Submitted by the experts of OICA and CLEPA

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Agenda item 4(d)

Proposal for amendments to the new UN Regulation No. [157] on ALKS

This document was produced during an informal meeting (on 23 September 2020) of interested experts who reviewed the documents presented at GRVA on 22 September 2020 and tried to combine the different proposals. They marked in green what they considered uncontroversial. They marked in yellow the text for which detailed review would be needed.

1. Proposal

1. Scope and purpose

1.1. This Regulation applies to the type approval of vehicles of Category M_1[1] with regards to their Automated Lane Keeping System.

2. Definitions

For the purposes of this Regulation:

2.1. "*Automated Lane Keeping System (ALKS)*" for low speed application is a system which is activated by the driver and which keeps the vehicle within its lane for travelling speed of 60 km/h or less by controlling the lateral and longitudinal movements of the vehicle for extended periods without the need for further driver input.

Within this Regulation, ALKS is also referred to as "*the system*".

2.1.1. "*Vehicle Type with regard to Automated Lane Keeping System (ALKS)*" means a category of vehicles which do not differ in such essential aspects as:

(a) Vehicle features which significantly influence the performances of ALKS;

(b) The system characteristics and design of ALKS.

2.2. "*Transition demand*" is a logical and intuitive procedure to transfer the Dynamic Driving Task (DDT) from the system (automated control) to the human driver (manual control). This request is given from the system to the human driver.

2.3. "*Transition phase*" means the duration of the transition demand.

2.4. "*Planned event*" is a situation which is known in advance, e.g. at the time of activation such as a journey point (e.g. exit of a highway) etc. and which requires a transition demand.

2.5. "*Unplanned event*" is a situation which is unknown in advance, but assumed as very likely in happening, e.g. road construction, inclement weather, approaching emergency vehicle, missing lane marking, load falling from truck (collision) and which requires a transition demand.

Paragraph 2.6., amend to read

[1] As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.6, para. 2 - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

"2.6. "*Imminent collision risk*" describes a situation or an event which **would** lead~~s~~ to a collision of the vehicle with another road user or an obstacle ~~which cannot be avoided by a braking demand with lower than 5 m/s²~~. **unless an emergency manoeuvre is carried out.**"

2.7. "*Minimum Risk Manoeuvre (MRM)*" means a procedure aimed at minimising risks in traffic, which is automatically performed by the system after a transition demand without driver response or in the case of a severe ALKS or vehicle failure**.**

2.8. "*Emergency Manoeuvre (EM)*" is a manoeuvre performed by the system in case of an event in which the vehicle is at imminent collision risk and has the purpose of avoiding or mitigating a collision.

2.9. Speed

2.9.1. "*Specified maximum speed*" is the speed declared by the manufacturer up to which the system operates under optimum conditions.

2.9.2. "*Maximum operational speed*" is the speed selected by the system up to which the system operates under current environmental and sensor conditions. It is the maximum vehicle speed at which the system may be active and shall be determined by the capability of the sensing system as well as the environmental conditions.

2.9.3. "*Present speed*" or "*speed*" is the current speed selected by the system due to traffic.

2.10. "*Detection range*" of the sensing system is the distance at which the system can reliably recognise a target, taking account of the deterioration of components of the sensing system due to time and usage throughout the lifetime of the **system** ~~vehicle~~ and generate a control signal.

2.11. Failures

2.11.1. An "*ALKS failure*" is any single failure specific to the operation of the ALKS (e.g. single sensor failure, loss of necessary calculation data for the driving path of the vehicle).

2.11.2. "*Failure mode*" is the operation status of the system in which the system operates with an ALKS failure.

2.11.3. A "*severe ALKS failure*" is a failure specific to the operation of the ALKS that affects the safe operation of the system when in failure mode with a very low probability of occurrence such as generally used for essential components as e.g. an electronic control unit. Single sensor failures are only considered as such when accompanied by another influence affecting the safe operation of the system.

2.11.4. A "*severe vehicle failure*" is any failure of the vehicle (e.g. electrical, mechanical) that affects the ability of the ALKS to perform the DDT and would also affect the manual operation of the vehicle (e.g. loss of power supply, failure of the braking system, sudden loss of tire pressure).

2.12. "*Self-check*" means an integrated function which checks for any system failure and for the detection range of the sensing system on a continuous basis.

2.13. A "*system override*" by the driver means a situation when the driver provides an input to a control which has priority over the longitudinal or lateral control of the system, while the system is still active.

2.14. "*Dynamic Driving Task (DDT)*" is the control and execution of all longitudinal and lateral movements of the vehicle.

2.15. "*Data Storage System for Automated Driving (DSSAD)*" enables the determination of interactions between the ALKS and the human driver.

2.16. "*Lifetime of the system*" is the period of time during which the ALKS system is available, as a function, on the vehicle.

2.17. "*Occurrences*" means, in the context of DSSAD provisions in paragraph 8, an action or instance of an arising event or incident, which requires storage within the data storage system.

2.18. "*R15~~X~~7 Software Identification Number (~~R15x SWIN~~ **R157SWIN**)*" means a dedicated identifier, defined by the vehicle manufacturer, representing information about the type approval relevant software of the Electronic Control System contributing to the UN Regulation No. 15~~X~~7 type approval relevant characteristics of the vehicle.

2.19. "*Electronic control system*" means a combination of units, designed to co-operate in the production of the stated automated lane keeping function by electronic data processing. Such systems, commonly controlled by software, are built from discrete functional components such as sensors, electronic control units and actuators and connected by transmission links. They may include mechanical, electro-pneumatic or electro-hydraulic elements.

2.20. "*Software*" means the part of an ~~E~~electronic ~~C~~control ~~S~~system that consists of digital data and instructions.

3. Application for approval

3.1. The application for approval of a vehicle type with regard to the ALKS shall be submitted by the vehicle manufacturer or by the manufacturer's authorized representative.

3.2. It shall be accompanied by the documents mentioned below in triplicate:

3.2.1. A description of the vehicle type with regard to the items mentioned in paragraph 2.1.1., together with a documentation package as required in Annex 1 which gives access to the basic design of the ALKS and the means by which it is linked to other vehicle systems or by which it directly controls output variables. The numbers and/or symbols identifying the vehicle type shall be specified.

3.3. A vehicle representative of the vehicle type to be approved shall be submitted to the Technical Service conducting the approval tests.

4. Approval

4.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraph 5 to 9 below, approval of that vehicle shall be granted.

4.2. An approval number shall be assigned to each type approved; its first two digits (at present 00 corresponding to the 00 series of amendments, its original version) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another vehicle type.

4.3. Notice of approval or of refusal or withdrawal of approval pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 1 and documentation supplied by the applicant being in a format not exceeding A4 (210 x 297 mm), or folded to that format, and on an appropriate scale or electronic format.

4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type

approved under this Regulation, an international approval mark conforming to the model described in Annex 2, consisting of:

4.4.1. A circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval;[2]

4.4.2. The number of this Regulation, followed by the letter "R", a dash and the approval number to the right of the circle prescribed in paragraph 4.4.1. above.

4.5. If the vehicle conforms to a vehicle type approved under one or more other Regulations, annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1. above need not be repeated; in such a case, the Regulation and approval numbers and the additional symbols shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1. above.

4.6. The approval mark shall be clearly legible and be indelible.

4.7. The approval mark shall be placed close to or on the vehicle data plate.

5. System Safety and Fail-safe Response

The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 (in particular for conditions not tested under Annex 5) and according to the relevant tests in Annex 5.

5.1. General Requirements

~~The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 (in particular for conditions not tested under Annex 5) and according to the relevant tests in Annex 5.~~

5.1.1. The activated system shall perform the DDT shall manage all situations including failures, and shall be free of unreasonable risks for the vehicle occupants or any other road users.

The activated system shall not cause any collisions that are reasonably foreseeable and preventable. If a collision can be safely avoided without causing another one, it shall be avoided. When the vehicle is involved in a detectable collision, the vehicle shall be brought to a standstill.

5.1.2. The activated system shall comply with traffic rules relating to the DDT in the country of operation.

5.1.3. The activated system shall exercise control over systems required to support the driver in resuming manual control at any time (e.g. demist, windscreen wipers and lights).

5.1.4. A transition demand shall not endanger the safety of the vehicle occupants or other road users.

5.1.5. If the driver fails to resume control of the DDT during the transition phase, the system shall perform a minimum risk manoeuvre. During a minimum risk manoeuvre, the system shall minimise risks to safety of the vehicle occupants and other road users.

5.1.6. The system shall perform self-checks to detect the occurrence of failures and to confirm system performance at all times (e.g. after vehicle start the system

[2] The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev. 6 - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

has at least once detected an object at the same or a higher distance than that declared as detection range according to paragraph 7.1.).

5.1.7. The effectiveness of the system shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by compliance with the 05 or later series of amendments to UN Regulation No. 10.

5.1.8. The manufacturer shall take measures to guard against reasonably foreseeable misuse by the driver and tampering of the system.

Paragraph 5.1.9 amend to read (need to check the other paragraphs)

"5.1.9. When the system can no longer meet the requirements of this Regulation, it shall not be possible to activate the system.

The manufacturer shall declare and implement a process to manage the safety and continued compliance of the ALKS ~~system~~ over **the** lifetime **of the system**."

5.2. Dynamic Driving Task

~~The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 (in particular for conditions not tested under Annex 5) and according to the relevant tests in Annex 5.~~

5.2.1. The activated system shall keep the vehicle inside its lane of travel and ensure that the vehicle does not cross any lane marking (outer edge of the front tyre to outer edge of the lane marking). The system shall aim to keep the vehicle in a stable lateral position inside the lane of travel to avoid confusing other road users.

5.2.2. The activated system shall detect a vehicle driving beside as defined in paragraph 7.1.2. and, if necessary, adjust the speed and/or the lateral position of the vehicle within its lane as appropriate.

5.2.3. The activated system shall control the speed of the vehicle.

5.2.3.1. The maximum speed up to which the system is permitted to operate is 60 km/h.

5.2.3.2. The activated system shall adapt the vehicle speed to infrastructural and environmental conditions (e.g. narrow curve radii, inclement weather).

5.2.3.3. The activated system shall detect the distance to the next vehicle in front as defined in paragraph 7.1.1. and shall adapt the vehicle speed in order to avoid collision.

While the ALKS vehicle is not at standstill, the system shall adapt the speed to adjust the distance to a vehicle in front in the same lane to be equal or greater than the minimum following distance.

In case the minimum time gap cannot be respected temporarily because of other road users (e.g. vehicle is cutting in, decelerating lead vehicle, etc.), the vehicle shall readjust the minimum following distance at the next available opportunity without any harsh braking unless an emergency manoeuvre would become necessary.

The minimum following distance shall be calculated using the formula:

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

Where:

d_{min} = the minimum following distance

v_{ALKS} = the present speed of the ALKS vehicle in m/s

t_{front} = minimum time gap in seconds between the ALKS vehicle and a leading vehicle in front as per the table below:

Present speed of the ALKS vehicle		*Minimum time gap*	*Minimum following distance*
(km/h)	(m/s)	(s)	(m)
7.2	2.0	1.0	2.0
10	2.78	1.1	3.1
20	5.56	1.2	6.7
30	8.33	1.3	10.8
40	11.11	1.4	15.6
50	13.89	1.5	20.8
60	16.67	1.6	26.7

For speed values not mentioned in the table, linear interpolation shall be applied.

Notwithstanding the result of the formula above for present speeds below 2 m/s the minimum following distance shall never be less than 2 m.

5.2.4. The activated system shall be able to bring the vehicle to a complete stop behind a stationary vehicle, a stationary road user or a blocked lane of travel to avoid a collision. This shall be ensured up to the maximum operational speed of the system.

"5.2.5. The activated system shall detect the risk of collision in particular with another road user ahead or beside the vehicle, due to a decelerating lead vehicle, a cutting in vehicle or a suddenly appearing obstacle and shall automatically perform appropriate manoeuvres to minimize risks to safety of the vehicle occupants and other road users.

~~For conditions not specified in paragraphs 5.2.4., 5.2.5. or its subparagraphs, this shall be ensured at least to the level at which a competent and careful human driver could minimize the risks. This shall be demonstrated in the assessment carried out under Annex 4. and by taking guidance from Appendix 3 to Annex 4.~~"

5.2.5.1. The activated system shall avoid a collision with a leading vehicle which decelerates up to its full braking performance provided that there was no undercut of the minimum following distance the ALKS vehicle would adjust to a leading vehicle at the present speed due to a cut in manoeuvre of this lead vehicle.

5.2.5.2. The activated system shall avoid a collision with a cutting in vehicle,

(a) Provided the cutting in vehicle maintains its longitudinal speed which is lower than the longitudinal speed of the ALKS vehicle and

(b) Provided that the lateral movement of the cutting in vehicle has been visible for a time of at least 0.72 seconds before the reference point for *TTCLaneIntrusion* is reached,

(c) When the distance between the vehicle's front and the cutting in vehicle's rear corresponds to a TTC calculated by the following equation:

$$TTCLaneIntrusion > vrel/(2{\cdot}6\text{m/s}^2) + 0.35s$$

Where:

Vrel = relative velocity between both vehicles, positive for vehicle being faster than the cutting in vehicle

TTCLaneIntrusion = The TTC value**,** when the outside of the tyre of the intruding vehicle's front wheel closest to the lane markings crosses a line 0.3 m beyond the outside edge

of the visible lane marking to which the intruding vehicle is being drifted.

5.2.5.3. The activated system shall avoid a collision with an unobstructed crossing pedestrian in front of the vehicle.

In a scenario with an unobstructed pedestrian crossing with a lateral speed component of not more than 5 km/h where the anticipated impact point is displaced by not more than 0.2 m compared to the vehicle longitudinal center plane, the activated ALKS shall avoid a collision up to the maximum operational speed of the system.

5.2.5.4. It is recognised that the fulfilment of the requirement in paragraph 5.2.5. may not be fully achieved in other conditions than those described above. However, the system shall not deactivate or unreasonably switch the control strategy in these other conditions. This shall be demonstrated in accordance with Annex 4 of this Regulation.

*Insert new paragraphs 5.2.6. and 5.2.7.*to read:

"5.2.6. Reserved (Lane Change)

5.2.7. For conditions not specified in paragraphs 5.2.4., 5.2.5. or its subparagraphs, the performance of the system shall be ensured at least to the level at which a competent and careful human driver could minimize the risks. The attentive human driver performance model and related parameters in the traffic critical disturbance scenarios from Annex 3 may be taken as guidance. The capabilities of the system shall be demonstrated in the assessment carried out under Annex 4."

5.3. Emergency Manoeuvre (EM)

~~The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 and according to the relevant tests in Annex 5.~~

5.3.1. An ~~E~~emergency ~~M~~manoeuvre shall be carried out in case of an imminent collision risk.

5.3.1.1. Any longitudinal deceleration demand of more than 5.0 m/s² of the system shall be considered to be an ~~EM~~ **emergency manoeuvre**.

5.3.2. This manoeuvre shall decelerate the vehicle up to its full braking performance if necessary and/or may perform an automatic evasive manoeuvre, when appropriate.

If failures are affecting the braking or steering performance of the system, the manoeuvre shall be carried out with consideration for the remaining performance.

During the evasive manoeuvre the ALKS vehicle shall not cross the lane marking (outer edge of the front tyre to outer edge of the lane marking).

After the evasive manoeuvre the vehicle shall aim at resuming a stable position.

5.3.3. An emergency manoeuvre shall not be terminated, unless the imminent collision risk disappeared, or the driver deactivated the system.

5.3.3.1. After an emergency manoeuvre is terminated the system shall continue to operate.

5.3.3.2. If the emergency manoeuvre results in the vehicle being at standstill, the signal to activate the hazard warning lights shall be generated. If the vehicle automatically drives off again, the signal to deactivate the hazard warning lights shall be generated automatically.

5.3.4. The vehicle shall implement a logic signal indicating emergency braking as specified in UN Regulation No. 13-H.

5.4. Transition demand and system operation during transition phase

~~The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 (in particular for conditions not tested under Annex 5) and according to the relevant tests in Annex 5.~~

5.4.1. The activated system shall recognise all situations in which it needs to transition the control back to the driver.

Types of situations in which the vehicle will generate a transition demand to the driver shall be declared by the vehicle manufacturer and included in the documentation package required in Annex 4.

5.4.2. The initiation of the transition demand shall be such that sufficient time is provided for a safe transition to manual driving.

5.4.2.1. In case of a planned event that would prevent the ALKS from continuing the operation, a transition demand shall be given early enough to ensure the minimal risk maneuver, in case the driver would not resume control, would bring the vehicle to standstill before the planned event occurs.

5.4.2.2. In case of an unplanned event, a transition demand shall be given upon detection.

5.4.2.3 In case of any failure affecting the operation of the system, the system shall immediately initiate a transition demand upon detection.

5.4.3. During the transition phase the system shall continue to operate. The system may reduce the speed of the vehicle to ensure its safe operation but shall not bring it to standstill unless required by the situation (e.g. due to vehicles or obstacles obstructing the path of the vehicle) or when caused by a haptic warning according to paragraph 6.4.1 started at speeds below 20 km/h.

5.4.3.1. Once in standstill the vehicle may remain in this condition and shall generate the signal to activate the hazard warning lights within 5 s.

5.4.3.2. During the transition phase, the transition demand shall be escalated latest after 4 s after the start of the transition demand.

5.4.4. A transition demand shall only be terminated once the system is deactivated or a minimum risk manoeuvre has started.

5.4.4.1. In case the driver is not responding to a transition demand by deactivating the system (either as described in paragraph 6.2.4. or 6.2.5.), a minimum risk manoeuvre shall be started, earliest 10 s after the start of the transition demand.

5.4.4.1.1. Notwithstanding paragraph 5.4.4.1. a minimum risk manoeuvre may be initiated immediately in case of a severe ALKS or severe vehicle failure.

In case of a severe ALKS or vehicle failure the ALKS may no longer be capable of fulfilling the requirements of this Regulation, but it shall aim at enabling a safe transition of control back to the driver.

5.4.4.1.2. The manufacturer shall declare the types of severe vehicle failures and severe ALKS failures that will lead the ALKS to initiate a MRM immediately.

5.5. Minimum Risk Manoeuvre (MRM)

~~The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 (in particular for conditions not tested under Annex 5) and according to the relevant tests in Annex 5.~~

5.5.1. During the minimum risk manoeuvre the vehicle shall be slowed down inside the lane or, in case the lane markings are not visible, remain on an appropriate

trajectory taking into account surrounding traffic and road infrastructure, with an aim of achieving a deceleration demand not greater than 4.0 m/s².

Higher deceleration demand values are permissible for very short durations, e.g. as haptic warning to stimulate the driver's attention, or in case of a severe ALKS or severe vehicle failure.

Additionally, the signal to activate the hazard warning lights shall be generated with the start of the minimum risk manoeuvre.

5.5.2. The minimum risk manoeuvre shall bring the vehicle to standstill unless the system is deactivated by the driver during the manoeuvre.

5.5.~~4~~3. A minimum risk manoeuvre shall only be terminated once the system is deactivated or the system has brought the vehicle to a standstill.

5.5.~~5~~4. The system shall be deactivated at the end of any minimum risk manoeuvre.

The hazard warning lights shall remain activated unless deactivated manually and the vehicle shall not move away after standstill without manual input.

5.5.~~6~~5. Reactivation of the system after the end of any minimum risk manoeuvre shall only be possible after each new engine start/run cycle.

6. Human Machine Interface/operator information

The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 and according to the relevant tests in Annex 5.

6.1. Driver Availability Recognition System

~~The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 and according to the relevant tests in Annex 5.~~

6.1.1. The system shall comprise a driver availability recognition system.

The driver availability recognition system shall detect if the driver is present in a driving position, if the safety belt of the driver is fastened and if the driver is available to take over the driving task.

6.1.2. Driver presence

A transition demand shall be initiated according to paragraph 5.4. if any of the following conditions is met:

(a) When the driver is detected not to be in the seat for a period of more than one second; or

(b) When the driver's safety belt is unbuckled.

The second level warning of the safety-belt reminder according to UN-R16 may be used instead of an acoustic warning of the Transition Demand.

6.1.3. Driver availability

The system shall detect if the driver is available and in an appropriate driving position to respond to a transition demand by monitoring the driver.

The manufacturer shall demonstrate to the satisfaction of the technical service the vehicle's capability to detect that the driver is available to take over the driving task.

6.1.3.1. Criteria for deeming driver availability

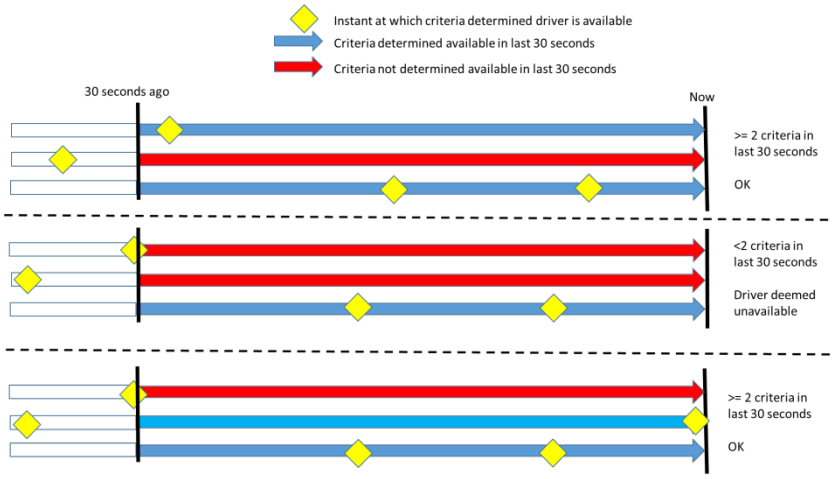
The driver shall be deemed to be unavailable unless at least two availability criteria (e.g. input to driver-exclusive vehicle control, eye blinking, eye

closure, conscious head or body movement) have individually determined that the driver is available in the last 30 seconds.

At any time, the system may deem the driver unavailable.

As soon as the driver is deemed to be unavailable, or fewer than two availability criteria can be monitored, the system shall immediately provide a distinctive warning until appropriate actions of the driver are detected or until a transition demand is initiated. At the latest, a transition demand shall be initiated according to paragraph 5.4. if this warning continues for 15s.

Justification for the number and combination of availability criteria, in particular with regard to the corresponding time interval, shall be provided by the manufacturer by documented evidence. However, the time interval required for any availability criteria shall not exceed 30 seconds. This shall be demonstrated by the manufacturer and assessed by the technical service according to Annex 4.



6.1.4. "*Other activities than driving*" through on-board displays available upon activation of the ALKS shall be automatically suspended (i) as soon as the system issues a ~~T~~transition ~~D~~demand or (ii) as soon as the system is deactivated, whichever comes first.

6.2. Activation, Deactivation and Driver Input

~~The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 and according to the relevant tests in Annex 5.~~

6.2.1. The vehicle shall be equipped with dedicated means for the driver to activate (active mode) and deactivate (off mode) the system. When the ALKS is activated, the means to deactivate ALKS shall be permanently visible to the driver.

6.2.2. 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.

6.2.3. The system shall become active only upon a deliberate action by the driver and if all the following conditions are met:

(a) The driver is in the driver seat and the driver's safety belt is fastened according to paragraphs 6.1.1. and 6.1.2.;

(b) The driver is available to take over control of the DDT according to paragraph 6.1.3.;

(c) No failure affecting the safe operation or the functionality of the ALKS is present;

(d) DSSAD is operational;

(e) The environmental and infrastructural conditions allow the operation;

(f) Positive confirmation of system self-check; and

(g) 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.

If any of the above conditions is no longer fulfilled, the system shall immediately initiate a transition demand unless specified differently in this Regulation.

6.2.4 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 6.2.1.

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.

6.2.5. In addition to paragraph 6.2.4., the system shall not be deactivated by any driver input other than those described below in paragraphs 6.2.5.1. to 6.2.5.4.

6.2.5.1. Deactivation by input to driving controls

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

(a) The driver overrides the system by steering while holding the steering control and this override is not suppressed, as specified in paragraph 6.3.; or

(b) The driver is holding the steering control and overrides the system by braking or accelerating, as specified in paragraph 6.3.1. below.

6.2.5.2. Deactivation during an ongoing transition demand or an ongoing minimum risk manoeuvre

In case a transition demand or a minimum risk manoeuvre is on-going, the system shall only be deactivated:

(a) As defined in paragraph 6.2.5.1. or

(b) Upon detection that the driver has taken hold of the steering control as a response to the transition demand or the minimum risk manoeuvre and provided the system confirms the driver is attentive as defined in paragraph 6.3.1.1.

6.2.5.3. Deactivation during an ongoing emergency manoeuvre

In case of an ongoing emergency manoeuvre, the deactivation of the system may be delayed until the imminent collision risk disappeared.

6.2.5.4. Deactivation in case of a severe vehicle failure or a severe ALKS failure

In case of a severe vehicle failure or a severe ALKS failure the ALKS may employ different strategies with regard to deactivation.

These different strategies shall be declared by the manufacturer and their effectiveness shall be assessed by the Technical Service with regard to ensuring a safe transition of control from the system to the human driver according to Annex 4.

6.2.6. On deactivation of the system, there shall not be an automatic transition to any function, which provides continuous longitudinal and/or lateral movement of the vehicle (e.g. ACSF of Category B1 function).

After deactivation, Corrective Steering Function (CSF) may be active with the aim at accustoming the driver to execute the lateral control task by gradually reducing lateral support.

Notwithstanding both paragraphs above, any other safety system delivering longitudinal or lateral support in imminent collision situations (e.g. Advanced Emergency Braking System (AEBS), Electronic Stability Control (ESC), Brake Assist System (BAS) or Emergency Steering Function (ESF)) shall not be deactivated in case of deactivation of ALKS.

6.2.7. Any deactivation shall be indicated to the driver as defined in paragraph 6.4.2.3.

6.3. System override

6.3.1. A driver input to the steering control shall override the lateral control function of the system when the input exceeds a reasonable threshold designed to prevent unintentional override.

This threshold shall include a specified force and duration and shall vary depending on parameters that include criteria used for driver attentiveness to be checked during the drivers input as defined in paragraph 6.3.1.1.

These thresholds and the rational for any variation shall be demonstrated to the Technical Service during the assessment according to Annex 4.

6.3.1.1. Driver attentiveness

The system shall detect if the driver is attentive. The driver is deemed to be attentive when at least one of the following criteria is met:

(a) Driver gaze direction is confirmed as primarily looking at the road ahead;

(b) Driver gaze direction is being confirmed as looking at the rear-view mirrors; or,

(c) Driver head movement is confirmed as primarily directed towards the driving task.

The specification for confirming these or equally safe criteria must be declared by the manufacturer and supported by documented evidence. This shall be assessed by the technical service according to Annex 4.

6.3.2. A driver input to the braking control resulting in a higher deceleration than that induced by the system or maintaining the vehicle in standstill by any braking system, shall override the longitudinal control function of the system.

6.3.3. 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.

6.3.4. Any driver input to the accelerator or brake control shall immediately initiate a transition demand as specified in paragraph 5.4., when the input exceeds a reasonable threshold designed to prevent unintentional input.

6.3.5. Notwithstanding the provisions laid down in paragraphs 6.3.1. to 6.3.3., the effect of the driver input on any control may be reduced or suppressed by the system in case the system has detected an imminent collision risk due to this driver input.

6.3.6. In case of a severe vehicle failure or a severe ALKS failure the ALKS may employ different strategies with regard to system override. These different strategies shall be declared by the manufacturer and their effectiveness shall be assessed by the Technical Service with regard to ensuring a safe transition of control from the system to the human driver.

~~6.3.7. The fulfilment of the provisions in paragraph 6.3 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 4.~~

6.4. Information to the driver

6.4.1. The following information shall be indicated to the driver:

(a) The system status as defined in paragraph 6.4.2.

(b) Any failure affecting the operation of the system with at least an optical signal unless the system is deactivated (off mode),

(c) Transition demand by at least an optical and in addition an acoustic and/or haptic warning signal.

At the latest 4 s after the initiation of the transition demand, the transition demand shall:

(i) Contain a constant or intermittent haptic warning unless the vehicle is at standstill; and

(ii) Be escalated and remain escalated until the transition demand ends.

(d) Minimum risk manoeuvre by at least an optical signal and in addition an acoustic and/or a haptic warning signal and

(e) Emergency manoeuvre by an optical signal

The optical signals above shall be adequate in size and contrast. The acoustic signals above shall be loud and clear.

6.4.2. System status

6.4.2.1. System unavailability indication

In case activation of the system following the deliberate action of the driver is denied by the system due to system unavailability, this shall be at least visually displayed to the driver.

6.4.2.2. System status display when activated

Upon activation the system status (active mode) shall be displayed by a dedicated optical signal to the driver.

The optical signal shall contain an unambiguous indication including:

(a) A steering control or a vehicle, with an additional "A" or "AUTO," or the standardized symbols in accordance with UN Regulation No. 121, and additionally

(b) An easily perceptible indication in the peripheral field of vision and located near the direct line of driver’s sight to the outside in front of the vehicle, e.g. prominent indication in the instrument cluster or on the steering control covering part of the outer rim perimeter facing towards the driver.

The optical signal shall indicate the active system state until the system is deactivated (off mode).

The optical signal shall be constant while the system is in regular operation and with the initiation of a transition demand at least the indication according to (b) shall change its characteristics, e.g. to an intermittent signal or a different colour.

When an intermittent signal is used, a low frequency shall be used in order to not unreasonably alert the driver.

During the transition phase and minimum risk manoeuvre, the indication according to (a) may be replaced by the instruction to take over manual control according to paragraph 6.4.3.

6.4.2.3. System status display when deactivated

Upon deactivation when the system status changes from active mode to off mode this shall be indicated to the driver by at least an optical warning signal. This optical signal shall be realized by non-displaying the optical signal used to indicate the active mode or non-displaying the instruction to take over manual control.

Additionally, an acoustic warning signal shall be provided unless the system is deactivated following a transition demand which contained an acoustic signal.

6.4.3. Transition Phase and Minimum Risk Manoeuvre

During the transition phase and the ~~M~~minimum ~~R~~risk ~~M~~manoeuvre, the system shall instruct the driver in an intuitive and unambiguous way to take over manual control of the vehicle. The instruction shall include a pictorial information showing hands and the steering control and may be accompanied by additional explanatory text or warning symbols, as shown in the example below.

Example 1.

Example 2.

6.4.3.2. With the start of the minimum risk manoeuvre, the given signal shall change its characteristics to emphasize the urgency of an action by the driver. e.g. by red flashing of the steering control and moving hands of the pictorial information.

6.4.4. Where examples are given above, an adequate and equally perceptible interface design for the optical signals may be used instead. This shall be demonstrated by the manufacturer and shall be supported by documented evidence. This shall be assessed by the Technical Service according to Annex 4.

6.4.5. Prioritization of ALKS warnings

The warnings of an ALKS during a transition phase, a ~~M~~minimum ~~R~~risk ~~M~~manoeuvre or an ~~E~~emergency ~~M~~manoeuvre may be prioritized over other warnings in the vehicle.

The prioritization of different acoustic and optical warnings during the ALKS operation shall be declared by the manufacturer to the Technical Service during Type Approval.

7. Object and Event Detection and Response (OEDR)

The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 and according to the relevant tests in Annex 5.

7.1. Sensing requirements

~~The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4 and according to the relevant tests in Annex 5.~~

The ALKS vehicle shall be equipped with a sensing system such that, it can at least determine the driving environment (e.g. road geometry ahead, lane markings) and the traffic dynamics:

(a) Across the full width of its own traffic lane, the full width of the traffic lanes immediately to its left and to its right, up to the limit of the forward detection range;

(b) Along the full length of the vehicle and up to the limit of the lateral detection range.

The requirements of this paragraph are without prejudice to other requirements in this Regulation, most notably paragraph 5.1.1.

7.1.1. Forward detection range

The manufacturer shall declare the forward detection range measured from the forward most point of the vehicle. This declared value shall be at least 46 metres.

The Technical Service shall verify that the distance at which the vehicle sensing system detects a road user during the relevant test in Annex 5 is equal or greater than the declared value.

7.1.2. Lateral detection range

The manufacturer shall declare the lateral detection range. The declared range shall be sufficient to cover the full width of the lane immediately to the left and of the lane immediately to the right of the vehicle.

The Technical Service shall verify that the vehicle sensing system detects vehicles during the relevant test in Annex 5. This range shall be equal or greater than the declared range.

7.1.3. The ALKS shall implement strategies to detect and compensate for environmental conditions that reduce the detection range, e.g. prevent enabling the system, disabling the system and transferring the control back to the driver, reducing the speed when visibility is too low. These strategies shall be described by the manufacturer and assessed according to Annex 4.

Paragraph 7.1.4., amend to read

"7.1.4. The vehicle manufacturer shall provide evidence that the effects of wear and ageing do not reduce the performance of the sensing system below the minimum required value specified in paragraph 7.1. over the lifetime of the system~~/vehicle~~."

7.1.5. The fulfilment of the provisions of paragraph 7.1. and its subparagraphs shall be demonstrated to the technical service and tested according to the relevant tests in Annex 5.

7.1.6. A single perception malfunction without failure should not induce hazardous event. The design strategies put in place shall be described by the vehicle manufacturer and their safety shall be demonstrated to the satisfaction of the technical service in accordance with Annex 4.

8. Data Storage System for Automated ~~Systems~~ Driving (DSSAD)

The fulfilment of the provisions of this paragraph shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4.

8.1. **Fitment**

Each vehicle equipped with ALKS (the system) shall be fitted with a DSSAD that meets the requirements specified below. ~~The fulfilment of the provisions of paragraph 8 shall be demonstrated by the manufacturer to the technical service during the inspection of the safety approach as part of the assessment to Annex 4.~~

This Regulation is without prejudice to national and regional laws governing access to data, privacy and data protection.

8.2. Recorded occurrences

8.2.1. Each vehicle equipped with a DSSAD shall at least record an entry for each of the following occurrences upon activation of the system:

(a) Activation of the system

(b) Deactivation of the system, due to:

(i) Use of dedicated means for the driver to deactivate the system;

(ii) Override on steering control;

(iii) Override by accelerator control while holding steering control;

(iv) Override by braking control while holding steering control.

(c) Transition Demand by the system, due to:

(i) Planned event;

(ii) Unplanned event;

(iii) Driver unavailability (as per para. 6.1.3);

(iv) Driver not present or unbuckled (as per para. 6.1.2.);

(v) System failure;

(vi) System override by braking input;

(vii) System override by accelerator input.

(d) Reduction or suppression of driver input;

(e) Start of Emergency Manoeuvre;

(f) End of Emergency Manoeuvre;

(g) Event Data Recorder (EDR) trigger input;

(h) Involved in a detected collision;

(i) Minimum Risk Manoeuvre engagement by the system;

(j) Severe ALKS failure;

(k) Severe vehicle failure.

8.3. Data elements

8.3.1. For each event listed in paragraph 8.2., the DSSAD shall at least record the following data elements in a clearly identifiable way:

(a) The occurrence flag, as listed in paragraph 8.2;

(b) Reason for the occurrence, as appropriate, and listed in paragraph 8.2.;

(c) Date (Resolution: yyyy/mm/dd);

(d) Timestamp:

(i) Resolution: hh/mm/ss timezone e.g. 12:59:59 UTC;

(ii) Accuracy: +/- 1.0 s.

8.3.2. For each event listed in paragraph 8.2., the **R_{15X7}SWIN** for ALKS, or the software versions relevant to ALKS, indicating the software that was present at the time when the event occurred, shall be clearly identifiable.

8.3.3. A single timestamp may be allowed for multiple elements recorded simultaneously within the timing resolution of the specific data elements. If more than one element is recorded with the same timestamp, the information from the individual elements shall indicate the chronological order.

8.4. Data availability

8.4.1. DSSAD data shall be available subject to requirements of national and regional law.[3]

8.4.2. Once the storage limits of the DSSAD are achieved, existing data shall only be overwritten following a first in first out procedure with the principle of respecting the relevant requirements for data availability.

Documented evidence regarding the storage capacity shall be provided by the vehicle manufacturer.

8.4.3. The data shall be retrievable even after an impact of a severity level set by UN Regulations Nos. 94, 95 or 137. If the main on-board vehicle power supply is not available, it shall still be possible to retrieve all data recorded on the DSSAD, as required by national and regional law.

8.4.4. Data stored in the DSSAD shall be easily readable in a standardized way via the use of an electronic communication interface, at least through the standard interface (OBD port).

8.4.5. Instructions from the manufacturer shall be provided on how to access the data.

8.5. Protection against manipulation.

8.5.1. It shall be ensured that there is adequate protection against manipulation (e.g. data erasure) of stored data such as anti-tampering design.

8.6. Availability of DSSAD operation

8.6.1. DSSAD shall be able to communicate with the system to inform that the DSSAD is operational.

9. Cyber Ssecurity and Software-Updates

9.1. **Cyber security and cyber security management system**

The effectiveness of the system shall not be adversely affected by cyber-attacks, cyber threats and vulnerabilities. The effectiveness of the security measures shall be demonstrated by compliance with UN Regulation No. 15~~Z~~5.

9.2. **Software update and software updates management system**

If the system permits software updates, the effectiveness of the software update procedures and processes shall be demonstrated by compliance with UN Regulation No. 15~~Y~~6.

9.3. Requirements for software identification

9.3.1. For the purpose of ensuring the software of the System can be identified, an R_{15X7}SWIN may be implemented by the vehicle manufacturer. If R_{15X7}SWIN is not implemented, an alternative software identification system (i.e. software version) shall be implemented.

9.3.2. If the manufacturer implements an R_{15X7}SWIN the following shall apply:

9.3.2.1. The vehicle manufacturer shall have a valid approval according to UN Regulation No. 15~~Y~~6 (Software Update Regulation).

[3] Note: based on a recent quantitative study of a Contracting Party, GRVA is considering that the text specifies several timestamps specifications of 2500 timestamps to correspond with a period of 6 months of use.

9.3.2.2. The vehicle manufacturer shall provide the following information in the communication form of this Regulation:

(a) The R_{15X7}SWIN

(b) How to read the R_{15X7}SWIN or software version(s) in case the R_{15X7}SWIN is not held on the vehicle

9.3.2.3. The vehicle manufacturer may provide in the communication form of this Regulation a list of the relevant parameters that will allow the identification of those vehicles that can be updated with the software represented by the R_{15X7}SWIN. The information provided shall be declared by the vehicle manufacturer and may not be verified by an Approval Authority.

9.3.3. The vehicle manufacturer may obtain a new vehicle approval for the purpose of differentiating software versions intended to be used on vehicles already registered in the market from the software versions that are used on new vehicles. This may cover the situations where type approval regulations are updated or hardware changes are made to vehicles in series production. In agreement with the testing agency, duplication of tests shall be avoided where possible.

Annex 1.

Item 11.2., amend to read:

"11.2. Information document: **see Addendum 1** ~~form (Appendix 2 of Annex 4)~~....."

Add the following paragraps after item 19.2.:

"19.2. If applicable, list the relevant parameters that will allow the identification of those vehicles that can be updated with the software represented by the R_{15X}SWIN under item 19.1.: .....

Addendum 1: Information document for automated lane keeping systems (refer to Appendix 1)."

Addendum 2: Contracting Parties where the vehicle manufacturer has declared that the ALKS had been assessed to comply with local traffic rules (refer to Appendix 2)."

Add Appendix 1 – the former Appendix 2 to Annex 4.

Appendix (former) consider as Appendix 2. Header and the sentence before the table, amend to read:

"Addendum 2 to Type approval Communication No … concerning the type approval of a vehicle type with regard to ALKS pursuant to Regulation No. [157]

Additional information

Contracting **Parties** ~~Party~~ ~~regions~~ where the vehicle manufacturer has declared that the ALKS had been assessed to comply with local traffic rules:"

Annex 3, add the content of the former Appendix 3 to Annex 4.

Annex 4:

Paragraph 1., amend to read:

"The requirements of this Annex ~~is~~ **are** intended to ensure that an acceptable thorough consideration of functional and operational safety for the automated system that provides the function(s) regulated by the ALKS Regulation has

been performed by the manufacturer during the design and development processes and will continue to be done throughout the vehicle type lifecycle (design, development, production, field operation, decommissioning).

The requirements cover ~~It covers~~ the documentation which must be disclosed by the manufacturer to the type-approval authority or the technical Service acting on its behalf (hereafter referred **to** as type-approval authority), for type approval purposes **and verification to be carried out by the type-approval authority**.

This documentation shall demonstrate that automated lane-keeping system meets the performance requirements specified in **paragraphs 5., 6., 7. and 8. of** this UN Regulation, ~~that~~ ~~it~~ **as that system** is designed and developed to operate in such a way that it is free of unreasonable safety risks to the driver, passengers, and other road users. ..."

"automated driving function" and "automated driving system" should be used in the whole Annex 4

3.1.1. Documentation shall be made available in three parts:

(a) Application for type approval: The information document which is submitted to the type approval authority at the time of type approval application shall contain brief information on the items listed in ~~Appendix 2~~ **Appendix 1 to Annex 2**1. It will become part of the approval."

Add new paragraph 4.0. to read:

"4. Verification and test

Taking into account the results of the analysis of the manufacturer's documentation package referred to in paragraph 3, the Type Approval Authority shall request the tests to be performed or witnessed by the Technical Service to check specific points arisen from the audit evaluation."

Paragraph 4.1.1., amend to read:

"4.1.1. Verification of the function of "The System"

...

~~Tests according to this Annex shall take into account tests already conducted in Annex 5 of this Regulation.~~

These tests can be based on scenarios listed in Annex 5 and/or on additional scenarios not covered by Annex 5."

Paragraph 4.1.1.1., amend to read:

"4.1.1.1. The ~~verification~~ **test** results shall correspond with the description, including the control strategies, provided by the manufacturer in paragraph 3.2. and shall comply with the requirements of this Regulation."

Paragraph 4.2., amend to read:

"4.2. Simulation tool and mathematical models for verification of the safety concept may be used in accordance with Schedule 8 of Revision 3 of the 1958 Agreement, in particular for scenarios that are difficult on a test track or in real driving conditions. Manufacturers shall demonstrate the scope of the simulation tool, its validity for the scenario concerned as well as the validation performed for the simulation tool chain (correlation of the outcome with

physical tests). **Simulation shall not be a substitute for physical tests in Annex 5 to this UN Regulation."**

Paragraph 6., delete:

"6. Reserved ~~Communication to other Type Approval Authorities (Appendix 2) containing:~~

~~(a) Description of the ODD and the high-level functional architecture focusing on the functions available to the driver, vehicle occupants and other road users.~~

~~(b) Test results during the verification process by the type approval authorities."~~

Appendix 2 to Annex 4: move to Annex 1 as Appendix 1 to Annex 1.

Appendix 2 (former) to Annex 4:

Paragraph 7., amend to read:

"7. Reserved
~~7. Verification and test by the authorities~~

~~7.1. Verification of the basic function of "The System" .....~~

~~7.2. Examples for checking the system reaction under the influence of a failure or an operational disturbance, emergency conditions and boundary conditions .....~~"

Appendix 3 to Annex 4: move to Annex 3.

Annex 5:

Paragraph 1., amend to read:

"This annex defines tests with the purpose to verify the technical requirements on ALKS.. **All tests performed under this annex shall be performed or witnessed by the Technical Service during the approval process as specified below**

Until such time that specific test provisions have been agreed, the ~~Technical Service shall ensure that the ALKS is subject to at least the tests outlined in Annex 5. The~~ specific test parameters for each test shall be selected by the Technical Service and shall be recorded in the test report in such a manner that allows traceability and repeatability of the test setup. ..."

Annex 5, Paragraph 4., amend to read

"4. Test scenarios to assess the performance of the system with regard to the dynamic driving task

At the time of type approval, the Technical Service shall conduct or shall witness at least the following tests to assess the behaviour of the ALKS:

Paragraph 5.2., amend to read:

"5.2. Compliance with the following provisions shall be demonstrated by the manufacturer **as part of the assessment under Annex 4** and ~~assessed~~ **be verified** by the Technical Service ~~at the time of type approval~~ **as part of the tests under section 4. and section 5.4. of this Annex."**

Reference in main text	*Test/Check*
6.2.2.	Off mode after new engine start/run
6.2.3	System can only be activated if
	(a) The driver is in driver seat & belt is fastened
	(b) The driver is available
	(c) No failures
	(d) DSSAD operational
	(e) **Environmental and infrastructural c**~~C~~onditions are within system limits
6.2.1	**Dedicated m**~~M~~eans ~~of~~ **for activation and deactivation** ~~deactivating~~
~~6.2.4~~	~~Dedicated means to activate and deactivate~~
6.2.~~5~~**4.**	**Means of deactivation is** protected against unintentional action
6.2.~~6~~**5.**	~~Steering~~ **Deactivation by input to driving controls**
	(a) Holding ~~wheel~~ **steering control** and brake/accelerate
	(b) Driver ~~holds steering wheel~~ **takes hold of steering control** in response to transition and MRM
	(c) ~~After deactivation~~ **Steering while holding the steering control**
6.3	Means to override the system
	(a) Steering control
	(b) Braking input higher than system
	(c) Accelerating to speed within system limits
6.3.1.1.	**Driver attentiveness**
6.1.3.1.	Criteria for deeming driver available
5.1.3	**Exercise control over systems required to support the d**~~D~~river ~~support systems active~~
~~6.3.1.1.~~	~~Driver attentiveness~~
5.5	System behaviour during a ~~M~~**m**inimal ~~R~~**r**isk ~~M~~**m**anoeuvre
	(a) **Termination only upon d**~~D~~river take over **or standstill**
	(b) **Activation of hazard warning lights when reaching s**~~S~~tandstill ~~(harzard lights)~~
	(c) Re-activation disabled if ~~reached standstill~~ **MRM was triggered**
5.1.4	Transition demand & behaviour/escalation
5.1.5	~~Driver resumes control~~ **Initiation of an MRM after Transition Demand**

Reference in main text	*Test/Check*
5.4	~~Without driver response (MRM)~~ **Events leading to a Transition Demand**
	(a) Planned transition
	(b) Unplanned transition
6.1.2	Transition demand ~~during operation~~ **when driver not present or unbuckled**
~~6.1.3~~	~~Exceed system parameters~~
5.4.**2.3.**	**Transition Demand in case of** Failure
	~~(a) Detectable collision~~
	~~(b) Driver not present~~
5.1.1.	**System reaction in case of a detectable collision**
5.3	System behaviour **during an** ~~for~~ Emergency Manoeuvre
	(a) Resulting in standstill
	(b) Not resulting in standstill
~~7.1~~	~~System detection areas~~
~~7.1.1~~	~~Front~~
~~7.1.2~~	~~Sides~~
~~7.1.3~~	~~Visibility"~~

Annex 5, Paragraph 5.3., amend to read

"5.3. Additional other ~~test cases~~ **scenarios** ~~may~~ **shall** be assessed **(e.g. by physical or virtual testing or appropriate documentation)** if ~~it is~~ deemed justified by the Technical Service. Some of the ~~cases~~ **scenarios** may include:

(a) Y-split of highway lanes

(b) Vehicles entering or exiting the highway …"