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World Forum for Harmonization of Vehicle Regulations**Working Party on Automated/Autonomous and Connected Vehicles****Seventh session**

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Item 6 (a) of the provisional agenda

UN Regulation No. 79 (Steering equipment):**Automatically Commanded Steering Function****Proposal for a Supplement to the 03 series of amendments to
UN Regulation No. 79 (Steering equipment)****Submitted by the expert from the International Organization of Motor
Vehicle Manufacturer***

The text reproduced below was prepared by the experts from the International Organization of Motor Vehicle Manufacturer (OICA). It is based on the informal document GRVA-05-30. It proposes amendments to the 03 series of amendments to UN Regulation No. 79 with regard to ACSF of Category C. The modifications to the existing text of the Regulation are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2020 as outlined in proposed programme budget for 2020 (A/74/6 (part V sect. 20) para 20.37), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.



I. Proposal

Paragraph 5.6.4.1.2, amend to read:

- 5.6.4.1.2. When the ACSF of Category C is activated (standby) the ACSF of Category B1 shall aim to center the vehicle in the lane, **unless a different position in lane is deemed reasonable due to the situation or resulting from driver input (e.g. when another vehicle is driving close beside).**

Paragraph 5.6.4.2.3., amend to read:

- 5.6.4.2.3. The system shall only be activated (standby mode) after a deliberate action by the driver.

Activation by the driver shall only be possible on roads where pedestrians and cyclists are prohibited and which, by design, are equipped with a physical separation that divides the traffic moving in opposite directions and which have at least two lanes in the direction the vehicles are driving. **The confirmation that the road is permitting the activation of an ACSF category C** ~~These conditions~~ shall be **based on ensured** by the use of at least two independent means.

In the case of a transition from a road type with a classification permitting an ACSF of Category C, to a type of road where an ACSF of Category C is not permitted, the system shall be deactivated automatically (off mode), **unless a temporarily missing second lane in driving direction is the only condition not fulfilled from the above (e.g. a connector between two highways).**

Paragraph 5.6.4.3., amend to read:

- 5.6.4.3. Overriding

A steering input by the driver shall override the steering action of the system. The steering control effort necessary to override the directional control provided by the system shall not exceed 50 N.

The system may remain activated (~~standby mode~~) **(active mode)** provided that priority is given to the driver during the overriding period.

Paragraph 5.6.4.5.2., amend to read:

- 5.6.4.5.2. When the system is in standby mode (~~i.e. ready to intervene~~), an optical signal shall be provided to the driver.

Paragraph 5.6.4.5.2.1. include new provision to read

- 5.6.4.5.2.1. When the initiation of the lane change procedure is actually possible, this may be indicated to the driver.**

Paragraph 5.6.4.5.4., amend to read:

- 5.6.4.5.4. When the lane change procedure is suppressed, in accordance with paragraph 5.6.4.6.8., the system shall clearly inform the driver about this system status by an optical warning signal and additionally by an acoustic or haptic warning signal. In case the suppression is initiated by the driver **or in case of automatic suppression while the lane change procedure hasn't commenced for more than 1s**, an optical warning is sufficient.

Paragraph 5.6.4.6.8.1., amend to read:

- 5.6.4.6.8. Suppression of the Lane Change Procedure

- 5.6.4.6.8.1. The lane change procedure shall be suppressed automatically by the system when at least one of the following situations occurs before the lane change manoeuvre has started:

- (a) The system detects a critical situation (as defined in paragraph 5.6.4.7.) **later than 1s after the initiation of the lane change procedure but before the start of the lane change manoeuvre;**
- (b) The system is overridden or switched off by the driver;
- (c) The system reaches its boundaries (e.g. lane markings are no longer detected);
- (d) The system has detected that the driver is not holding the steering control ~~at the start of~~ **when the lane change manoeuvre is about to start;**
- (e) The direction indicator lamps are manually deactivated by the driver;
- (f) The lane change manoeuvre has not commenced within 5.0 seconds following the deliberate action of the driver described in paragraph 5.6.4.6.2.;
- (g) The lateral movement described in paragraph 5.6.4.6.4. is not continuous.

Paragraph 5.6.4.8.3., amend to read:

5.6.4.8.3. After each vehicle new engine start/run cycle (other than when performed automatically, e.g. the operation of a stop/start systems), the ACSF of Category C function shall be prevented from performing a lane change manoeuvre until the system has detected, at least once, ~~an moving~~ object at a distance greater than the minimum distance S_{rear} declared by the manufacturer in paragraph 5.6.4.8.1. above.

If, in addition to moving objects, the system uses the detection of stationary objects, this shall be demonstrated by the manufacturer to and assessed by the Technical Service.

II. Justification

A. Lane centering (paragraph 5.6.4.1.2.)

1. The suggested change aims to align with the principle agreed for Automated Lane Keeping Systems (ALKS), where the aim of this provision is to achieve stable vehicle behaviour and not necessarily that vehicle is centered in the lane at all times. When the driver adapts the position to a vehicle driving close by in an adjacent lane or drives with an offset to avoid lane ruts, centering the vehicle in lane would not be the appropriate ACSF of Category B1 control strategy.

B. Activation conditions (paragraph 5.6.4.2.3.)

2. The proposed amendments aim at clarifying that each individual criterion above don't have to be ensured by at least two independent means at all time. The overall aim, to prevent activation on unsuitable roads, shall be ensured by information from at least two sources.

3. Furthermore, the proposed amendment aims to make activation by the same means as for ACSF of Category B1 possible, as it is referred to in paragraph 5.6.4.2.2.

4. When changing from one highway to another, where the road e.g. temporarily changes down to one lane, the ACSF of Category C should be permitted to remain in stand-by, because having to reactivate ACSF of Category while ACSF of Category B1 remains active would not be understandable to the driver.

5. Since stand-by mode of ACSF of Category C is indicated to the driver, and in some cases when the ACSF of Category C is ready to intervene; the driver will be aware of the current status of the ACSF of Category C at all times.



C. Overriding (paragraph 5.6.4.3.)

6. The original provision contradicts itself, as it refers to the system remaining in standby mode, under the precondition that priority is given to the driver. During standby mode the system would not be allowed to provide any support, so there wouldn't be any need to require priority to the driver. The proposal aims at clarifying that the Lane Change Procedure may remain active, provided that priority is given to the driver.

D. Indication during Standby mode (paragraph 5.6.4.5.2.)

7. The proposed amendment aims to resolve the inconsistency about the meaning of Standby.

8. Standby doesn't necessarily mean ready to intervene. There might be other conditions preventing the system from becoming active in that instance, for example if the current vehicle speed is below V_{smin} .

E. "Ready-to-intervene" indication (paragraph 5.6.4.5.2.1.)

9. The proposed amendment aims at resolving the inconsistency about the meaning of Standby-mode and "ready to intervene" as addressed in the previous amendment.

10. In addition to the indication of "stand-by mode" the system should be allowed to indicate to the driver when it is "ready to intervene" in order to achieve transparency regarding expected vehicle behaviour.

F. Indication to the driver in case of suppression (paragraph 5.6.4.5.4.)

11. The proposed amendment aims to address that the large number of suppression criteria could lead to suppression of the function too often. When the suppression occurs before the lateral movement of the vehicle has started, which by definition is later than 1s after the initiation of the lane change procedure, an optical warning should be sufficient.

G. Suppression criteria (paragraph 5.6.4.6.8.1.)

12. The proposed amendment aims to resolve the inconsistency between the opening paragraph which defines the assessment to be "before the lane change manoeuvre has started" and item (d) which defines the assessment to take place "at the start of the lane change manoeuvre".

13. Furthermore, the proposed amendment to item (a) aims to make the system more useable in everyday traffic conditions. Surrounding vehicles naturally react to another vehicle indicating its intention of a lane change, which could resolve a situation that according to paragraph 5.6.4.7. would have to be assessed as a critical situation. Therefore the point in time when an existing critical situation leads to suppression of the lane change the procedure

should be when the lateral movement of the vehicle is about to start and not at the start of the lane change procedure.

H. Sensor test before activation (paragraph 5.6.4.8.3.)

14. The proposed amendment aims to include stationary objects when confirming the detection range before activation of ACSF of Category C.

15. This original provision makes the availability of the system dependent on surrounding traffic. At night-time or on a Sunday morning, this will limit system availability, in a very intransparent manner to the driver. Confirmation through the detection of stationary objects would be technically equally sufficient.
