

Proposal for amendments to informal document GRRF-78-14

Amendments lettered in red colour (ad-hoc in this October)

Additional amendments lettered in blue colour

***Paragraph 5.1.6.3.3 in green colour:**

The latest status of proposal for LKAS was reflected.

- 2.3.4. "Advanced Driver Assistance Steering System" means a system, additional to the main steering system, that provides assistance to the driver in steering the vehicle but in which the driver remains at all times in primary control of the vehicle. It comprises one or both of the following functions:
- 2.3.4.1. "Automatically commanded steering function (ACSF)" means the function within a complex electronic control system where actuation of the steering system can result from automatic evaluation of signals initiated on-board the vehicle, possibly in conjunction with passive infrastructure features, to generate continuous control action in order to assist the driver in following a particular path, **such as;**
- (a) low speed manoeuvring~~or,~~
 - (b) parking operations~~or,~~
 - (c) ~~driving operations in highway which is designed for non-urban multilane road sections with constructional separation of the two directions of traffic and at least two lanes into the driving direction.~~
lane keeping operation or
 - (d) lane changing operation.**
- 2.3.4.2. "Corrective steering function" means the discontinuous control function within a complex electronic control system whereby, for a limited duration, changes to the steering angle of one or more wheels may result from the automatic evaluation of signals initiated on-board the vehicle, in order to maintain the basic desired path of the vehicle or to influence the vehicle's dynamic behaviour.
- Systems that do not themselves positively actuate the steering system but that, possibly in conjunction with passive infrastructure features, simply warn the driver of a deviation from the ideal path of the vehicle, or of an

unseen hazard, by means of a tactile warning transmitted through the steering control, are also considered to be corrective steering.

2.3.4.2.1. “Lane Keeping Assistance System” means a system which assists the driver in keeping the vehicle within the chosen lane, by influencing the lateral movement of the vehicle.

5.1.6. Advanced driver assistance steering systems shall only be approved in accordance with this Regulation where the function does not cause any deterioration in the performance of the basic steering system. In addition they shall be designed such that the driver may, at any time and by deliberate action ¹⁾, override the function.

¹⁾ The vehicle manufacturer shall provide a list of these actions to the technical service at the time of type approval and it shall be annexed to the test report and mentioned in the communication form according to Annex I.

5.1.6.1. Whenever the ~~Automatically Commanded Steering function ACSF~~ becomes operational, this shall be indicated to the driver and the control action shall be automatically disabled if the vehicle speed exceeds the set limit of 10 km/h by more than 20 per cent or the signals to be evaluated are no longer being received. Any termination of control shall produce a short but distinctive driver warning by a visual signal and either an acoustic signal or by imposing a tactile warning signal on the steering control.

5.1.6.2. Notwithstanding the requirements of paragraph 5.1.6.1., the ~~Automatically Commanded Steering function ACSF designed for a restricted area where road traffic environment and infrastructure condition are well developed such as a highway, e.g. Automated Lane Change system, Enhanced Lane Keeping Assistance System, Automated Safety Stop System in case of Driver’s Medical Emergency etc.~~ **designed to assist the driver in the following steering operations** may be enabled at vehicle speed greater than 10km/h, provided that the following requirements of paragraph 5.1.6.2.1. to ~~5.1.6.2.4.5.1.6.2.6.~~ are all met,;

- **lane keeping operation or**
- **lane changing operation in a restricted area which has multilane road sections with constructional separation of the two directions of**

traffic and no mixed traffic with pedestrians, cyclists and oncoming vehicles.

5.1.6.2.1. The **system** shall be designed so that excessive intervention of steering control (e.g. an excessive steering torque) is suppressed to ensure the steering operability by the driver and to avoid unexpected vehicle behaviour, during its operation.

The end of the intervention shall be such that the **system** reduces its directional control to zero in a progressive manner, to ensure easy and safe handling of the vehicle, as defined in paragraph 5.1.1. The directional control fade-out strategy shall be at the discretion of the vehicle manufacturer.

The steering control effort necessary to override the directional control provided by the **system** shall not exceed the value specified in paragraph 6.2.4.2. for an intact steering equipment.

5.1.6.2.2. When the system is temporarily not available, for example due to inclement weather conditions, the system shall clearly inform the driver about the system status, except if the system is in the OFF mode, e.g. switched off. This exception does not affect the required warning in the case of a system malfunction.

5.1.6.2.3. The vehicle shall be equipped with a means for the driver to activate or deactivate the Automatically Commanded Steering function.

5.1.6.2.4. The ~~Automatically Commanded Steering Function~~ **ACSF** shall have an adequate steering control strategy ~~including a means to detect the events that is predicted to influence vehicle travelling path, such as lane markings and obstacles on a road etc. and ensuring the safe transition at the termination of its control from automatically commanded steering to manual steering~~ **which meets all the following conditions;**

(a) To include a means to detect the events that is predicted to influence vehicle travelling path, such as lane markings, obstacles on a road etc.

(b) To ensure the safe transition at the termination of its control from ~~automatically commanded steering~~ **ACSF to manual steering by the driver, based on the manufacture's safety concept including ~~that~~**

~~on unordinary system conditions or driving situations, such as the following aspects;~~

- In case of ACSF for lane changing operation:

To choose the transient operation whether the Automatically Commanded Steering Function for lane changing operation ACSF safely completes the vehicle movement to target lane or returns the vehicle to initial lane, against abrupt disturbance to vehicle travelling path, or

- In case of ACSF for lane keeping operation:

To provide at least [2] seconds as the transient time from the Automatically Commanded Steering Function for lane keeping operation ACSF to manual steering by the driver, and

- For both cases:

To select the appropriate timing to produce the warning signal of termination prescribed in paragraph 5.1.6.1, to notify the driver of the transition from ACSF to manual steering.

This safety concept on the safe transition is applied to the following unordinary system or driving conditions during the system intervention;

- System functional limitation or temporary ineffectiveness, or

- Abrupt disturbance to vehicle travelling path, such as sudden occurrences of a leading low-speed vehicle, closing adjacent-lane vehicle, stiff side wind, etc.

(c) ~~To select the appropriate timing to produce the warning signal of termination prescribed in paragraph 5.1.6.1, to ensure the safe transition prescribed in above sub-paragraph (b) for the following conditions during the system intervention;~~

~~— System malfunction, functional limitation or temporary ineffectiveness, or~~

~~— Abrupt disturbance to vehicle travelling path, such as sudden occurrences of a leading low speed vehicle, closing adjacent lane vehicle, stiff side wind, etc..~~

In case of system malfunction caused by a failure of its component, to warn the driver and avoid the abrupt change of vehicle behavior at the termination of control [so as not to confuse the driver].

~~The vehicle manufacturer shall provide the Technical Service with the information on the control strategy at type approval.~~

5.1.6.2.5. The vehicle manufacturer shall provide the information on the system design including the conformity with the requirements of paragraph 5.1.6.2.1 to 5.1.6.2.4, to the Technical Service at the time of type approval, [and it shall be annexed to the test report and mentioned in the communication form according to Annex I].

5.1.6.2.6. The vehicle manufacturer shall provide the owner's manual, cautionary statement or other appropriate means to clearly inform the driver of the responsibility of his/her steering operation even during the intervention of the automatically commanded steering function.

5.1.6.3. Special provisions for Lane Keeping Assistance System

5.1.6.3.1. The system shall meet the requirements of paragraph 5.1.6.2.1, 5.1.6.2.2 above.

5.1.6.3.2. The vehicle may be equipped with a means for the driver to activate or deactivate the Lane Keeping Assistance System.

5.1.6.3.3. The LKAS shall provide a means of detecting that the driver is likely to be no longer in primary control of the vehicle (e.g. by sensing the driver's input on the steering wheel). This means of detection is required to work when the system is available (i.e. ready to intervene or intervening).

When the LKAS is available and has detected that the driver is likely to be no longer in primary control of the vehicle, [until the driver takes primary control again / encouraging the driver to take primary control again / to call the driver's attention.], effective warnings shall be given simultaneously or in a cascade involving at least two means out of optical, acoustic and appropriate haptic.

- 5.5.2. It must be possible to verify in a simple way the correct operational status of those Electronic Systems, which have control over steering. If special information is needed, this shall be made freely available. It must be possible to verify the correct operational status of those Electronic Systems via the serial interface of the standard diagnostic connector (OBD).

Justification for amendments lettered in blue colours:

The intentions of these amendments are;

- **Paragraph 5.1.6.2.4:**

Subparagraph (b) and (c) of the original requirement have the same purpose to ensure the safe transition from ACSF to manual steering though each has different detailed requirements. However, for better understanding, it is appropriate to combine them into one subparagraph (b) while maintaining the original meanings.

A new created subparagraph (c) was added because it is important to prevent an abrupt change of vehicle behaviour, caused by the unavoidable termination of ACSF, in a condition of system malfunction.

And other editorial improvements are added to make it easier to understand.