

Submitted by the Chair of  
the IWG on ACSF

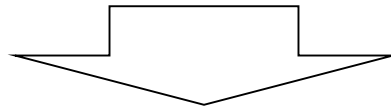
Informal document **GRVA-04-36**  
4<sup>th</sup> GRVA session, 24. Sep – 27. Sep. 2019,  
Agenda item 4(c)

# **Status of the Informal Working Group on ACSF**

Summary of ACSF IWG Meetings – 22<sup>nd</sup> and 23<sup>rd</sup> Session

# Schedule of IWG on ACSF

- **22<sup>nd</sup> meeting** was held from 9<sup>th</sup> to 11<sup>th</sup> April 2019 (Brussels, Belgium)
- **Small Drafting Group** was held from 28<sup>th</sup> to 29<sup>th</sup> May 2019 (Berlin, Germany)
- **23<sup>rd</sup> meeting** was held from 30<sup>th</sup> July to 1<sup>st</sup> August 2019 (Brussels, Belgium)



**IWG ACSF would like to present the current situation of discussions**

# Overview of the discussion topics on requirements for Automated Lane Keep System on highways

- Scope
- General Requirements
- Activation, Deactivation and Driver Input
- Dynamic Driving Task, and Sensing Capabilities
- Driver Availability Recognition System
- Transition Demand and System Operation during Transition
- Minimum Risk Manoeuvre
- Emergency Manoeuvre

## ■ Scope

### Agreed principle

- The following set of requirements applies to “Automated Lane Keeping System (ALKS) for low speed application”, a system which is initiated/activated by the driver and which keeps the vehicle within its lane by influencing the lateral movement of the vehicle and controls the longitudinal movement of the vehicle for extended periods without further driver command/confirmation at the speed of [60] km/h or below.
- This system applies to vehicles of categories M1.

# ■ General Requirements

## Agreed principle

- The activated system shall cope with all dynamic driving tasks and situations including failures.
- If determined necessary, the activated system shall issue a transition demand with sufficient lead time.
- The activated system shall comply with all relevant road traffic regulations in the country of operation.

# ■ Activation, Deactivation and Driver Input

## Agreed principle

- The system shall become active only upon a deliberate action by the driver and all the following condition are met:
  - The driver is in the driver seat and the driver's safety belt is fastened,
  - the driver is available to take over control of the dynamic driving task,
  - no failure affecting the safe operation or the functionality of the ALKS is present,
  - DSSAD is operational,
  - the environmental and infrastructural conditions allow the operation and
  - the vehicle is 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.

# ■ Activation, Deactivation and Driver Input

## Agreed principle

- It shall be possible to manually deactivate (off-mode) the system by an intentional action of the driver using the same means as to activate the system.
- The means of deactivating shall provide protection against unintentional manual deactivation.
- Driver override by steering, accelerating or braking shall be permissible
- It shall be ensured the driver is in control of the vehicle at the time of the deactivation

## Discussion points

- How to confirm that ‘the driver is in control of the vehicle’ before deactivating the system
- When the driver is responding to the transition demand, is it enough to confirm the driver is holding the steering control, or is it necessary to check additional criteria to confirm ‘the driver is in control of the vehicle’?

# ■ Activation, Deactivation and Driver Input

## Discussion point

- What status should the driver assistance systems be after the ALKS deactivation?

<Option 1>

Return to the status which was at right before the ALKS activation (e.g. if the ACSF category B1 and ACC were ON, it is possible to return to the B1 and ACC mode)

<Option 2>

It is not permissive to shift to the functions which allow the driver remove his/her hands/foot off from the steering/accelerator/braking control (because the driver should become in charge of the steering/accelerator/braking control after the system deactivation to avoid his/her mode confusion)



# ■ Dynamic Driving Task, and Sensing Capabilities

## Discussion point

- The minimum following distance shall be calculated using the formula:

$$d_{\min} = v_{\text{ALKS}} * t_{\text{front}}$$

Where:

- $d_{\min}$  = the minimum following distance
- $v_{\text{ALKS}}$  = the actual speed of the ALKS vehicle in [m/s];
- $t_{\text{front}}$  = minimum time gap in seconds between the ALKS vehicle and a leading vehicle in front as per the table below:

Actual travel speed of the ALKS vehicle is greater than ...		Minimum time gap in seconds
km/h	m/s	[s]
0	0	[1,0]
10	2,78	[1,1]
20	5,56	[1,2]
30	8,33	[1,3]
40	11,11	[1,4]
50	13,89	[1,5]
60	16,67	[1,6]

# ■ Driver Availability Recognition

## Agreed principle

Driver presence:

- Check use of the seat belt
- Check driver's presence in the seat

## Discussion point

- It is desirable to establish detailed criteria for driver availability recognition, but on the other hand establishing standardized criteria can be difficult since it is still a technologically premature area and it may also lead to restricting future technological development.

# ■ Transition Demand

## Agreed principle

- System shall detect its limits and always issue a transition demand before/upon reaching the limits, System shall work properly during the whole transition phase
- Transition phase shall be long enough for human drivers (not sleeping; no medical issues) to take over manual control again.
- Warning during transition phase shall be escalating and demanding to encourage the driver to take over the control manually as soon as possible.
- Vehicle is not allowed to be brought to standstill by the system during the transition phase except when the traffic situation requires it.
- System shall be deactivated automatically after a transition phase except a MRM is started.
- a minimum risk manoeuvre shall be started automatically, earliest [10 s] after the start of the transition demand

## ■ Minimum Risk Manoeuvre

### Agreed principle

- Only starts after a transition demand if the driver has not taken over manual control.
- System shall be deactivated automatically after MRM.
- In case of severe vehicle failure or severe ALKS failure, it is permissible to directly initiate MRM without issuing transition demand

### Guidance point

- If the system [is designed to / intends to] perform lane change manoeuvres during the MRM, should Lane change maneuver during MRM be allowed for the low speed ALKS?
- If lane change manoeuvres are to be allowed, it is necessary to discuss/develop additional requirements and test procedure but it may be difficult to complete within the timeframe of the current mandate.

# ■ Emergency Manoeuvre (EM)

## Agreed principle

- Only allowed if traffic situation requires to prevent / mitigate imminent collision.
- Full deceleration capabilities of the vehicle and evasive manoeuvre in the lane allowed.
- No transition demand required; EM works in parallel with ongoing transition phase/MRM with higher priority for EM.

## Discussion point

- After an Emergency Manoeuvre the system shall [continue to operate/initiate a transition demand].

## Guidance point

- If the system is capable of confirming and has confirmed that no critical situation, should crossing the lane marking during the evasive manoeuvre be allowed for the low speed ALKS ?
- If crossing the lane marking during the evasive manoeuvre is to be permitted, it is necessary to discuss/develop additional requirements and test procedure but it may be difficult to complete within the timeframe of the current mandate.

# Summary

- IWG ACSF discussion is proceeding in conformity with the principles and the guidelines of the framework document.
- IWG ACSF has made **progress** in defining core technical requirements for ALKS on highways, with **many in-depth discussions** about these **very complex issues**.
- IWG ACSF focuses on only the low speed system in order to finalize the draft proposal for submission to 5<sup>th</sup> GRVA.
- Work Plan until 5th GRVA:  
Two IWG ACSF meetings (November in Barcelona, January TBD) and several web-ex meetings are planned.