of the UNECE associated with intelligent transport systems (ITS) and the automation of vehicle control, interaction between them and the issues they work on is shown on figure 1.

The World Forum WP.29 and its subsidiary working groups develop new technical regulations (UN Regulations, UN Global Technical Regulations (GTR) and UN Rules), harmonize existing technical regulations and their amendments and updates. WP.29, due to the nature of its activities on the development of internationally agreed safety requirements to motor vehicles, became to the center of the discussions of issues related to the technologies of automated control. WP.29 established in its structure a special working group on intelligent transport systems and automated driving (ITS-AD), which takes care of strategic issues that support implementation of new technologies. This group has developed a number of guidance documents that form the common understanding on ITS, principles of providing assistance to a driver from ITS and it deals with issues of terminology, classification of automated vehicles and the development of general principles of cyber security. The perspective topics for consideration, which ITS-AD would begin, are shown in table 1 [7].
Figure 1. The organizational structure of UNECE forums, participating in discussions of ITS.

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### Table 1. The perspective topics for consideration by the informal working group ITS-AD.

| Objective | Vehicle Category | Use case (Operational design domain) | Examples of concrete approach | Possible major safety requirements |
|-----------|------------------|-------------------------------------|---------------------------------|-----------------------------------|
|           | Advanced passenger vehicle | Shuttle, Pod | Platoon for Trucks |                     |
| To provide a more comfortable driving environment | Alternative of public transport | CO2 reduction in truck transport | Improvement of working environment |
| To improve safety | Mobility services within a fixed (limited) area such as geo-fence | Platoon running on motorway | Keeping the lane as much as possible after selecting a specific lane |

#### Objective
- To provide a more comfortable driving environment
- To improve safety

#### Use case (Operational design domain)
- Alternate driving or driving support:
  - for traffic congestion at low velocity
  - on motorway at high velocity
  - on urban road (driver must exist)
- Mobility services within a fixed (limited) area such as geo-fence
- No Driver is necessary at the final stage

#### Examples of concrete approach
To establish the regulation for level 3 technology under human driver:
- **1st step:** for traffic congestion at low velocity [30/60km/h or less]
- **2nd step:** on motorway at high velocity
- **3rd step:** on urban road

Considering that type of vehicles to be used and how to use them are different in each country, minimum guidelines should be issued assuming usage conditions. Considering the consistency with Vienna and Geneva Convention:
- **1st step:** On vehicle supervisor or remote control
- **2nd step:** Unmanned system

#### Possible major safety requirements
- Driver monitoring
- Minimal risk maneuver
- Data storage
- Transition process

- (1st step: On vehicle supervisor or remote control)
- Clarification of geo-fenced driving environments (as French proposal)
- Requirements for emergency brake
- Cyber security
- Maximum velocity
- (2nd step: Unmanned system)
- Maximum velocity
- Minimal risk maneuver
- Data storage

- (1st step: With drivers on the following vehicles)
- Referring the technical requirement for ACC and CACC
- (2nd step: Without drivers on the following vehicles)
- Minimal risk maneuver
- Data storage
- Safety requirements for electronic combination

A separate ad hoc working group is developing provisions for automatically commanded steering functions (ACSF).

The Global Forum WP.1 administers the 1949 Geneva and 1968 Vienna Conventions on Road Traffic, which are the basis for the national traffic regulations.

In cooperation with WP.29, WP.1 at its 68th session in March 2014, adopted the amendments to Article 8 of the 1968 Convention, according to which, it is considered that vehicle systems that affect the way of driving a vehicle, comply with the provisions of the Convention, if they meet the conditions...
of manufacture, installation and operation according to the international legal instruments concerning wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles (those are the regulations developed by WP.29). It is also considered that such systems not meeting the conditions outlined above, comply with the provisions of the Convention, if a driver can at any time switch those to manual mode or disable.

A similar amendment was included in the 1949 Convention.

6. Proposals to eliminate legal uncertainties

In Russia, technologies of vehicle automated control practically are not standardized for the time being. The relevant work on standardization, based on existing and developing international standards and national standards of technologically advanced countries are needed to be carried out.

Standardization should cover:

• Terminology;
• The technical level of vehicles with automated control that ensure safe operation within the established boundary conditions;
• The order of admission to operation for vehicles with automated control as innovative ones (in accordance with the provisions of paragraph 16 of the Customs Union Technical Regulation «Concerning Safety of Wheeled Vehicles» (CU TR 018/2011);
• Requirements to road infrastructure;
• Information exchange between vehicles and road infrastructure;
• Protection of vehicles with automated control from unauthorized interference in their operation.

In respect of vehicles with a high level of automation of control the operation rules should be developed, providing:

• The restriction of territory of their operation;
• The rules of motion of vehicles with automated control;
• The transport security.

FSUE "NAMI" carried out the analysis of the regulatory legal base aimed at the establishment of legal acts subject to change in connection with the introduction of vehicles with automated control. The list of legal acts requiring analysis and subject to revision is shown in table 2.

Table 2. The list of legal acts requiring analysis and subject to revision.

| No. | Legal Act                                                      | Necessity of changes                                                                 |
|-----|----------------------------------------------------------------|------------------------------------------------------------------------------------|
| 1.  | Federal Law «Concerning traffic safety»                       | The need to establish common requirements for the operation of vehicles with a high level of automation |
| 2.  | Federal Law «Concerning transport security»                   | The need to establish responsibility and procedures, emerging and regulated under this law |
| 3.  | Federal Law «Concerning compulsory insurance of civil liability of vehicle owners» | The need to define the insurance event and the liability in a traffic accident involving a vehicle with highly automated control |
| 4.  | The Civil Code of the Russian Federation                      | The need for defining responsibilities and procedures in cases regulated by the civil legislation associated with damage from vehicles with a high level of automation |
| 5.  | The Code of the Russian Federation About Administrative Offences | The necessity of defining liability for administrative offences related to the operation of vehicles with a high level of automation |
| 6.  | The Criminal Code of the Russian Federation                   | The necessity of defining liability for criminal offences related to the operation of vehicles with a high level of automation |
| 7.  | Federal Law «The Charter of road transport and urban surface electric transport» | The need to establish responsibility and procedures, emerging and regulated under this law |
7. Development of technical requirements to automated vehicles

In recent times it is said a lot at various levels about the need for quick establishment of technical requirements to vehicles with automated control.

However, the experience of other developed countries, as well as the results of international activities within the framework of the UNECE, the development of the requirements will be processed gradually, with the accumulation of sufficient experience.

When developing requirements the following principles are proposed to be used as guidance:

1. Automated systems solve individual tasks of a vehicle control for a driver. The higher the automation level, the more tasks are solved. But it is very difficult to cover a significant number of control tasks solved by a driver, therefore, at least at the present stage of development of automation technology, that number needs to be limited one way or other, for example, by means of the organization of designated lanes on roads, minimizing intersection with other road users, etc.;

2. The above-cited Article 13 of the 1968 Convention on Road Traffic on the need to maintain control over a vehicle under any circumstances is relevant in the case of automated vehicle control. Such vehicle speed, which will provide the desired system performance should be determined as well as (1) the procedure for the transfer of control from a system to a driver, if the boundary conditions for the operation of a system would be exceeded, and (2) the procedure for safe vehicle stop, if the transfer of control to a driver would not happen (so-called a minimum risk maneuver);

3. The following general requirements associated with the specificity of automated control system functioning and its interaction with the human operator (driver) should be specified:
   a) To the reliability and functional safety of a system;
   b) To the interface that enables interaction with a human operator (driver) and an automated control system;
   c) To the record of data relating to happened events and actions of the system, so that, if necessary, the course of events could be reconstructed; the technical and legal ability to transfer these data to interested persons or authorities should be provided;
   d) To the measures ensuring cyber security: protection from unauthorized access («eSecurity») and protection against failures, for example, the systems outage, the data redundancy in a system etc. («eSafety»);
   e) To the information of other road users that the automated control system is in operating condition;
   f) To the knowledge of an operator (driver) on the peculiarities of a system and about functions, which it performs.

Before the vehicle requirements with automated control will be developed in the form of normative documents (international and national standards, technical regulations), which CU TR 018/2011 will refer to, such vehicle in accordance with paragraph 16 of CU TR 018/2011 will be qualified as innovative. In such vehicle new design solutions, qualitatively changing its major performance indicators, which cannot be evaluated in accordance with CU TR 018/2011, are realized. In the case of innovative vehicle safety requirements shall be established by decision of the authorized body of a member state of the Customs Union for technical regulating, which carries out compliance assessment. This provision of the CU TR 018/2011 gives the opportunity to put into circulation a vehicle with automated control, without waiting for the adoption of the standards. This does not mean that the safety
of such vehicles will not be checked. The individually developed list of requirements should consider the risks associated with the operation of automated vehicles, including those described in this article.

As an example, a list of special requirements proposed by the authors is considered in relation to autonomous vehicles designed to operate on closed areas on specific routes on a dedicated lane, which does not presume the presence of other vehicles (other than vehicles of a similar type) and pedestrians (table 3).

**Table 3. The list of special requirements for autonomous vehicles for operation in closed areas.**

| No. | Element or property of the object of technical regulating | The document, compliance with which ensures compliance with the requirement | The applicability of the requirements for autonomous vehicles for operation in closed areas |
|-----|----------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 1.  | Braking performance                                      | The base document is UN Regulation No. 13-11                             | Partial compliance with Regulation. The testing methods need to be changed. The performance of braking system and ABS should be checked. Should be designed to determine the for speed 25 km/h excluding control action from a driver on the brake pedal. 1. The function of the service, secondary and parking brake systems without control action from a driver's side; 2. The performance of the ABS; 3. Safety inspection for complex electronic systems. |
| 2.  | Vehicle protection from unauthorized use                 | The legal document is not available                                      | The measures for protection against unauthorized access to the electronic control unit should be taken (cybersecurity). |
| 3.  | Speed measuring devices                                  | The legal document is not available                                      | The correct determination of a vehicle speed should be confirmed. The requirements and test method should be developed. |
| 4.  | Requirements to ensure safe operation of autonomous vehicles | The legal document is not available. The specific provisions are contained in UN Regulations Nos. 79-02, 107-06 and 131-01. | The numerical targets in relation to the following requirements and the relevant test methods should be developed, including the following items: 1. Providing motion within a dedicated lane; 2. Providing stops according to the route. 3. Providing opening and closing the service doors at the bus stop; 4. Providing a possibility for the emergency stop for passengers («emergency brake»); 5. Providing voice communication between passengers and the vehicle operation manager; 6. Ensuring passenger comfort with regard to accelerations; 7. Ensuring detection and detour of fixed and moving obstacles, also in the dark. 8. Providing self-diagnosis of faults. |

8. Conclusions

For the time being, all developed countries can be characterized by the situation when the development of the regulatory framework is behind the implementation of innovative ideas of automation of vehicle control. At the same time, significant efforts are applied to overcome such situation at the national level and at the level of UNECE.
Vehicles with automatic control functions can be characterized by the same risks as conventional vehicles. At the same time, there are new risks associated with the use of computer technologies: the error of geo-location and, as a result, the risk of accidents with elements of road infrastructure, loss of data, including data about the parameters of vehicle motion, as well as personal data of a user; improper interaction with a driver (remote operator); loss of control over a vehicle due to technical failure, and in connection with the unauthorized intervention in the control system. These specific risks require the development of appropriate regulatory measures.

Currently, for vehicles with a high level of control automation neither at the regional (Eurasian Economic Union) nor at the national level no measures for technical regulating and technical standards are developed.

In economically developed countries, the experience of regulating in relation to automated control systems is not sufficient for the development of legal acts. This is due to the fact that the speed of the introduction on market of the new technologies of automated control significantly outperforms procedural terms of development, consideration and approval of legal acts. Therefore, at the national level guidance documents containing recommendations on functioning and effectiveness of such systems are published.

The experience of economically developed countries and the cooperative regulatory activities under the auspices of the UNECE are the basis for the development of regulatory requirements for vehicles with automated control. The participation of the Russian Federation in international agreements leads to the use of technical regulations developed and accepted in international forums under the auspices of the UNECE. In this regard, rulemaking at the national level in relation to vehicle automated control should be carried out in concert with activities at the UNECE level. This approach, in addition to effects associated with the facilitation of promotion of Russian products in foreign markets, would also help to save on scientific and technical developments, without repeating the research already been conducted in other countries.

The authors propose an approach towards building a regulatory framework that will ensure the implementation of highly automated vehicles in Russia. Proposals to eliminate legal uncertainties include the development of changes in national legislation as well as standards and regulations for operation of vehicles with automated control. The formulated principles are proposed to guide the development of technical requirements for automated vehicles. Until that those requirements would be developed in the form of regulatory documents (international and national standards, technical regulations), such vehicles in accordance with paragraph 16 of CU TR 018/2011 could be qualified as innovative. In the case of innovative vehicles safety requirements shall be established by a decision of the authorized body for technical regulating of a member state of the Customs Union, which carries out compliance assessment. An individually developed list of requirements should consider the risks associated with the operation of automated vehicles, including those described in this article. As an example, the list of special requirements proposed by the authors for the autonomous vehicle designated for traffic in closed areas.

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