

Modifications to the existing text of UNR157-10-04 are marked in **blue bold** for new or ~~strikethrough~~ for deleted characters.

## I. Proposal

*These proposals describe the requirements for a safe regular lane change*

*Paragraph 2.XX, insert to read:*

**2.XX.** **“Possibly vehicle-existing area” is the area that is enclosed by the following lines.**

- (a) Forward line is a line perpendicular to traveling direction at the minimum following distance specified in paragraph 5.2.3.3.**
- (b) Lateral lines are a lines parallel to the traveling direction at the outer edge of the ALKS vehicle and outer edge of the lane next to the target lane.**
- (c) Rearward line is a line perpendicular to traveling direction at the distance specified in paragraphs 5.2.6.7.2.1.and 5.2.6.7.2.3.**

**The lines (a) ~ (c) above are measured from the most forward / side / rearward point of the vehicle, the area changes according to travel speed of the ALKS vehicle.**

*Paragraph 5.2.6.5.1, amend to read:*

**5.2.6.5.1. Lane Change Procedure: Additional specific requirements for regular lane changes**

**The activated system may undertake a regular LCP only if all of the following conditions are fulfilled:**

- (a) There is no other vehicle in the possibly vehicle-existing area except for following vehicles at and near merging and departing lanes.This is not the case with the ALKS which has a capability of detecting the activation of direction indicator of othe vehicle.**
- (b) There is no other vehicle which is activating direction indicator to come to the target lane in the possibly vehicle-existing area if the ALKS has a capability of detecting the activation of direction indicator of other vehicles.**
- (~~a~~ c) 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 (e.g. due to the surrounding traffic), it should at the next available opportunity either complete the LCP or return to its original lane.**
- (~~b~~ d) The target lane is a regular lane of travel, or hard shoulder temporarily opened up as a regular lane of travel.**
- (~~e~~ 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.**

Paragraph 5.2.6.7.2.1, amend to read:

**5.2.6.7.2.1. When there is an approaching vehicle**

An approaching vehicle in the target lane should not have to decelerate but where this is reasonable it shall not be at a higher level than  $A \text{ m/s}^2$ ,  $B$  seconds after the ALKS vehicle starts ~~crossing a lane marking the lane change manoeuvre~~, to ensure the distance between the two vehicles is never less than that which the ~~lane change~~ ALKS vehicle travels in  $C$  seconds. If the ALKS does not have a capability of detecting activation of direction indicator of other vehicles, an approaching vehicle in the next to the target lane shall be treated as the approaching vehicle is in the target lane.

With:

(a)  $A$  equal to ~~3.0~~ [1.5]  $\text{m/s}^2$

(b)  $B$  equal to:

~~(i) 0.4 seconds after the outside edge of the tyre tread of the vehicle's front wheel closest to the lane marking crosses the outside edge of the lane marking start of the lane change manoeuvre, provided there was at least 1.0 s lateral movement of the ALKS vehicle within the starting lane that was in principle visible to an the approaching vehicle from the rear without an obstruction before the LCM starts; or~~

~~(ii) 1.4 seconds after the outside edge of the tyre tread of the vehicle's front wheel closest to the lane marking crosses the outside edge of the lane marking start of the lane change manoeuvre, 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.~~

2.0 seconds after starting lateral movement of the vehicle toward the lane boundary.

(c)  $C$  equal to 1.0 second.

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 ~~including the activation of direction indicator in other vehicle:~~

(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;

[If the ALKS is capable of performing a LCP, in addition to above, a sensing system shall be able to determine the traffic dynamics in ~~((e) Across the full width of its own traffic lane, the full width of the traffic lanes immediately to its left and to its right, the full width of the lane next to the target lane, up to the limit of the forward side and rearward 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.

Paragraph 7.1.X. insert to read:

**7.1.X. Detection range of activation of direction indicator of other vehicle**

**If the manufacturer declares that the ALKS has a capability of detecting activation of direction indicator of other vehicle, this declared range shall be sufficient to cover area and height of the direction indicator of the vehicles which normally in the market in possibly vehicle-existing area.**

**The Technical Service shall verify that the distance and the height of at which the vehicle sensing system detects a direction indicator during the relevant test in Annex 5 is equal or greater than the declared value.**

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 front, side and rearward detection range at least the target lane and the lane next to the target lane.]**

4.6.2. The test for the forward detection

**[4.6.2.1 The requirements of this paragraph apply to the system, if the ALKS is capable to perform a LCP.**

**The test for the forward detection range shall be executed at least:**

- (a) When approaching a motorcycle target positioned at the outer edge of each target lane and the lane next to the target lane;**
- (b) When approaching a stationary pedestrian target positioned at the outer edge of each target lane and the lane next to the target lane;]**

4.6.3. The test for the lateral detection range

**[4.6.3.1 The requirements of this paragraph apply to the system, if the ALKS is capable to perform a LCP.**

**The test for the lateral detection range shall be executed at least:**

- (a) With a motorcycle target approaching the ALKS vehicle from the left target lane and the lane next to the target lane;**
- (b) With a motorcycle target approaching the ALKS vehicle from the right target lane and the lane next to the target lane.**

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~~ target lane and the lane next to the target lane;**
- (b) With a motorcycle approaching the ALKS from the rear in the right ~~adjacent lane~~ target lane and the lane next to the target lane.]**

**4.6.5. The test for the direction indicator detection range**

**The requirements of this paragraph apply to the ALKS that has a capability of detecting a direction indicator of other vehicle.**

**The test for the detection range of direction indicator shall be executed at least:**

- (a) With an activation of direction indicator of a motorcycle target positioned at the outer edge of each target lane and the lane next to the target lane.
- (b) With an activation of direction indicator of a motorcycle target positioned at random of each target lane and the lane next to the target lane.

## **II. Justification**