Proposal for amendments regarding lane change

Modifications to the existing text of UN-Regulation No. 157 are in **bold** for new or ~~strikethrough~~ for deleted characters.

UK modifications to UNR157-11-04 are in **light green bold** for new or ~~light green strikethrough~~ for deleted characters.

1. **Proposal**

**2.xx. An "*Evasive lane crossing”* is an emergency manoeuvre that results in the ALKS vehicle crossing a lane marking.**

**2.xx. “*Evading lane*” is the lane into which the ALKS vehicle crosses during an evasive lane crossing.**

**2.28. *“Possibly vehicle-existing area”* is the area that is enclosed by the following: ~~lines.~~**

**a) ~~Forward line is~~ a line to the front of the vehicle, perpendicular to ~~traveling~~ the direction of travel at the minimum following distance specified in paragraph 5.2.3.3. measured from the forward most point of the vehicle.**

**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 to the rear of the vehicle, perpendicular to ~~traveling~~ the direction of travel at the critical distance established by ~~specified in~~ paragraph~~s~~ 5.2.6.7.2.1.~~and 5.2.6.7.2.3.~~ measured from the rearward most point of the vehicle.**

**c) a line parallel to the direction of travel along the side of the vehicle adjacent to the target lane.**

**d) a line parallel to the direction of travel along the furthest lane marking of the lane beyond to the target lane or of the target lane if there is not one beyond it.**

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

**5.2.6.5.2.3. A lane change procedure shall not start within the first 5 seconds following the start of the MRM intervention if the system is no longer able to meet the requirements of this Regulation, unless earlier commencement is required to reach the target stop area.**

**5.2.6.7.2.3. When there is no vehicle detected**

 **If no approaching vehicle is detected by the system in the target lane, the ~~minimum gap to the rear~~ assessment shall be calculated as per 5.2.6.7.2.1. with ~~under~~ the assumption that:**

**a) the approaching vehicle in the target lane is at a distance from the ALKS vehicle equal to actual rearward detection range; ~~and~~**

**b) the approaching vehicle in the target lane is travelling with the allowed maximum speed + 30km/h or 160km/h, whichever is lower; and**

**c) the full width of the approaching vehicle is detected by the ALKS vehicle during its lateral movement for at least 1 second.**

**5.2.6.7.3.2. When there is no vehicle detected**

 **If no approaching vehicle is detected by the system in the target lane, the ~~minimum gap to the rear~~ assessment shall be calculated as per 5.2.6.7.2.1. with ~~under~~ the assumption that:**

**a) the approaching vehicle in the target lane is at a distance from the ALKS vehicle equal to actual rearward detection range ~~distance~~; ~~and~~**

**b) the approaching vehicle in the target lane is travelling with the allowed maximum speed +30 km/h or 160km/h, whichever is lower, or, if the target lane is a hard shoulder, ~~and~~**

**~~(c)~~ the approaching vehicle ~~on a hard shoulder~~ is travelling at a maximum speed of 80 km/h ~~and~~ or a maximum speed difference to the ALKS vehicle at the start of the LCM of 40 km/h, whichever is lower; and**

**c) the full width of the approaching vehicle is detected by the ALKS vehicle during its lateral movement for at least 1 second.**

**[5.3.5. ~~Lateral Evasive manoeuvre crossing~~ Evasive lane crossing ~~markings~~ ~~to minimize the risk of a collision.~~]**

**5.3.5.x An evasive lane crossing shall only be performed by the ALKS when the situation or event [of the imminent collision risk] was not within the forward, lateral or rearward detection range before it became an imminent collision risk.**

 **If utilising an evasive lane crossing as part of an emergency manoeuvre, the ALKS shall ensure that it is as least as safe as avoiding the imminent collision risk with the vehicle’s full braking performance.**

**[5.3.5.1. The vehicle shall only cross lane markings in response to a ~~risk of~~ imminent collision risk if the system has sufficient information about its surrounding to the front, ~~and~~ side ~~(as defined in paragraph 7.1.)~~ and to the rear ~~(~~according to the following paragraphs~~)~~ in order to assess the criticality of crossing the lane markings.]**

**[5.3.5.2. The ~~activated~~ system shall not cause a collision with another vehicle or road user in the predicted path of the vehicle when ~~crossing lane markings~~ performing an evasive lane crossing ~~in response to a risk of imminent collision~~.]**

**[5.3.5.3. The vehicle shall only perform an evasive lane crossing ~~cross lane markings in response to a risk of imminent collision~~ if another vehicle in the ~~evasive~~ evading lane is not forced to unmanageably decelerate due to that manoeuvre.]**

**[5.3.5.3.1. When crossing the lane markings by not more than [30] cm, it shall be ensured that:**

* **the distance to a vehicle following behind in the ~~evasive~~ evading lane ~~at equal or lower speed~~ is greater than that which the following vehicle travels in 0.5s.; ~~[~~and~~/or]~~**
* **a minimum lateral distance of 1m to vehicles travelling in the ~~evasive~~ evading lane is ensured.]**

 **[5.3.5.3.2. When crossing the lane markings by more than [30] cm up to [half the vehicle’s width], it shall be ensured that**

* **an approaching vehicle in the ~~evasive~~ evading lane shall not have to decelerate at a higher level than 4 m/s², 0,4 seconds after the ALKS vehicle starts crossing the lane markings, to ensure collision avoidance between the two vehicles;~~, and~~**
* **the distance to a vehicle following behind in the ~~evasive~~ evading lane at equal or lower speed is greater than that which the following vehicle travels in 0.5s.; and**
* **the ~~evasive~~ evading lane is unoccupied across the length of the ALKS vehicle.]**

**[5.3.5.3.3. When crossing the lane markings by more than [half the vehicle’s width], the criticality of the situation shall be assessed according to the corresponding provisions for a LCP during a MRM as specified ~~provisions~~ in paragraph~~s~~ 5.2.6.]**

**[5.3.5.4. The vehicle shall aim at returning to its original lane of travel once the situation that required the ~~lateral manoeuvre~~ evasive lane crossing has passed.]**

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;

**~~[(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, 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.]~~**

**[If the ALKS is capable of performing a LCP, in addition to above, a sensing system shall be able to determine the traffic dynamics at a width of at least ~~up to~~ [9]m to each side, measured from the centre of the ALKS vehicle ~~in~~****~~[(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, the full width of the lane next to the target lane~~, ~~up to~~ from the limit of the forward detection range to the limit of the ~~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.

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

**~~The manufacturer shall declare the forward detection range measured from the most forward point of the vehicle.~~****~~This~~ The declared range in paragraph 7.1.1. shall be sufficient to cover at least ~~the target lane~~****~~and the lane next to the target lane~~ an area [9]m to the side(s) to which the ALKS performs a LCP measured from the centre of the ALKS vehicle.**

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

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

 **The manufacturer shall also declare the lateral detection range~~.~~****~~This declared range~~ that shall be sufficient to cover at least ~~the target lane~~****~~and the lane next to the target lane~~ an area [9]m to the side(s) to which the ALKS performs a LCP measured from the centre of the ALKS vehicle.**

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

**[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 rearward detection range measured from the most rearward point of the vehicle. This declared range shall be sufficient to cover at least ~~the target lane~~****~~and the lane next to the target lane~~ an area [9]m to the side(s) to which the ALKS performs a LCP measured from the centre of the ALKS vehicle.**

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

1. **Justification**
2. .
3. .