List of open issues

Topic	Sub-topic	Open issue(s)	Positions	Status	Text proposal	Reference
Speed increase	1. Expected vehicle behaviour in nominal/complex situations?	**Para 5.2.3.3.: Minimum headway/safety distance**	(DE): For the minimum safety distance the approach was a linear scale with the DE requirement of 1.8 s at speeds of 80 km/h or above and a lower limit of 1.0 s at slow speeds in a traffic jam with an absolute minimum of 2 m). Above (80 km/h /) 100 km/h was defined to meet traffic law (1.8 s (DE) / 2 sec (other CPs)). Interpolation between 60 km/h and 100 km/h. (JP)The table should not be deleted because the requirement like "the vehicle shall not cause collision" is ambiguous and considered differently between TSs, and the minimum requirements for important parameters are effective in order to ensure safety. Without table, there is some concern for approval of ADS with substandard level. Japan is discussing internally the concrete value. Japan will provide proposal at the following SIG. Notwithstanding this requirement, appropriate following distance for complying other requirements (e.g. traffic rules, avoid collisions) should be maintained. (OICA/CLEPA): Industry believes the safety distance is influenced by the collision avoidance requirements. We hoped ALKS would establish an understanding that permitted the ALKS to drive at smaller following distances when able to provide the necessary level of safety and understood the table therefore to describe the actual minimum for ALKS, regardless of human-driver centered traffic rules. When this understanding is overturned, the table is of no benefit and could be removed, as safety is already ensured by the following provisions on collision avoidance with stationary obstacles.	TBD	DE text: Paragraph 5.2.3.3., amend to read: 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 a 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: [FORMULA] [TABLE **(amended speeds > 60 kph)**] 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. **The requirements of this paragraph are without prejudice to other requirements in this Regulation, most notably paragraphs 5.2.4. and 5.2.5. with subparagraphs.** EC proposal: Paragraph 5.2.3.3., amend to read: 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 a 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 **this** ~~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:~~ **[FORMULA + TABLE deleted]** **The requirements of this paragraph are without prejudice to other requirements in this Regulation, most notably paragraphs 5.2.4. and 5.2.5. with subparagraphs.**	ECE/TRANS/WP.29/GRVA/2020/32 (DE proposal) UNR157-02-07 +UNR157-02-07 (OICA/CLEPA) UNR157-03-04 (SE) UNR157-03-06 (EC) UNR157-03-08 (JP)
			JRC: No need for a table as already covered by collision avoidance requirements+risk for traffic flow+possible contradiction with traffic rules. SE: Keep the table (as proposed by DE) UK : keen to keep the table as 2 sec is in traffic rules			
		String stability: No negative effect on traffic flow	EC: String stability general requirements as in 03-06 (OICA/CLEPA): Instability often results from driver expected behavior (e.g. driving off quickly, driving at fairly low following distance requiring strong system response to other road users). None of this applies to the ALKS. The ALKS "can take its time", driving off moderately, reacting less strong because of the higher following distances. Therefore we do not really see this as an issue that should explicitly be addressed. As long as the provisions on collision avoidance remain as they are there will be little freedom for lower following distances anyway. (JP)It is premature to implement this requirement because there are few vehicles with ADS in the market.	TBD	EC proposals: Insert new definitions to read: **2.x. "Stability of vehicle and driver system" is the ability of the system composed by the vehicle and the driver, either human or non-human, to recover the initial safe motion after a disturbance.** **2.x "String stability" is the capability of the ALKS vehicle to react to a perturbation in the speed profile of the vehicle in front, whose speed profile directly affects the speed profile of the ALKS vehicle, with a perturbation in its speed profile of lower or equal absolute magnitude.** Paragraph 5.2.1., amend to read: 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~~ **motion** inside the lane of travel to avoid confusing other road users.	UNR157-02-07 (OICA/CLEPA) UNR157-03-06 (EC)
				TBD	EC proposal: Paragraph 5.2.7., insert to read: **5.2.7. The stability of the vehicle and driver system is a necessary condition that must be always met, provided that effects of unplanned events disturbing the safe motion are within reasonable limits. This shall be demonstrated in the assessment of the tests carried out in accordance with Annex 4 and 5 of this Regulation.** Paragraph 5.2.8., insert to read: **5.2.8. While following another vehicle the ALKS vehicle shall be string stable. This shall be demonstrated in accordance with Annex 5 of this Regulation.**	
				TBD	EC proposal: Paragraph 5.3.2., amend to read: 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~~ **motion.**	

	Minimum front detection range	Parameters to be used? (DE/FR): 5 m/s2 (modern vehicle braking capability under wet conditions). 0,5 sec reaction time. (SE/JP): 3,7 m/s2+0,5 sec reaction time (SE): Need to redraft the following para to ensure the speed is continuously adapted to ensure the detection range required (according to table), due to different conditions: I*t is recognized that the minimum forward detection range cannot be achieved under all conditions. Nevertheless, the system shall implement appropriate strategies in order to ensure safe operation at all times.* (OICA/CLEPA): 3,7m/s2 were used out of context for ALKS and are the wrong basis as Industry has argued throughout the drafting process of ALKS already. The minimum detection range is that at which the system has to generate a control output at the very latest. Any system fulfilling the requirement will likely detect an obstacle sooner than that, because detection doesn't go from 0 to 100% from one meter to the next. In order to ensure safety, this value must be chosen to ensure the vehicle can safely be brought to standstill. As data shows that even on wet road surfaces the adhesion will permit a deceleration of 5m/s2 this is the appropriate threshold, because any maneuver requirering a higher deceleration would potentially exceed adhesion limits. That's why maneuvers requiring more than 5m/s2 are considered an Emergency Maneuver. Pedestrians on the road are an absolut exception when travelling at 130km/h and should therefore not be required to trigger a "comfort system reaction" as that would likely not be the case with a human driver either.	TBD	Proposal based on DE proposal + group discussion so far: Paragraph 7.1.1., amend to read: 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 **for a specified maximum speed of 60 km/h.** **A specified maximum speed above 60 km/h shall only be declared by the manufacturer, if the declared forward detection range fulfils the corresponding minimum value according the following table:** **[TABLE AMENDED*]** **For values not mentioned in the table, linear interpolation shall be applied.** **It is recognized that the minimum forward detection range cannot be achieved under all conditions. Nevertheless, the system shall implement appropriate strategies (e.g. limited speed in case of bad weather condition) in order to ensure safe operation at all times.** 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. **Point of discussion: parameters to be used for forward detection range: German proposal (5m/s2 deceleration) or alternative value from SE/JP(3,7 m/S2)*	ECE/TRANS/WP.29/GRVA/2020/32 (DE proposal) UNR157-02-07 + UN157-04-08 (OICA/CLEPA) UNR157-03-04 (SE) UNR157-03-08 (JP)
		Point of discussion: (delete the reference to the table as proposed in red by EC) or if the table is kept, parameters as proposed by Germany to be confirmed)		DE proposal: Paragraph 5.2.3.1., amend to read: 5.2.3.1. **Speed** **The manufacturer shall declare the specified maximum speed based on the forward detection range of the system as described in paragraph 7.1.1.** The maximum speed up to which the system is permitted to operate is ~~60~~ **130** km/h.	
	Speed limits: varies in each country, how should they be treated under the Regulation? (JP).	(JP)No need to modify UNR157 text because compliance to speed limit is covered by "traffic rule requirement". (OICA/CLEPA): Agree with Japan. This is covered by traffic rules. we understand this to be the case even with the current ALKS provisions, because the system has to comply with the traffic rules related to the DDT, and even though they do not occur frequently, in some areas speed limits below 60km/h do exist. So this should already be covered by the existing ALKS text. Chair: OK. But still maybe test for speed sign recognition?	TBD		UNR157-02-07 (OICA/CLEPA) UNR157-03-08(JP)
			TBC	DE proposal Paragraph 2.1., amend to read: 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~~ **130** 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".	
	L**ine between type approval/traffic rules** (JP: Are there any cases where following traffic law could cause danger? If so, how should we treat those cases in regulation)	Chair: Priority of safety over traffic rules?? (JP) This issue cannot be dealt with WP29 since vehicle regulation/guideline cannot permit vehicle to break traffic rules. This issue should be considered in WP1. Before reaching any conclusion from the discussion above, we propose to keep the provision of "the activaded system shall comply with traffic rules" in 5.2.1. (OICA/CLEPA): A potential scenario that leads to this conflict could be a situation where an evasive maneuver crossing lane markings could avoid a potential collision, but the lane is marked by a solid line prohibiting lane crossing. In general, traffic rules usually already contain that type of exceptions to these rules. As suggested by EC in ACSF-24-08 a provision like this could be included: "5.1.2. The activated system shall comply with traffic rules relating to the DDT in the country of operation unless there is no other way to avoid an accident." Note: What about violating ALKS requirements in order to avoid a collision?	TBD		UN157-04-08 (OICA/CLEPA)

	Combination of higher speed with lane change: Wouldn't the system have to be able to change lanes e.g. to provide space at a highway entrance?	(OICA/CLEPA) Even when the system was capable of performing lane changes the adjacent lane could be occupied so the system would have to have a strategy to behave safely even if a lane change was not possible. And the same applies for a system that is not capable of a regular lane change. It will have to establish operating strategies to ensure safe operation	TBD		UNR157-02-06 (OICA/CLEPA)
2. Expected reaction of the vehicle to critical situations	**Any differences with ALKS low speed which need particular consideration?**		TBD	DE proposal: Paragraph 5.4.2., amend to read: 5.4.2. The initiation of the transition demand shall be such that sufficient time is provided for a safe transition to manual driving. **Manufacturers shall declare during type approval that drivers' adjustments in and on the vehicle when the system is active (e.g. for the purpose of engaging in non-driving related activities) do not have negative consequences to a take-over in the manual driving phase.**	GRVA/2020/32
	5.2.4. **wrong way driver scenario**	(EC) proposal to include wrong way driver scenarios+ removing the reference to complete stop (depends on the scenario). (JP) The ADS shall detect the risk of "wrong way driver" and perform appropriate manoeuvres to minimize risks. (support EC proposal.). "Appropriate manoeuvre" should be as safe as or better than competent and careful human driver.EC proposal to change "bring the vehicle to a complete stop" to "be able to handle in a safe way" seems not appropriate since this modification seems to change the requirement into less stringent way. Japan proposes to keep the original requirement of 5.2.4 as it is, and add additional paragraph requireing the issues that should be handled in a safe way.	TBD	EC proposal: Paragraph 5.2.4 amend to read: 5.2.4. The activated system shall be able to **handle in a safe way the presence in the same lane of** ~~bring the vehicle to a complete stop behind~~ a stationary vehicle, a ~~stationary~~ road user , **a passable or unpassable obstacle [debris, lost cargo, etc.],** or a blocked lane of travel to avoid a collision. This shall be ensured up to the maximum operational speed of the system.	UNR157-03-06 (EC)
				EC proposal: Paragraph 5.2.5. and its subparagraphs, amend to read: 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, **a vehicle proceeding in the opposite direction** 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 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 **by another vehicle** ~~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.~~ **This shall be demonstrated in accordance with the test specifications defined in Annex 5.**	
				5.2.5.2 The activated system shall avoid a collision with a cutting in vehicle **at least for the conditions for which a competent and attentive human driver supported by state-of-the-art driving assistance or automation systems would also be able to avoid a collision. This shall be demonstrated in accordance with the test specifications defined in Annex 5 of this Regulation and with the performance model defined in Appendix 3 to Annex 4.** ~~(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~~ [DELETE FORMULA]	
		(OICA/CLEPA) If "wrong way driver" is considered a scenario to be assessed this should be added to section 5.3. of Annex 5, because there is no clear pass/fail criteria. While braking is usually an appropriate response, an attempt at evasive steering could potentially lead to an even more devastating accident, when vehicles collide at a small overlap or when both vehicles steer to the same direction.			UN157-04-08 (OICA/CLEPA)
	Scenarios (e.g. cut-in) and **scenario paramaters** as defined currently in UN R 157 appropriate for higher speeds (> 60 km/h)?	(DE) No change proposed on cut-in/ cut-out.deccelerating front vehicles. (EC): Alternative model merging the DE and JP model (JP) If some CPs propose to change the requirement completely (e.g. EC proposal), that proposal should be discussed firstly in FRAV. (OICA/CLEPA) believes the identified relevant scenarios are applicable also for speeds up to 130km/h. The parameters for the test cases will vary, but as they are described in a flexible manner, no amendments are necessary.	TBD	See UNR157-03-06 (EC)	UNR157-03-06 (EC)

		Should Appendix 3 to Annex4 be replaced?	(JP) Current Appendix3 to Annex4 is important to assess the human driver level. Therefore, Japan suggests to keep current Appendix3 with amendment (e.g. speed extension). If other CP requests to add other requirement, we can discuss to add it as other Appendix or something else. (OICA/CLEPA) believes a replacement of Appendix 3 to Annex 4 (recently repositioned to be Annex 3) does not need to be replaced.	TBD	See UNR157-03-06 (EC)	UN157-04-08 (OICA/CLEPA)
		5.2.2.3 Pedestrian scenario: To what level should pedestrian **crossing** be covered? (it could be difficult to avoid a collision in a high-speed area but what should be the level required under the Regulation?) (JP)	(DE) Focus was to garantee pedestrian collision avoidance/mitigation up until 60 km/h. Does not mean that standing pedestian should not be managed. (JP)Collision to a pedestrian in the same lane shall be avoided. ADS should avoid collision in front of the ego vehicle as safe as a human driver. If necessary, we can accept to discuss amendments to current test procedure from the point of view above. Japan is discussing internally the case in which a pedestrian is standing beside the lane. Japan will provide proposal at the following SIG.	TBD	DE proposal: Paragraph 5.2.5.3., amend to read: 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~~ **60 km/h.**	ECE/TRANS/WP.29/GRVA/2020/32 (DE proposal) UNR157-03-08 (JP)
			OICA/CLEPAThere is two different requirements related to pedestrians currently: - collision avoidance with a pedestrian inside the lane - collision avoidance with a pedestrian crossing into the lane While a collision with a pedestrian inside the lane shall be avoided up to the maximum operational speed, this approach cannot be applied similarly to a crossing pedestrian. In order to achieve collision avoidance with a crossing pedestrian at 130km/h the ALKS would need to start decelerating when the pedestrian is still several meters away from the lane. The risk of false activations and their potential negative effects would by far outweigh the safety benefit. While collision avoidance may not always be reasonably achievable, the manufacturer will implement strategies to lower the risk, e.g. reducing the vehicle speed when a pedestrian is detected near the lane or moving the vehicle to the opposite side of the lane to create more distance.			UN157-04-08 (OICA/CLEPA)
		Is it necessary to consider situations where **lane marking is not visibl**e?	(JP)No need to modify UNR157 text because it is obvious that the vehicle should keep control until the transition to the driver even if the lane marking is disappeared suddenly. (During MRM, the case when the lane marking is not visible is already described (5.5.1.).)	TBD	(Current ALKS text) 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.	UNR157-03-08 (JP) UN157-04-08 (OICA/CLEPA)
			(OICA/CLEPA)ALKS was written in the sense that as long as it is defined what safe operation and safe transition is, there is no need to regulate behavior related to different system boundaries. Therefore "missing lane markings" do not need to be specifically addressed. Additionally Annex 5, Par. 5.3. (g) already assesses the system behavior in case of faded/erased/hidden lane markings.			UN157-04-08 (OICA/CLEPA)
		Is evasive emergency manoeuvre required for higher speed? Distinction < 80 km/h and above?	(JP)The function of evasive emergency manoeuvre should be optional (i.e. not mandatory but may be fitted). If the function of evasive emergency manoeuvre is fitted, it is necessary that the function can only be activated when the braking is not capable of avoiding accidents.	TBD		
			(OICA/CLEPA) In principle, the ALKS should be permitted to cross lane markings in a safe manner during an evasive maneuver. The assumption that an evasive maneuver should only be permitted when a collision cannot be avoided by braking goes against normal driving behavior. When there is sufficient free space no other driver following behind would expect the ALKS vehicle to brake to standstill when an obstacle could be safely steered around.			UN157-04-08 (OICA/CLEPA)
		What would be the boundary between dense traffic and free driving with regard to whether a Lane Change capability is required?	The boundary is understood with regard to whether it is permitted to use any lane or restricted to a certain lane (e.g. slowest available lane).	TBD		UNR157-02-06 (OICA/CLEPA)
		During evasive emergency manoeuvre, **is it permitted to cross lane marking**?	(JP)The function of evasive emergency manoeuvre should be optional (i.e. not mandatory but may be fitted). If the function of evasive emergency manoeuvre is fitted, it is necessary that the function can only be activated when the braking is not capable of avoiding accidents.	TBD		
			(OICA/CLEPA) As there is only little available space in the ego lane when steering around an obstacle and aiming to keep a minimum lateral distance to that obstacle, an evasive maneuver should also be permitted to cross lane markings.			UN157-04-08 (OICA/CLEPA)

Lane change	1. Type of lane changes/scenario for lane changes	Shall **different types of lane change** be defined (nominal, during MRM and evasive)?	(JP) "during MRM", "evasive manoeuvre", "regular lane change" should be clearly differenciated. (see UNR157-02-05) (OICA/CLEPA): Description of different lane change/lane crossing described in UN157-02-06. Industry believes MRM and regular lane changes could be adressed on the basis of one set of provisions with slightly different parameters for the assessment of a critical situation. Additionally separate provisions for an evasive maneuver crossing lane markings should be introduced.	TBD	Definitions and requirements, which could be commonly used (independent of type of lane change): Paragraphs 2.21. to 2.25., insert to read: **2.21. "Starting lane" is the lane out of which the ALKS vehicle intends to manoeuvre.** **2.22. "Target lane" is the lane into which the ALKS vehicle intends to manoeuvre. The target lane can be a regular lane of travel, an enter lane, an exit lane or a hard shoulder or emergency refuge area.** **2.24. A "Lane Change Procedure (LCP)" starts when the direction indicator lamps are activated and ends when the direction indicator lamps are deactivated by the system. It comprises the following operations in the given order:** **(a) Activation of the direction indicator lamps;** **(b) Temporary suspension of the mandatory lane keeping functionality of the ALKS;** **(c) Lateral movement of the vehicle towards the lane boundary;** **(d) Lane Change Manoeuvre;** **(e) Resumption of the mandatory lane keeping function of the ALKS;** **(f) Deactivation of direction indicator lamps.** **2.25. A "Lane Change Manoeuvre (LCM)" is part of the LCP and** **(a) Starts when the outside edge of the tyre tread of the vehicle's front wheel closest to the lane markings crosses the outside edge of the lane marking to which the vehicle is being manoeuvred and** **(b) Ends when the rear wheels of the vehicle have fully crossed the lane marking.**	UNR157-02-05 (JP) UNR157-02-06 and UNR157-02-08(OICA/CLEPA)
					Paragraph 5.2.6. and subparagraphs, insert to read: **5.2.6. Lane Change Procedure** **The requirements of this paragraph and its subparagraphs apply to the system, if ~~additionally~~ fitted to perform a LCP.** **The fulfilment of the provisions of this paragraph and its subparagraphs shall be demonstrated by the manufacturer to the satisfaction of the technical services during the assessment of Annex 4 and according to the relevant tests in Annex 5.** **5.2.6.1. A LCP shall not cause an unreasonable risk to safety of the vehicle occupants and other road users.** **5.2.6.2. The activated system shall only undertake a LCP in compliance with Paragraph 5.1.2, and if the following requirements are fulfilled:** **(a) The vehicle is equipped with a sensing system capable of fulfilling the rearward detection range requirements as defined in paragraph 7.1. and subparagraph 7.1.3.;** **(b) ~~The~~ All system self-checks, as defined in paragraph 5.1.6. is positively confirmed;** **(c) The assessment of the target lane as defined in paragraph 5.2.6.6. and its subparagraphs is positively confirmed;** **(d) The LCP is anticipated to be completed before the ALKS vehicle comes to standstill (i.e. in order to avoid coming to standstill while in the middle of two regular lanes due to stopped traffic ahead). In case the ALKS vehicle becomes stationary between two regular lanes during the LCM ~~nonetheless~~ (e.g. due to the surrounding traffic), it should at the next available opportunity either complete the LCP or return to its original lane.** **(e) The target lane is a regular lane of travel, or hard shoulder temporarily opened up as a regular lane of travel, or;** **If the LCP is being undertaken as part of a MRM, the target lane may additionally be a hard shoulder, emergency refuge area, or other emergency lane, providing there is no other vehicle travelling in that lane within the rear detection range of the ALKS vehicle.** **~~5.2.6.3. In compliance with paragraph 5.1.2. in particular, the activated system may undertake a LCP if:~~**		
					(e) There is a reason for a lane change (e.g. Operation cannot be continued in the current lane, for the purpose of overtaking a slower moving vehicle, to prevent violation of the obligation to drive in the slowest lane when possible or during a minimal risk manoeuvre). **or;** **The LCP is being undertaken as part of a MRM** **(~~b~~g) A gap allowing a LCM is already present or expected to open up shortly.** **5.2.6.43. A LCP shall be completed without undue delay.** **5.2.6.4. The system shall generate the signal to activate and deactivate the direction indicator signal. The direction indicator shall remain active throughout the whole period of the LCP and shall be deactivated by the system in a timely manner once the lane keeping functionality is resumed.**		
					5.2.6.5. Specific requirements for LCM **The lateral movement to approach the lane marking in the starting lane and the lateral movement necessary to complete the LCM shall aim to be one continuous movement.** **The LCM shall not be initiated before a period of 3.0 seconds a~~nd not later than 7.0 seconds~~ after activation of the direction indicator lamps.** **The LCM may be ~~terminated~~ abandoned before being completed if the situation requires it. In this case the LCM shall be completed by steering the ALKS vehicle ~~has to be steered~~ back into the starting lane.** **The ALKS vehicle shall be in a single lane of travel at the end of the LCM.** **In case of a lane change during a minimal risk manoeuvre upon termination of the LCM the ALKS shall aim to bring the vehicle in a position that reduces the risk to the vehicle occupants and other road users.**		

		What are the items that need to be strengthened when **compared to ACSF category C**?	(JP)[REGULAR] Lv3 Lane change during normal driving (not emergency situation) should consider the situation around the ego vehicle including forward and side (including 2 lane next). These requirements should be discussed in FRAV. (note: Detection of forward and side are not required in ACSF provisions.) [MRM] The requirements for Lange change during MRM should be discussed based on ACSF category C (can be based on category E but the requirements are not yet specified). [EVASIVE] The requirements for evasive manoeuvre is difficult to define because the impact of secondary accident (i.e. collision to vehicle passing the next lane) should be considered. The function of evasive emergency manoeuvre should be optional (i.e. not mandatory but may be fitted). If the function of evasive emergency manoeuvre is fitted, it is necessary that the function can only be activated when the braking is not capable of avoiding accidents.	TBD	**Option 1** **5.2.6.6. Assessment of the target lane** **A ~~LCP~~ LCM shall only be initiated if an approaching vehicle in the target lane is not would not be forced to unmanageably decelerate due to the lane change of the ALKS vehicle.** **Or** **5.2.6.6. Assessment of the target lane** **A LCP shall only be initiated if the ALKS vehicle would be able to keep a safe distance from a lead vehicle or any other obstacle in the target lane according with the previsions of paragraph 5.2.3.3. and if an approaching vehicle in the target lane is not forced to unmanageably decelerate due to the lane change of the ALKS vehicle.**	UNR157-03-08 (JP)
					5.2.6.6.1. An approaching vehicle in the target lane should not have to decelerate at a higher level than A m/s², B seconds after the ALKS vehicle starts crossing a lane marking, to ensure the distance between the two vehicles is never less than that which the lane change vehicle travels in C seconds. **With:** **(a) A equal to:** **(i) 3.0 m/s2 for a regular lane change** **(ii) 3.7 m/s2 for a lane change during a minimal risk manoeuvre** **(b) B equal to:** **(i) 0.0 second, if during a minimal risk manoeuvre the lateral movement of the ALKS vehicle continued for at least 1 second while the vehicle had not yet crossed the lane marking and the direction indicator had been active for at least 3.0 seconds prior to crossing of the lane markings while a vehicle approaching from the rear was detected by the sensing system;** **(i) 0.4 seconds after the ALKS vehicle has crossed the lane marking, provided there was at least 1.0 s lateral movement of the ALKS vehicle within the starting lane in principle visible to an approaching vehicle from the rear without an obstruction before the LCM starts; or** **(ii) 1.4 seconds after the ALKS vehicle has crossed the lane marking, provided there was not at least 1.0 s lateral movement of the ALKS vehicle within the starting lane in principle visible to an approaching vehicle from the rear before the LCM starts.** **(c) C equal to:** **(i) 0.5 second, if the lane change is performed towards a lane intended for slower traffic or towards the hard shoulder during a minimal risk manoeuvre;** **(ii) 1.0 second for all other conditions.**	
					OR **Option 2** **5.2.6.6.1. An approaching vehicle in the target lane should always have a TTC to the ALKS vehicle of at least [4] seconds at the end of the LCM.** **5.2.6.6.2. Determination of whether a situation is critical shall consider any deceleration or acceleration of the ALKS vehicle after it has crossed the lane marking.**	
					Option 1 **5.2.6.6.23. If no approaching vehicle is detected by the system in the target lane, the ~~minimal~~ minimum gap to the rear shall be calculated under the assumption that:** **(a) an approaching vehicle on a target lane intended for faster traffic (including ~~enter~~ entry lanes) is travelling with at least the allowed ~~or the advised~~ maximum speed ~~whichever is lower~~ or, on roads where no speed limit applies, at least the advised maximum speed, or;** **b) an approaching vehicle on a target lane intended for slower traffic (including exit lanes and hard shoulders temporarily opened for regular traffic) is travelling with a ~~maximum~~ speed difference of at least [20] km/h at the beginning of the LCM or ~~while not exceeding the allowed or advised maximum speed or advised maximum speed~~ is travelling with at least the allowed maximum speed or, on roads where no speed limit applies, at least the advised maximum speed.** **(c) An approaching vehicle on a hard shoulder is travelling at a maximum speed of 80 km/h and a maximum speed difference to the ALKS vehicle at the start of the LCM of 40 km/h.** **OR Option 2** **5.2.6.6.2. If no approaching vehicle is detected by the system in the target lane, the conditions laid down in paragraph 5.2.6.6.1 ~~minimal gap to the rear~~ shall be assessed ~~calculated~~ under the assumption that** **a) the approaching vehicle in the target lane is at a distance from the ALKS vehicle equal to rearward detection distance and** **b) ~~the an~~ approaching vehicle in the ~~on a~~ target lane ~~intended for faster traffic (including enter lanes)~~ is travelling with the allowed or the advised maximum speed whichever is ~~lower~~ higher ~~or~~** **~~b) an approaching vehicle on a target lane intended for slower traffic (including exit lanes and shoulders temporarily opened for regular traffic) is travelling with a maximum speed difference of 20 km/h at the beginning of the LCM while not exceeding the allowed or advised maximum speed.~~**	

				5.2.6.7. When there is an equally fast or slower moving vehicle **At the beginning of the LCM, t****The distance between the rear of the ALKS vehicle and the front of to to a vehicle following behind in the target lane at equal or lower longitudinal speed shall never be less than the speed which the following vehicle in target lane travels in:** **(a) 0.7s for a lane change during a minimal risk manoeuvre** **(b) 1.0s for a regular lane change.** **5.2.6.8. For the duration of the lane change manoeuvre, the lane change vehicle shall observe the minimum following distance requirements in accordance with 5.2.3.3 for any lead vehicle(s) or road user(s) in the target lane of travel or the initial lane of travel.** **The strategy shall be clearly documented to ensure that this requirement is met, whilst ensuring that all lane changes can be completed and forward collisions avoided.** **5.2.6.9 In the case that, in the target lane, no obstacle or road user is present within the forward detection range, the speed of the ALKS vehicle, prior to beginning the lane change manoeuvre, shall be such that the lane change manoeuvre can complete and the vehicle can be brought to a complete stop within a distance equal to the forward detection range less 2m.**	
		(OICA/CLEPA): We can group the difference lane changes during MRM and nominal. Evasive is during an emergency manoeuvre **Regular:** - Lane change timing should be permitted to be flexible in according with local traffic rules - no need to define distances to the front, as the ALKS will need to fulfill collision avoidance requirements also in the target lane **MRM:** - Paramters for a critical situation should be revisited under the assumption that the emergency situation has already been indicated to other road users through the hazard warning lights - it should be considered that the can be hard shoulders not wide enough to fit the entire vehicle, still moving off the live lane of traffic would be beneficial, so the manoeuvre should not require to fit the vehicle fully into the new lane as is currently the case for lane change according to Cat. C **Evasive steering:** - the definition of "sufficient free space" is most relevant, as if the gap required is too large, evasive steering will never be possible, while at the same time other traffic participants should not be "scared" by such a manoeuvre - it should be considered if indication of such a manoeuvre to other road users is useful or harmful		Paragraph 5.4.2.4., insert to read: **5.4.2.4. In case the ALKS is capable to perform a regular LCP, it shall be aimed that a LCP is not part of the transition phase, meaning that the transition demand is not given shortly before or during a LCP.** Paragraphs 5.5.1-5.5.2., amended to read: 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. **The ALKS shall either:** **(a) Keep the vehicle 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; or,** **(b) Bring the vehicle to a safe stop outside of its lane of travel, when:** **(i) ALKS is capable of performing a lane change according to paragraph 5.2.6.; and** **(ii) A lane change can be safely performed under the current conditions.** Additionally, the signal to activate the hazard warning lights shall be generated with the start of the minimum risk **manoeuvre.** **If a lane change procedure is performed during the minimal risk manoeuvre, the signal to activate the hazard warning lights shall be generated again once the vehicle has reached its target lane.**	UN157-04-08 (OICA/CLEPA)
	Wouldn't changing lanes in traffic jam scenarios be different because the gaps are smaller?	(OICA/CLEPA): The general approach to regulating ALKS lane changes should apply to any type of lane change. Individual parameters, e.g. distance to another vehicle following behind, that we deem to be safe might have to be adapted for individual scenarios.			UNR157-02-06 (OICA/CLEPA)
	What would be the boundary between dense traffic and free driving with regard to whether a Lane Change capability is required?	(OICA/CLEPA): The boundary is understood with regard to whether it is permitted to use any lane or restricted to a certain lane (e.g. slowest available lane).	TBD		UNR157-02-06 (OICA/CLEPA)
2. Rerequirement for a safe lane change	Should criteria for permitting lane change be defined? If so, what should be the criteria?	(JP) See above (OICA/CLEPA): Situations, that require the ALKS to leave its own lane should be defined as proposed in column "F". Additionally a regular lane change, should only be executed, when necessary.	TBD	Paragraph 5.1.6., amend to read: 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 has at least once detected an object at the same or a higher distance than that declared as detection ranges according to paragraph 7.1. **and its subparagraphs**). Paragraph 5.2.1., amend to read: 5.2.1. The activated system shall keep the vehicle inside its lane of travel and ensure that the vehicle does not **unintentionally** cross any lane marking (outer edge of the front tyre to outer edge of the lane marking), **except during a Lane Change Manoeuvre, as part of a Lane Change Procedure.** The system shall aim to keep the vehicle in a stable lateral position inside the lane of travel to avoid confusing other road users. Paragraph 5.2.4., amend to read: 5.2.4. The activated system shall be able to **handle in a safe way the presence in the same lane of ~~bring the vehicle to a complete stop behind~~** a stationary vehicle, a ~~stationary~~ road user, **a passable or unpassable obstacle [debris, lost cargo, etc.]**, or a blocked lane of travel to avoid a collision. This shall be ensured up to the maximum operational speed of the system.	UN157-04-08 (OICA/CLEPA)

		Need to **define what is a safe lane change** (parameters or general principles?)	(JP) MRM lane change should be based on ACSF Cat C. (OICA/CLEPA): in principle supports the approach proposed by Germany. We should be careful not to over regulate AD Lane Change, as this could make the ALKS unable to adapt to changing traffic situations and behave unnaturally with other road users. (DE): Cat C basis. New thing :Other participants to have the chance to see the vehicles during 1,4 sec becasue the ALKS is fully responsible (compared to C) (EC): Alternative parameter of 4 sec of remaining TTC at the end of the LCP.+ clarifications UK proposal on MRM based on DE proposal with some adaptation. OICA: How much we want to describe the critical situation. Evasive: important is the free space. defintiion+requirements to be provided by OICA by the (UK): The system shouldn't wait till the situation is critical before deciding to change lane. (OICA): Lane change covered by traffic rules. Parameter based on timings at the end of LCP difficult to work with.	TBD	Paragraph 6.4.1., amend to read: 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 **(f) A LCP, if the ALKS is capable of performing a LCP, by at least an optical signal.** The optical signals above shall be adequate in size and contrast. The acoustic signals above shall be loud and clear."	ECE/TRANS/WP.29/GRVA/2020/33 (DE proposa) UK proposal on lane change for MRM UNR157-03-06 (EC)
		How would we ensure that the ODD conditions are still met in the new lane?	(OICA/CLEPA): ALKS would still have to fulfill all general ALKS requirements in the new lane (e.g. with regard to collision avoidance or operation during a transition demand). So the system would have to ensure that it can continue to operate in the lane that a lane change is performed into	TBD		UNR157-02-06 (OICA/CLEPA)
		Need to define triggering conditions for lane change. Should aim to prevent erratic lane change. (NO)	(JP) See above. (OICA CLEPA): A lane change that is performed while the ALKS is active is initiated by the system in a situation in which the system assesses the lane change to be necessary and possible. Instead of defining trigger conditions permitting/prohibiting lane changes under certain circumstances, we should define what we consider to be a safe lane change (i.e. with regard to manageable behavior by other traffic). What is considered to be safe can potentially vary depending on the preconditions, e.g. when the vehicle already indicated an emergency situation through active hazard warning lamps (MRM), surrounding traffic might be expected to react sooner. (OICA CLEPA) No need to define specific trigger conditions, as the individual parameters could be very well situation dependent. As long as we define what a safe lane change is, there is no need to define what causes the ALKS to change lanes in any more detail. (SE) Should introduce a requirement to return to the slowest lane. Chair: already covered by 5.2.6.3 of the DE proposal	TBD	see e.g. proposed paragraph 5.2.6.3.	UNR157-02-06+ UN157-04-08 (OICA/CLEPA)
		Shall driver interruption (over ride) during auto lane change be acceptable? What kind of action should be required for override during auto lane change? (JP)	(JP)No special modification to present text is needed. (OICA/CLEPA) Agree with Japan, that no special provisions for override during lane change are needed. The system is already permitted to adapt its thresholds to specific situations.	TBD		
		Is there any other additional requirement necessary for the Level 3 lane change function? (JP)		TBD		
		Is it necessary to decide a **minimum detection range for directions other than forward** (side, diagonal)? (JP)	(JP) The requirement of MRM lane change can refer the requirement of risk mitigation function (RMF), that is provisionally based on ACSF Cat C, which is under discussion in ADAS-TF. Regarding regular lane change, the requirement should be discussed in FRAV. (OICA/CLEPA): The detection ranges as currently proposed by Germany are reasonable to address lane changes during ALKS operation but would support the idea of not defining a sensing range and leaving it up to the strategy.	TBD	Paragraph 7.1. amend to read: 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; **(c) 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 rear detection range, if fitted to perform a LCP.** The requirements of this paragraph are without prejudice to other requirements in this Regulation, most notably paragraph 5.1.1.	UN157-04-08 (OICA/CLEPA)

					Renumber paragraphs 7.1.3. to 7.1.6. into 7.1.4. to 7.1.7. Paragraph 7.1.3., insert to read: 7.1.3. Rearward detection range **The requirements of this paragraph apply to the system, if the ALKS is capable to perform a LCP.** The manufacturer shall declare the rear detection range measured from the most rearward point of the vehicle. ~~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 this paragraph over the lifetime of the system/vehicle.~~ 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. Paragraph 7.1.5., amend to read: 7.1.5. 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 values specified in paragraph 7.1. over the lifetime of the system/vehicle.	
Both	1. Traffic situations	Any **additional traffic situations** which need particular attention and possibly need to be introduced? (based on VMAD input)	(OICA/CLEPA): All relevant scenarios are in principle already addressed. If there is a need for an asessment of more specific situations these should be added under Annex 5 Par. 5.3. as proposed in UNR157-02-08	TBD		UN157-04-08 (OICA/CLEPA)
	2. MRM	During MRM, is it acceptable to stop within the lane? Or **should lane change to the shoulder (lane change during MRM) be mandatory**?(JP)	(JP) Having the function to change lane to the shoulder (lane change during MRM) should be mandatory for ADS with ODD higher than 60km/h because a stopped vehicle in highway without traffic jam is dangerous. (It is important to have the function of MRM lane change and it can be allowed that MRM lane change is not achieved under some conditions (e.g. when shoulder does not exist).) (OICA/CLEPA) ALKS was drafted under the assumption that the driver will always resume control within 10s, therefore making sure that the MRM will not lead the vehicle to standstill unless in case of a very severe medical emergency that leaves the driver physically unable to resume control. When driving at a speed of up to 130km/h it will take even longer to bring the vehicle to standstill. So what is the actual benefit of such a provision? OICA: not always a hard shoulder. Systems with no lane change capability shall be able to operate in the slowest lane.	TBD		UN-O4-03-r1 (Japan) UN157-04-08 (OICA/CLEPA)
	3. HMI	Any change/improvement to current **HMI requirement** given that more time will be spent without any intervention from the driver? Further harmonization needed?	(JP) We do not see any necessity to change the current requirement at this time. However, we should reflect on conclusions coming from FRAV and VMAD, if any. (EC): Need to review driver monitoring requirement as the driver will be longer out of the loop with higher speed/lane change functions? (OICA/CLEPA) believes the HMI provisions as they currently are, are appropriate also for higher speeds/lane changes. The driver will take equally long to resume control, and the only safety relevant information to the driver is the system status and transition demand. We should ask ourselves what aspects are safety relevant, and not what we would like the vehicle to tell us just because it would be nice to know.	TBD		UN-O4-03-r1 (Japan) UN157-04-08 (OICA/CLEPA)
	DSSAD/EDR	Need to update DSSAD/EDR requirements for speed extension/lane change?				
	4. Test, Audit & In-service monitoring	During Type Approval, what type of tests should be conducted or provided by the documentation? (**Should current requirements be further clarified?**) (JP)	(JP) We do not see any necessity to change the current requirement at this time. However, we should reflect on conclusions coming from VMAD if any. (OICA/CLEPA) As explained in UNR157-02-08 Industry believes all relevant aspects are already covered by the current ALKS provisions.	TBD		Proposal from OICA/CLEPA on tests in GRVA?
		Need to improve present test, especially **track tests**?	(JP) We do not see any necessity to change the current requirement at this time. However, we should reflect on conclusions coming from VMAD if any. (EC): Need for new test for lane change+wrong way driver? (OICA/CLEPA): The only addition necessary is tests for lane changes, which Industry already proposed in GRVA/2021/04. Other than that Industry believes the current test section already adressess all relevant scenarios and as there are no specific parameters defined, any potential scenario is covered.	TBD	Annex 5, Tests, paragraph 4.6., amend to read: 4.6. Field of View test 4.6.1. The test shall demonstrate that the ALKS is capable of detecting another road user within the forward detection area up to the declared forward detection range and a vehicle beside within the lateral detection area up to at least the full width of the adjacent lane. **If the ALKS is capable of performing lane changes, it shall additionally demonstrate that the ALKS is capable of detecting another vehicle within the rear detection range.** 4.6.2. The test for the forward detection … 4.6.3. The test for the lateral detection range … **4.6.4. The test for the rear detection range shall be executed at least:** **(a) With a motorcycle approaching the ALKS from the rear in the left adjacent lane;** **(b) With a motorcycle approaching the ALKS from the rear in the right adjacent lane.**	UNR157-03-06(EC) UNR157-04-08 (OICA/CLEPA) UNR157-04-03r1(Japan)

					Annex 5, Tests, insert a new paragraphs 4.7., 4.8. and 4.9. to read: **4.7. Lane Change tests (only required if the ALKS is capable of performing lane changes either during an MRM, or during regular operation)** **The test shall demonstrate that the ALKS, if designed to be capable of performing lane changes, is able to assess the criticality of the situation before starting the LCM.** **4.7.1. The test shall be executed at least:** **(a) With different vehicles, including a motorcycle approaching from the rear;** **(b) In a scenario where a LCM in regular operation is possible and executed;** **(c) In a scenario where the LCM in regular operation is not possible due to a vehicle approaching from the rear;** **(d) With an equally fast vehicle following behind in the adjacent lane at a distance of less than that which the following vehicle travels in 1.0 second preventing a lane change;** **(e) With a vehicle driving beside in the adjacent lane preventing a lane change;** **(f) In a scenario where a LCM during a minimal risk manoeuvre is possible and executed.** **4.7.2. The following tests shall be executed:** **(a) With the ALKS vehicle performing lane change in the adjacent (target) lane;** **(b) Merging at motorway entry;** **(c) Merging at lane end;** **(d) Merging into an occupied lane.**	
					4.8 Detect and response to traffic rules and road furniture **4.8.1. These tests shall ensure that the ALKS respects traffic rules, detects and adapts to a variation of permanent and temporary road furniture.** **4.8.2. The test shall be executed at least with the list of scenarios below, but based on the ODD of the given system:** **(a) Different speed limit signs, so that the ALKS vehicle has to change its speed according to the indicated values;** **(b) Signal lights of an ending lane. The signal lights are set above the belonging lanes, and the signal lights of adjacent lanes are kept in green state, while the one of the current lane for the ALKS vehicle is kept red.;** **(c) Driving through a tunnel: at least [X]m long section of the road with no sunlight and availability of the positioning system.** **(d) Toll station: a section of the motorway with toll station-, speed limit signs and buildings (ticket machines, barriers, etc.).** **(e) Temporary modifications: e.g., road maintenance operations indicated by traffic signs, cones and other modifications.** **4.8.3. Each test shall be executed at least:** **(a) Without a lead vehicle;** **(b) With a passenger car target as well as a PTW target as the lead vehicle / other vehicle.** **4.9. Avoid braking before a passable object in the lane** **4.9.1. The test shall demonstrate that the ALKS vehicle is not braking without a reason before a passable object in the lane (e.g., a manhole lid or a small branch).** **4.9.2. The test shall be executed at least:** **(a) Without a lead vehicle;** **(b) With a passenger car target as well as a PTW target as the lead vehicle / other vehicle.**	
		Does the **audit and in-service** monitoring need to be enhanced?	(JP) We do not see any necessity to change the current requirement at this time. However, we should reflect on conclusions coming from VMAD if any. (EC): Need to update audit and in-service montoring requirements for higher speed/lane change? See proposals to update information document (not linked to LC/Higher speed however) (OICA/CLEPA) As explained in UNR157-02-08 Industry believes all relevant aspects are already covered by the current ALKS provisions.	TBD		UNR157-03-06, UNR157-04-05, UNR157-04-06 and UNR157-04-09(EC) UNR157-04-08 (OICA/CLEPA) UNR157-04-03r1(Japan)
	Lifetime consideration (wear and tear, load variation, different environmental conditions, replacement parts, different update of the vehicles, change due to traffic rules such as winter tyres)		(F): How should vehicle configuration changes be taken into account by the approval process ? §Should they be part of the ODD ? §Should they be managed by the vehicle owner/driver if not detected by the ADS itself ? And then how should the vehicle owner/driver be informed of that ? How will the system cope with different grip conditions depending on the road and the vehicle's tire fitment during the vehicle's lifetime?How will the system comply with local traffic rules in winter (mandatory special equipment on specific roads & countries) without recognizing its tires?	TBD		UNR157-02-04 (F)
			OICA/CLEPA: In responses to FR questions on lifetime considerations, there are responsibilities (e.g. appropriate tyres, snow tyres, proper load, load properly secured) that remain with the driver because the driver will have driven the vehicle manually before ALKS becomes active. Beyond that, ALKS needs to implement strategies to cope with reasonably expected changes in vehicle configuration (e.g. different load conditions, different permitted tyres fitted to the vehicle, different tyre age) and external influences (e.g. varying grip conditions of the road). What exactly these strategies are will be demonstrated to the Technical Service during Type Approval.			UNR157-03-07

Clarifying Regulation	1. Emergency vehicles	How should a vehicle respond? Is it with transition demand or shall it create a corridor?		TBD	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 vehicles, missing lane marking, load falling from truck (collision)~~ and which requires a transition demand. **This may include road construction, inclement weather, approaching emergency vehicles/enforcement vehicles, missing lane marking, load falling from truck (collision).** 5.1.2. The activated system shall comply with traffic rules relating to the DDT in the country of operation **including responding to emergency/enforcement vehicles**.	UNR-157-03-12 (OICA)
		Does the system need to react to the direction of an **enforcement officer**? (UK)		TBD		
	2. Detectable collision	What is a detectable collision? (UK)		TBD	5.1.1. … When the vehicle is involved in a ~~detectable~~ **significant** collision **with another road user while ALKS is active**, the ~~vehicle~~ **control strategy** shall be ~~brought~~ to **bring the vehicle to** a standstill. +Update Annex 5, Paragraph 5.2 (table) accordingly (replace "detectable" by "significant")	UNR-157-03-12 (OICA)
HDV ALKS below 60 km/h*		**Maximum deceleration value (para. 5.5.1.):** Current requirements applicable to M1 are limiting the maximum deceleration during the MRM to 4m/s²; should this value be adapted to other vehicle categories, given the lower deceleration potential of heavier categories compared to passenger cars?	JP: 4m/s2 can be acceptable because no safety concern has been observed. (However, buses with standing passengers should require additional consideration.) OICA/CLEPA: The MRM in para. 5.5.1. requires a deceleration not greater than 4 m/s². That means a lower value is possible. The minimum brake performance required by R13 for service braking system is 5 m/s². A deceleration value of 4 m/s² reflects the expectations of the other traffic participants and therefore it is independent from the ego-vehicle. So there is no difference in the perception if a passenger car or a CV is decelerating. 15/04/2021: AGREED: Group concensus the value of 4 m/s2 as maximum deceleration value duing MRM also valid ifor HDV scope extenstion , therefore no amendment to paragraph 5.1.1. in UN-R 157 needed.	AGREED	*No need for new text.*	UNR-157-02-10 (OICACLEPA)
		Minimum following distance (para. 5.2.3.3.): The requirements define a table with the minimum following distance between a passenger car equipped with an active ALKS and the preceding vehicle. Industry is expected to review whether and how the HCVs parameters impacts the values in the table.	JP: Minimum following distance should be calculated by the same method as M1 by useing HDV parameters(the distance with maximum deceleration). In favor to keep table in general. DE: The minimum following distances in the table for ALKS60 are defined according to traffic rules and reasonable deceleration values and not directly linked to the minimum performance of the service brake of a special vehicle category. If required, special provisions for the minimum safety distance exist for special vehicles in the national traffic rules (e.g. 50 m above 50 km/h in DE). The general requirement to avoid any collision remains valid, therefore no system is forced to only drive with the minimum safety distance if the braking performance might be too low. Values in the table need reconsidering and checking, if applicable in all countries. JRC: no need for table in general as this distance will in any case depend on the traffic situation and traffic rules and proposed instead a general requirement on safety distance keeping OICA/CLEPA: Suggestion to add a special column for M2/M3/N2/N3 in the tabel based on the follwoing approach: - Using a deceleration value of 5 m/s² (minimum performance of the service brakes in R13) for each speed value for the calculation - Using a brake delay of 0.4s (linear increase up to full brake performance --> 0.8s/2) for each speed value for the calculation - Ensuring that the minimum following distance is always greater than the calculated braking distance 15/04/2021: 1.) AGREED: Group consensus to keep approach using table for minimum following distance for the time being. 2.) OPEN: Values for minium following distance need confirmation and agreement, will be revisited in next meeting (OICA/CLEPA proposals UNR157-03-09 and UNR157-04-07: suggestion using 5 m/s2 and derive values)	TBD	calculated distance < min. follwing distance **a (average)** | **v** | **s-brake** | **s-brake with 0.4s delay** | **following distance** | **time gap (in R157 for M1)** | **time gap (proposal)** [m/s²] | [km/h] | [m/s] | [m] | [m] | [m] | [s] | [s] 5 | 7,2 | 2,00 | 0,4 | 1,2 | 2,4 | 1,0 | 1,2 5 | 10 | 2,78 | 0,8 | 1,9 | 3,9 | 1,1 | 1,4 5 | 20 | 5,56 | 3,1 | 5,3 | 8,9 | 1,2 | 1,6 5 | 30 | 8,33 | 6,9 | 10,3 | 15,0 | 1,3 | 1,8 5 | 40 | 11,11 | 12,3 | 16,8 | 22,2 | 1,4 | 2,0 5 | 50 | 13,89 | 19,3 | 24,8 | 30,6 | 1,5 | 2,2 5 | 60 | 16,67 | 27,8 | 34,4 | 40,0 | 1,6 | 2,4	**GRVA/2021/03 (OICA/CLEPA)** UNR-157-02-10 (OICA/CLEPA) UNR157-03-09 (OICA) UNR157-03-05 (DE) UNR157-03-08 (JP)

		Minimum forward detection range (para. 7.1.1.): for HDV and influence of vehicle dynamics for safety distance to the front/detection range.	JP: The same requirements as M1 can be acceptable. DE: The requirement for '7.1.1. Forward detection range' is also linked to the minimum following distance. The actual 46 m in R 157 ALKS are derived from an average braking performance calculation and the requirements for the minimum following distances of a M1 vehicle with a max. speed of 60 km/h. For other vehicles one of these two parameters may be above the required 46 m (e.g. required min. following distance of 50 m for some vehicles and speeds within the range of 60 km/h). Therefore the min. forward detection range should be adjusted accordingly or the better solution would be to remove an explicit detection range completely. OICA/CLEPA: The Calculation of the 46m is based on a speed of 60 km/h, a deceleration of 3.7 m/s² and delay of 0.5s. These values are also useable for M2/M3/N2/N3. The minimum following distance was not a parameter in that discussion. 15/04/2021: OPEN: Validity/transferability of 46 m for M2/M3/N2/N3 vehicles needs confirmation. Linked to minium following distance discussion and needs to be revisted in the next meeting.	TBD		
		TTC Lane intrusion (para. 5.2.5.2.): In the section about the cutting-in scenario, should the parameter "TTCLaneIntrusion" be modified, considering the width of HDVs compared to a passenger car?	JP: No need to modify UNR157. DE: No modifications needed for the "TTCLaneIntucion" calculation for other vehicle categories. (The value describes more a criticality of a situation to be avoided and not directly a minimum braking performance of the ALKS vehicle. There is already far enough space in the calculation of the critical point in time and the reaction of the ALKS vehicle with the additionally introduced 0.72 s perception time. For the safety of the other road users it is not justifiable, why an automated truck should be allowed to have more collisions (with even more potential consequences) than a passenger car. 6 m/s2 in good road conditions is also manageable with a heavy truck. There is no need to go down to a relatively old requirement of a minimum deceleration performance of 5 m/s2 for a modern truck that is built to drive automated.) OICA/CLEPA: No influence on the TTC by the width of the ALKS-vehicle. No value in the equation is depending on the width of the ALKS vehicle. TTC is a time, which is depending on the rear-most point of the cutting in vehicle and the front most point of the ALKS vehicle. The 0.3 m is just a defined value which specifies the point when the vehicle is intruding in the lane of the ALKS vehicle. This is independent of the width of the ALKS vehicle. 15/04/2021: 1.) AGREED: Group conclusion no adjustments to formula needed due to width of trailer. 2.) OPEN: Deceleration value needs checking and agreement, will be revisted in next meeting. - Value in UN R 157 currently for M1: 6 m/s2 - Proposal by OICA/CLEPA for N1: 6 m/s2 and for M2/M3/N2/N3: 5 m/s2 (supported by JP and EC) - Concerns to industry proposal: formula describes expected capabilites of surrounding vehicles - Ideas contributing to find solution: check other regulations, e.g. UN R 13 or UN R 131 for max breaking capabilties	TBD		**GRVA/2021/03** **(OICA/CLEPA)** UNR-157-02-10 (OICACLEPA)