

Probably missed items in FRAV-02-05-Rev.2

Note: This document is presented to identify probably missed items in FRAV-02-05-Rev.2. The intention is to incorporate the missed items in the main outcome document of the FRAV IWG.

I. WP.1 Resolution on the deployment of highly and fully automated vehicles in road traffic

WP.1 at its 77th session in September 2018 adopted the Resolution on the deployment of highly and fully automated vehicles in road traffic (Annex 1 to ECE/TRANS/WP.1/165). Chapter IV of this WP.1 Resolution contains the recommendations for automated driving systems in highly and fully automated vehicles. Those recommendations are considered as a demand to be addressed by the technical provisions, which development is a subject of activity of FRAV IWG.

The table below indicates the relevance of the items stipulated in Chapter IV of the WP.1 Resolution the content of the FRAV-02-05-Rev.2 together with comments. The probably missed items are indicated in red.

Item from the Chapter IV of the WP.1 Resolution	Relevance to the content of FRAV-02-05-Rev.2 and comments
Automated driving systems in highly and fully automated vehicles should:	
(a) Make road safety a priority	This is a general demand
(b) Monitor and safely interact with the surrounding traffic environment	This is, as well, a general demand, which, however, refers to Chapter 6 – Execution of DDT
(c) Endeavour to safely tolerate errors of the vehicles' users, inside and outside of the vehicle, and of other road users in order to minimize potential effects of such errors	This is a general demand to be addressed by traffic scenarios (VMAD IWG). However, this demand, perhaps, should be reflected as a statement in Chapter 4 – System safety
(d) Comply with traffic rules, including those referring to:	
(i) Interacting safely with other road users;	This general demand refers to Chapters 4 – System safety, 6 – Execution of DDT, 7 – HMI, 8 – Failsafe (Safe fallback) response
(ii) Following instructions from law enforcement authorities, and those authorized to direct traffic;	This demand, perhaps, should be added to Chapter 6 – Execution of DDT and maybe extended to the recognition of the appearance and exact gestures of persons regulating traffic
(iii) Maintaining smooth and safe flow of traffic	This demand is addressed in Chapter 6 – Execution of DDT

Item from the Chapter IV of the WP.1 Resolution	Relevance to the content of FRAV-02-05-Rev.2 and comments
(e) Only operate within their ODD	This demand, perhaps, should be added to Chapter 4 – System safety, although it is addressed in Chapter 7 - HMI
(f) Be capable of achieving a state that maximizes road safety when a given trip cannot or should not be completed for example in case of a failure in the automated driving system or other vehicle system	This demand refers to Chapter 8 – Failsafe (Safe fallback) response
(g) React to unforeseen situations in a way that minimizes danger to the vehicle’s users and other road users	This demand refers to Chapters 4 – System safety and 8 – Failsafe (Safe fallback) response
(h) Communicate with their users and other road users, in a clear, effective and consistent way, by providing sufficient information about their status and intention, and enabling an appropriate interaction	This demand refers to Chapter 7 – HMI
(i) Clearly and effectively provide appropriate notice, if the vehicle leaves its ODD	This demand refers to Chapters 7 – HMI and 8 – Failsafe (Safe fallback) response
(j) Operate in a way that enables verification as to whether or not they are or were performing dynamic control	This demand refers to Chapter 7 – HMI
(k) Enable their deactivation in a safe manner	This demand, perhaps, should be added to Chapter 4 – System safety

II. Introduction of probably missed items in FRAV-02-05-Rev.2

1. Chapter 4 – System Safety

1.1. An Automated Driving System (ADS) as a complex electronic system shall be built in accordance with the safety concept implying the presence of design measures providing for the possibilities of switching to a backup control option or to using a backup control system that ensure the reliability of systems even in the event of damage to the electrical circuit.

1.2. Actions that allow deactivating an automated vehicle and/or the ADS by a person directly in the vehicle and a remote operator shall be provided.

2. Chapter 5 – Operational Design Domain (ODD)

2.1. An ADS shall be able to verify that it is operating within its ODD and approaching the boundaries of the ODD. Actions of an ADS after reaching the boundaries of the ODD (e.g. executing a minimum risk maneuver) shall be provided.

3. Chapter 6 – Execution of Dynamic Driving Tasks (DDT)

3.1. In section 6.4. (Object and Event Detection and Response (OEDR)) indicate that detection of objects shall be available at the dusk and darkness conditions.

3.2. In section 6.5. (Longitudinal and lateral motion control): The correct determination of a vehicle speed shall be confirmed.

3.3. Specific functional requirements to vehicle engine control, braking and steering (bearing in mind that existing UN Regulations Nos. 13, 13H and partly 79 are not relevant to the automated driving conditions).

Examples:

1. Functioning of the service, secondary and parking brake systems without control action from a driver (Annex 4 to the UN Regulation No. 13, including Appendix).
2. The performance of the ABS, including that on slippery roads and with uneven adhesion coefficient on the sides of a vehicle (Annex 13 to the UN Regulation No. 13).

4. Chapter 7 – Human-Machine Interface (HMI)

4.1. A highly or fully automated vehicle shall be identified in the traffic flow at the conditions, when:

- the ADS is active;
- the ADS is inactive;
- a minimum risk maneuver (MRM) is performed;
- an emergency maneuver (EM) is performed.

4.2. What kinds of users are involved in an automated vehicle operation, their functions and expected performance (from SAE J3016: Conventional Driver (term 3.29.1.1), Remote Driver (term 3.29.1.2), Passenger (term 3.29.2), DDT Fallback-Ready User (term 3.29.3) and Driverless Operation Dispatcher (term 3.29.4)).

5. Chapter 9 – Safety of In-use Vehicles

5.1. A description of the checks allowing evaluating the serviceability and correctness of the operation of an ADS, including the functioning of the human-machine interface (HMI), during the periodic technical inspection shall be provided. Performing those checks shall not be costly or time-consuming.

5.2. An ADS shall provide for self-diagnosis of faults in accordance with the prescribed list (e.g. battery discharging, wheel puncturing, etc.) with communication to the Driverless Operation Dispatcher followed the execution of the minimum risk maneuver, a safe vehicle stop and disembarkation of passengers.

5.3. A list of considerable system failures, description of failures and relevant actions by an automated vehicle shall be established.

6. A new Chapter – Classification and definitions for automated driving technologies

Classification and definitions for automated driving technologies is needed, if the specific requirements will be introduced, which are relevant to a particular technology and not relevant to other technologies.

Examples:

1. An automated passenger shuttle should provide specific features ensuring safety of passengers and interact with passengers. It also should provide ride comfort for passengers.
2. A platooning technology should ensure smooth transition of vehicle control from a human driver to an automated driving system and vice versa. Providing priority of human control actions is important for this technology.

7. A new Chapter – Specific requirements for automated vehicles carrying passengers

The following specific requirements are proposed for automated vehicles carrying passengers (specifically for driverless shuttles, but also applicable to other vehicles, e.g. robotaxis).

- 7.1. To provide stops in the places required by the route.
- 7.2. To provide opening the service doors at the bus stop and closing them before motion after a stop.
- 7.3. To provide audio messages to passengers about approaching a stop and start motion after a stop.
- 7.4. To provide a possibility for the emergency stop of a vehicle by passengers («emergency brake»).
- 7.5. To provide voice communication between passenger compartment and the Driverless Operation Dispatcher.
- 7.6. To ensure passengers' comfort during normal acceleration and deceleration of a vehicle and its lateral acceleration at cornering.
- 7.7. To provide audible (sound) notification of passengers during emergency braking.
