Submitted by the Experts of OICA and CLEPA

Informal Document - ACSF-17-06

ACSF C

Proposal for draft amendments to UN R79.03

1. Background

OICA and CLEPA has proposed an amendment of ACSF C requirements, which was discussed on the 16th meeting of the ACSF Informal Group in Tokyo in January 2018. This amendment proposes specific provisions for the use of a lane change function with 2-step HMI. After the contracting parties' comments, OICA and CLEPA have amended this initial proposal.

The proposed changes are based on document WP29/2018/35.

2. Proposal

Amend 5.6.4.6.4 to read:

5.6.4.6.4. The lateral movement of the vehicle towards the intended lane shall not start earlier than 1 s after the start of the lane change procedure. Additionally the lateral movement to approach the lane marking and the lateral movement necessary to complete the lane change manoeuvre shall be completed as one continuous movement.

~~The lane change manoeuvre shall not be initiated before a period of 3.0 seconds and not later than 5.0 seconds after the deliberate action of the driver described in paragraph 5.6.4.6.2. above~~.

The lateral movement may be initiated automatically or by a second deliberate action of the driver.

The lane change manoeuvre shall commence not earlier than 3s and

- **not later than 5.0 seconds with an automatic initiation or**
- **not later than 10.0 seconds with an initiation by a second deliberate action**

following the deliberate action of the driver to start the procedure described in paragraph 5.6.4.6.2.

The control to operate the second deliberate action shall be located in the steering control area.

Amend 5.6.4.6.7 to read:

5.6.4.6.7. The direction indicator shall remain active throughout the whole period of the lane change manoeuvre and shall be deactivated by the system no later than 0.5 seconds after the resumption of ACSF of Category B1 lane keeping function as described in paragraph 5.6.4.6.6 above. **Automatic deactivation of the direction indicator is only required if the lane change manoeuver is initiated automatically without a second deliberate action.**

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),

(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 the lane change manoeuvre,

(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.~~**; Following the deliberate action of the driver to start the procedure described in paragraph 5.6.4.6.2., the lane change manoeuvre has not commenced**

- **latest after 5.0 seconds with an automatic initiation,**
- **latest after 10.0 seconds with an initiation by a second deliberate action**

whatever is appropriate.

(g) The lateral movement described in paragraph 5.6.4.6.4. is not continuous.

Amend par 3.5.1.2 Annex 8, to read:

3.5.1.2. The requirements of the test are fulfilled if:

(a) The lateral movement towards the marking does not start earlier than 1 second after the lane change procedure was initiated,

(b) The lateral movement to approach the lane marking and the lateral movement necessary to complete the lane change manoeuvre are completed as one continuous movement,

(c) The recorded lateral acceleration does not exceed 1m/s^2,

(d) The moving average over half a second of the lateral jerk does not exceed 5 m/s^3,

(e) The measured time between the start of the lane change procedure and the start of the lane change manoeuvre is not less than 3.0s and not more than**:**

- 5.0 seconds **with an automatic initiation**,
- **10.0 s with an initiation by a second deliberate action**

whatever is appropriate.

(f) The system provides an information to the driver to indicate that the lane change procedure is on-going,

(g) The lane change manoeuver is completed in less than 5s for M1, N1 vehicle categories and less than 10s for M2, M3, N2, N3 vehicle categories,

(h) ACSF of Category B1 automatically resumes after the lane change procedure is completed, and

(i) The direction indicator is deactivated not before the end of the lane change manoeuvre and no later than 0.5 seconds after B1 has resumed**, in case the lateral movement is initiated automatically.**

Amend par 3.5.4.1 Annex 8, to read:

3.5.4.1. The test vehicle shall be driven in a lane of a straight test track, which has at least two lanes in the same direction of travel, with road markings on each side of the lanes.

The vehicle speed shall be V_{smin} + 10km/h.

The ACSF of Category C shall be activated (standby mode) and another vehicle shall approach from the rear in order to enable the system as specified in paragraph 5.6.4.8.3. above.

The approaching vehicle shall then pass the vehicle under test entirely.

A Lane Change Procedure shall then be initiated by the driver.

The test shall be repeated for each of the following conditions, which shall occur before the lane change manoeuvre has started:

(a) The system is overridden by the driver;

(b) The system is switched off by the driver;

(c) The vehicle speed is reduced to : V_{smin}-10 km/h;

(d) The driver has removed his hands from the steering control and the hands-off warning has been initiated;

(e) The direction indicator lamps are manually deactivated by the driver;

(f) The lane change manoeuvre has not commenced within 5.0 s following the initiation of the lane change procedure. (e.g., another vehicle is driving in the adjacent lane in a critical situation as described in 5.6.4.7.) **or 10.0 seconds if initiated by a second deliberate action.**

Amend par 3.5.7.1.1 Annex 8, to read:

3.5.7.1.1. Following a new engine start /run cycle performed by the driver, the test vehicle shall be driven in a lane of a straight test track, which has at least two lanes in the same direction of travel, with road markings on each side of the lanes.

The ACSF of Category C shall not be activated (off mode) and another vehicle shall approach from the rear and the approaching vehicle shall pass the vehicle entirely.

~~The direction indicator used to initiate a lane change procedure shall be activated by the driver for a period greater than 5 seconds.~~

A lane change procedure and manoeuvre shall then be initiated by the driver with the appropriate deliberate action(s).

Amend par 3.5.7.2.1 Annex 8, to read:

3.5.7.2.1. Following a new engine start / run cycle performed by the driver, the test vehicle shall be driven in a lane of a straight test track, which has at least two lanes in the same direction of travel, with road markings on each side of the lanes.

The ACSF of Category C shall be manually activated (standby mode).

A lane change procedure **and manoeuvre** shall then be initiated by the driver **with the appropriate deliberate action(s).**

Amend par 3.5.7.3.1 Annex 8, to read:

3.5.7.3.1. Following the completion of the test phase 2, another vehicle shall approach from the rear on the adjacent lane in order to enable the system as specified in paragraph 5.6.4.8.3.

The approaching vehicle shall be a type approved high volume series production vehicle.

The distance between the rear end of the test vehicle and the front end of the approaching vehicle shall be measured (e.g. with a differential GPS), and the value when the system detects the approaching vehicle be recorded.

After the rear coming vehicle has entirely passed the vehicle under test, a lane change procedure **and manoeuvre** shall be initiated by the driver **with the appropriate deliberate action(s).**

3. Justifications

Introduction:

This proposal does not change at all the current requirements of the ACSF-C with 1-step HMI.

The proposal is to add provisions for ACSF-C 2-step HMI while keeping the main performance of the system e.g. rear sensor range, critical situations, minimum distance and minimum operating speed, etc.

Proposal:

Paragraph 5.6.4.6.4.: For the lane change function with one-step HMI, the lane change manoeuvre shall be initiated between the 3rd and the 5th second after the initiation of the lane change procedure.

The lane change function with 2-step HMI is a quite natural HMI, closer to manual lane change:
the driver has full control on the timing of the 2 steps of a Lane Change, i.e. initiating the lane change procedure, then initiating the lateral movement, by two deliberate actions.
This permits to increase the maximum time between the Lane Change Procedure and the Lane Change Manoeuvre.
So, it is proposed for the lane change manoeuvre to be started after a second deliberate action and between the 3rd and the 10th second after the initiation of the lane change procedure.

The driver will have to perform two different actions in a short time frame. Moreover, he should still continue to drive and be supervising its environment. That's why it is important that the control of the second deliberate action shall be located close to the steering control area (e.g.: Push button on the steering wheel….)

Paragraph 5.6.4.6.7.: As the lane change function with 2-step HMI is closer to manual lane change, we propose to keep the possibility for this function to have an automatic or a manual deactivation of the direction indicator.

Paragraph 5.6.4.6.8.1. In this paragraph are described the conditions that lead to an automatic suppression of the lane change procedure. For the lane change with 2-step HMI, the lane change manoeuvre shall commence before the 10th second. Otherwise, the lane change procedure shall be suppressed and ACSF-B1 shall resume.

Annex 8 : The testing procedure is then adapted according to the above requirements.