

This requirement is established based on the general principles and concepts below:

- System Scope
 - SAE level 3 Automated Driving System (driver's presence in the driver seat is necessary)
 - The system operates by intention of the driver under limited circumstances
 - When the system is in operation the driver can stop its operation anytime by intentional input
 - When the system is in operation the system performs all the necessary driving tasks in accordance with traffic regulations
 - When the system is in operation the system detects automatically those situations where the system cannot anticipate performing driving tasks safely and warns the driver to switch back to manual operation by the driver.
- Relationship between System and Driver
 - Legally automated driving falls under 'driving' and system user falls under 'driver'
 - Driver control is prioritized over system control
- Driver Responsibility when Using Automated Driving System
 - Driver is responsible for using the system properly and thereby partially relieved from the responsibility of constant monitoring
 - During automated driving, the driver is responsible for at least staying alert to recognize system warnings and when needed cancel the system operation and switch back to manual operation by the driver.

2.3. General Requirements

- 2.3.1 The system shall have the capability to detect failures affecting the safe operation or the functionality of the ALKS.

Justification:

As Level 3 Automated Driving System, ALKS must ensure that it is capable of coping with failure situations that affects the safe operation and functioning of the system, and this is only achievable on condition that the system is capable of detecting such failures.

- 2.3.2. The activated system shall cope with all dynamic driving tasks and with any situation including failures or shall otherwise transition the control back to the driver offering sufficient lead time.

Any type of situation in which the vehicle will generate a transition demand to the driver shall be declared by the vehicle manufacturer and documentation shall be provided together with the documentation package required in Annex [X] [CEL].

Justification:

As Level 3 Automated Driving System, ALKS must ensure that when in operation it is capable of carrying out all dynamic driving tasks. When

there is a situation where it is impossible to continue dynamic driving task, the dynamic control must be transferred back to the driver within adequate transition period.

The situations where transition demands are generated may vary depending on the system hence all the possible situations applicable to the system must be declared to the Technical Service.

- 2.3.3. The activated system shall comply with all relevant traffic regulations in the country of operation

Justification:

As Level 3 Automated Driving System, ALKS must ensure that it is capable of complying with the traffic regulations concerning dynamic driving tasks in the country of operation so that the system can carry out adequately those dynamic driving tasks as specified in 2.3.2 in place of the driver. This concept was agreed during the #23 IWG. The wording 'regulations' is in line with the description under the framework document adopted at the #178WP29.

- 2.4. Activation, Deactivation and Driver Input

- 2.4.1. The vehicle shall be equipped with a means for the driver to activate (active mode) and deactivate (off mode) the system.

Justification:

As Level 3 Automated Driving System, ALKS must ensure that it offers means so that the driver can deliberately activate/deactivate the system. This concept was agreed during the #23 IWG.

- 2.4.2. The default status of the system shall be the off mode at the initiation of each new engine start/run cycle. This requirement does not apply when a new engine start/run cycle is performed automatically, e.g. by the operation of a stop/start system.

Justification:

As Level 3 Automated Driving System, ALKS must be designed so that its default setting is OFF, and the driver shall confirm his/her intention to use the system by turning on the system at every ignition cycle. In this context, stop/start system operation is considered as the same ignition cycle. This concept was agreed during the #23 IWG.

- 2.4.3. 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 according to paragraph 2.6.,
- the driver is available to take over control of the dynamic driving task according to paragraph 2.6.,

- 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.
- [after ignition on the system has at least once detected an object at the same or a higher distance than that declared as detection range according to paragraph 2.5.6.1.

Justification:

As Level 3 Automated Driving System, ALKS must be designed so that, in addition to the requirement that the driver shall intentionally turn on the system, it shall also confirm that certain conditions required to secure the safe operation of the system are met before allowing the system activation. This concept was agreed during the #23 IWG.

2.4.4. Manual Deactivation

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, as mentioned in paragraph 2.4.1. The means of deactivating shall provide protection against unintentional manual deactivation for example by requiring a single input exceeding a certain threshold of time or a double press, or two separate but simultaneous inputs. Additionally, it shall be ensured the driver is in lateral control of the vehicle at the time of the deactivation, by e.g. placing the deactivation means on the steering control or confirming the driver is holding the steering control.

Justification:

During the 23 session, the IWG agreed that as Level 3 Automated Driving System, ALKS must be designed so that the driver can manually deactivate the system at any time, and it should be possible to do so using the same means as the ones used for activation so that it is easily understood by the driver. The IWG also identified that it is necessary to ensure such deactivation shall not be caused by the driver's unintentional input, and also ensure that the driver is in a condition to take over the vehicle control once deactivated.

2.4.5. Automatic Deactivation

The system shall not be automatically deactivated by any driver input other than those described in 2.4.5.1, 2.4.5.2 and 2.4.5.3.

Justification:

It is not appropriate to allow the system to abruptly stop its operation. Automatic deactivation of the system is therefore only allowed in those cases where the driver intentionally overrides the system (2.4.5.1) or where the driver takes over the driving task in response to a TD (2.4.5.2. and

2.4.5.3). *In this context, it is not appropriate to strictly restrict those deactivation conditions as it may lead to increasing those risks of confusing the drivers by not allowing their intended deactivation and causing the vehicle undergo MRM (stop on the road). The IWG recognizes that such deactivation should be achieved under well-balanced conditions.*

2.4.5.1. Deactivation by input to driving controls

The system shall be deactivated automatically when at least one of the following conditions is met.

- The driver maintains the vehicle in standstill for at least [1] s by any braking system
- The driver overrides the system by steering, while holding the steering control, and this override is not suppressed, as specified in paragraph 2.4.8
- The driver is holding the steering control and overrides the system by braking or accelerating, as specified in paragraph of 2.4.8

Justification:

The system shall be automatically deactivated when the driver intentionally overrides the system and is ready to take over the driving task. Based on the IWG discussions this section prescribes specific cases of such condition.

- *When the vehicle is stationary: When the vehicle is stationary and the driver controls the brake system for a certain period of time, it is assumed that the driver has the intention to take control of the vehicle and stationary is a safe condition for the driver to take over the driving task, and therefore the system is deactivated automatically*
- *When the driver overrides by steering control: When the driver holds the steering control and gives steering input overriding the lateral control of the system, it is assumed that the driver has the intention to take control of the vehicle and has already taken over the driving task, and therefore the system is deactivated automatically.*
- *When the driver overrides by brake or acceleration control: When the driver gives braking or acceleration input overriding the longitudinal control of the system, it is assumed that the driver has the intention to take control of the vehicle, but readiness to safely take over the driving task is assumed only when the driver is holding the steering control, at which point the system is deactivated automatically. It is not permissive to deactivate the system automatically when the driver is not holding the steering control, since there is a risk that the driver may not be ready to safely take over the driving task.*

2.4.5.2. Deactivation during an ongoing transition demand initiated by the system

In the case where a transition demand [initiated by the system] is on-going, the system shall be deactivated automatically upon detection that the driver has

taken hold of the steering control as a response to the transition demand, provided the system confirms the driver is attentive as per 2.4.5.2.1.

Justification:

When the driver holds the steering control in reaction to a Transition Demand initiated by the system, it is assumed that the driver has the intention to take over the driving task. In addition, the driver's readiness to take control of the vehicle is assumed by confirming attentiveness of the driver, i.e. not being involved in secondary activity and not looking away from the road, and then the system is deactivated automatically. Confirming the steering input is not appropriate for some cases, e.g. when the vehicle is moving straight forward, where no steering input required hence confirming the driver's holding the steering control is considered most sufficient and effective.

2.4.5.2.1. Driver attentiveness shall be confirmed by at least one of the following criteria:

- Driver gaze direction is being confirmed as primarily looking at the road ahead

- Driver head movement is being confirmed as primarily directed towards the road ahead, or

alternative criteria to be defined by the manufacturer

The specification for confirming these criteria must be declared by the manufacturer and supported by documented evidence. This shall be assessed by the technical service according to Annex X (CEL).

Justification :

During #23 IWG it was agreed that driver attentiveness must be confirmed before system deactivation after TD initiated by the system. This paragraph was added during the #23 IWG to specify criteria for confirming the driver's readiness to take control of the vehicle before system deactivation.

(Para 2.6, on the other hand, specifies the criteria for monitoring the driver's condition to be able to react to a TD throughout the ALKS operation hence serves a different purpose.)

Driver attentiveness can be assumed when the driver's eye gaze and/or head orientation is confirmed to be in the forward direction. Alternative criteria for confirming driver attentiveness may also be accepted but such method and judgment criteria shall be declared and submitted in the documentation by the manufacturer and assessed by the Technical Service.

2.4.5.3. Deactivation during an ongoing transition demand initiated by the driver input

In the case where a transition demand initiated by the driver input is on-going, the system shall be deactivated automatically upon detection that the driver has taken hold of or inputted to the steering control.

Justification:

In the case where a transition demand was initiated by the driver input, it is assumed that the driver has the intention to take over the driving task and when the driver holds the steering control or gives steering input it is assumed that the driver is ready to take control of the vehicle, then therefore the system is deactivated automatically.

Paras 2.4.5, 2.4.5.1 and 2.4.5.2 were revised by France/NL/UK/Germany during #23 IWG. Para 2.4.5.3. was added to address differences in the system deactivation conditions between the cases where a TD was initiated by the driver input and where a TD initiated by the system.

- 2.4.6. Following a deactivation, the driver may only be supported in his driving task by any driver assistance function which was active at the time of the activation of the ALKS or which was activated during the operation of the ALKS, [except such driver assistance functions which allow the driver make his/her hands be off from the steering control, or his/her foot be off from both the accelerator control and the braking control].

[The manufacturer shall provide evidence that suitable information is provided to the driver to ensure mode awareness when changing from ALKS to assisted driving mode.]

[Any longitudinal control that will be active after the deactivation of the ALKS shall not exceed upon [automatic] activation the speed limit valid at the time of deactivation of the ALKS.]

Justification:

The IWG has been discussing possible concept regarding Driver Assistance System operation after ALKS deactivation

Option 1:

[After ALKS deactivation the driver shall be able to use driver assistance functions of level 2 or below. However, to avoid causing mode confusion, steering, acceleration and braking control must be solely controlled by the driver. If the driver wants to use driver assistance functions providing steering, acceleration or braking control, such driver assistance functions must be turned on by the driver.]

Option 2:

[After ALKS deactivation the driver shall be able to use driver assistance functions of level 2 or below, provided the manufacturer submits the evidence to prove such mode change from ALKS to the driver assistance function is sufficiently informed to the driver. In this situation, longitudinal control after ALKS deactivation shall not exceed the speed limit at the time of ALKS deactivation.]

- 2.4.7. An automatic deactivation shall be indicated to the driver by an optical and an acoustic signal. The acoustic signal is not required when the deactivation occurs following a transition demand that contains an acoustic signal.

Justification:

When the system was automatically deactivated, it should be indicated to the driver. When deactivation was caused by the driver's input in reaction to a transition demand which includes acoustic signal, however, acoustic signal shall not be required since it would be redundant. This concept was agreed during the #23 IWG.

- 2.4.8. System override

- 2.4.8.1. A driver input to the steering control shall override the lateral control function of the system when the input exceeds a reasonable threshold (e.g. based on force and duration) designed to prevent unintentional override.

This threshold including a possible variation depending on parameters like speed, gaze direction of the driver, or a second deliberate action (e.g. the use of the turn indicator accompanying the steering input) and the rationale for the variation shall be provided to the Technical Service during the assessment according to Annex X (CEL).

Justification:

As Level 3 Automated Driving System, ALKS must be designed so that when the system is in operation the driver shall be prioritized over the system and capable of overriding lateral control of the vehicle by giving steering input. Such override, however, should not be caused by the driver's unintentional input and therefore such input must be judged with appropriate threshold. Appropriate judgment threshold setting may depend on several parameters such as input speed, eye gaze or second reaction of the driver (e.g. use of direction indicator), so if there are variations, rationality of such variation setting must be explained to the Technical Service during the assessment. This concept was agreed during the #23 IWG.

- 2.4.8.2. A driver input to the braking control resulting in a higher deceleration than that induced by the system shall override the longitudinal control function of the system.

Justification:

As Level 3 Automated Driving System, ALKS must be designed so that when the system is in operation the driver shall be prioritized over the system and capable of overriding longitudinal control. However, when the deceleration by the driver input is smaller than the deceleration induced by the system, the braking distance will become longer if such override is permitted. Therefore, it should be specified that the driver's override of longitudinal control shall only be acceptable when the driver's deceleration input is greater than that of the system.

- 2.4.8.3. A driver input to the accelerator control may override the longitudinal control function of the system. However, such an input shall not cause the system to

no longer meet the requirements of this regulation, unless the driver is holding the steering control.

Justification:

As Level 3 Automated Driving System, when ALKS is in operation the driver is prioritized over the system but when the driver gives acceleration input while the vehicle is under the system control, permitting such longitudinal override unconditionally may cause the vehicle overspeeding or excessively approaching the front vehicle. Therefore, the driver's override of longitudinal control shall be permitted only when the driver is holding the steering control i.e. ready to take control of the vehicle, and otherwise it is limited to the accepted range of speed, vehicle distance, etc. under the requirement.

- [2.4.8.4. Notwithstanding the provisions laid down in paragraphs 2.4.8.1. to 2.4.8.3., the effect of the driver input on any control may be reduced or suppressed by the system in case the system has detected the risk of a collision due to this driver input.]

Justification:

As Level 3 Automated Driving System, when ALKS is in operation the driver is prioritized over the system but when the system detects that the received driver input could increase the risk of collision, it is permissible to reduce or suppress the driver's input. This clause however is causing some conflicts as the basic concept of Level 3 systems prioritizes the driver input over the system so questionable if it should be acceptable to reduce or suppress the driver input. This paragraph therefore is kept in square brackets for further consideration.

- 2.4.8.5. Any system override due to driver input to the accelerator or brake control shall immediately initiate a transition demand as specified in paragraph 2.7.

Justification:

When the driver gave acceleration or braking input, a transition demand (2.7) is initiated to prompt the driver to hold or control the steering control.

- 2.4.9. In case of a severe vehicle failure or a severe ALKS failure the ALKS may employ different strategies with regard to deactivation and override. These different strategies shall be declared by the manufacturer and their efficiency with regard to ensuring a safe transition of control back to the driver shall be assessed by the Technical Service.

Justification:

During the #23 session it was agreed that it shall be acceptable to immediately initiate MRM and bring the vehicle to a halt in case where a severe vehicle failure or ALKS failure that affect the safe operation of the vehicle has been detected (para 2.7). In this case, the system deactivation/override strategies may need to be changed from those under the normal condition. The detail of such strategies needs to be declared by the manufacture to the Technical Service.

2.4.10. The fulfilment of the provisions in paragraph 2.4 and its subparagraphs shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex X [CEL].

Justification:

The manufacture must demonstrate that the system is in compliant with all the requirements under paragraph 2.4. to the Technical Service under Annex X [CEL].
