Submitted by the experts from Germany

UNR157-03-05

Submitted by the experts from CLEPA and OICA

Informal document **GRVA-09-34**
9th GRVA, 1-5 February 2021,
Agenda item 4(d)

UNR157-02-10

First answers to questions in red by industry

ALKS for HCVs

Background:

- Industry prepared a proposal to amend UN R157 to expand the scope of the regulation from M1 only to all M and N vehicle categories: see GRVA-2021-03 and GRVA-09-19.
- Last Friday on the 29th of January industry organized an ALKS workshop together with interested CPs, and collected comments.
- Industry would like to prepare input (e.g. a Q&A) to address questions for the next meeting of the Special interest group on ALKS.

Expectations from GRVA-09:

- Collect new comments from CPs not able to attend the workshop last week.
- Confirm collected questions during the workshop:

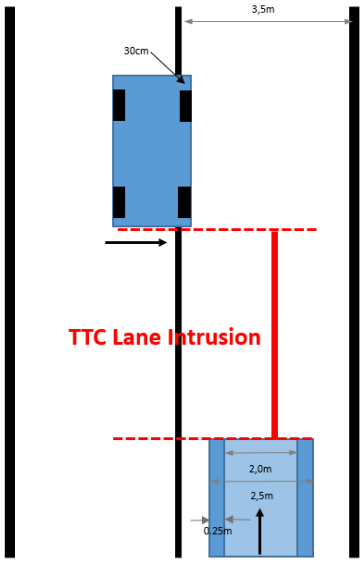
1. Current requirements applicable to M1 are limiting the maximum deceleration during the MRM to 4m/s²; should this value be adapted to other vehicle categories, given the lower deceleration potential of heavier categories compared to passenger cars?
   - MRM in para. 5.5.1. requires a deceleration not greater than 4 m/s². That means a lower value is possible.
   - Minimum brake performance required by R13 for service braking system is 5 m/s².
   - Deceleration value of 4 m/s² reflects the expectations of the other traffic participants, therefore independent from the ego-vehicle.
   - There is no difference in the perception if a passenger car or a CV is decelerating.
2. 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.
   - Add vehicle cat. N1 also to the already existing table for vehicle cat. M1.
   - Minimum performance of the service brake for R13 vehicle about 25% lower than for R13-H-vehicle (6.43 m/s² compared to 5m/s²)
   - Therefore, 25% more minimum following distance needed → additional 0.4s on the time gap compared to M1-vehicles
3. In the section about the cutting-in scenario, should the parameter “TTCLaneIntrusion” be modified, considering the width of HDVs compared to a passenger car?
   - 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.

Kommentar [BO1]: 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.

Kommentar [BO2]: The minimum following distances in the table 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 GER). 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. Maybe a better way would be to completely remove the table with the minimum safety distances for all vehicle categories?

Kommentar [BO3]: 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.

- 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.

Kommentar [BO4]: Agree. Furthermore the 0.3 m are copied out from R 130, a Regulation especially for N2, M2, N3 and M3 vehicles. For M1 and N1 0.1 m would have been sufficient but only the 0.3 m are defined an introduced in a Regulation and therefore also used in R157. No adjustment needed for other categories.

4. The 3 previous questions raise the question of whether the different dynamic behaviour of HCVs compared to PCs may impact some other requirements in the regulation.

   - We checked the whole ALKS regulation for necessary amendments for CVs and all necessary amendments are reflected in the industry proposal.
   - We rechecked the following paragraphs, where the dynamic behaviour of the ALKS vehicle is reflected:
     - Imminent collision risk (para 2.6.): deceleration of 5 m/s² is not depending on the ALKS vehicle dynamics. It defines, that a collision is not avoidable by less than 5 m/s².
     - Emergency manoeuvre (para. 5.3.2.): ALKS vehicle shall decelerate the vehicle up to its full braking performance
     - Crossing pedestrian (para. 5.2.5.3.): unusual situation compared to para 5.2.5.2. (TTC) → manufacturer must implement strategies to fulfil the requirement.
     - MRM: see question 1
     - Minimum Following Distance: see question 2
     - TTC: see question 3
   - Industry is interested to get to know about the potentially missed items

Kommentar [BO5]: Yes, independent from a vehicle category.

5. Why is the trailer communication not included in the proposal, e.g. for the motor vehicle to get information for example about the length and the width of the trailer?

   - The detection area beside the vehicle or combination can be handled by the towing vehicle only. That is different to the ACSF-C, where the area behind the trailer has to be detected with a minimum value of 55 m
   - To fulfil para. 5.2.5. (detection the risk of a collision), just a rough knowledge of the length of the combination is needed (e.g. sensors which detect the end of the trailer). Therefore, no communication needed.

Kommentar [BO6]: What about the weight of the whole combination? Fully loaded vs. empty is a difference in braking performance and has an influence on the needed safety distance?

Kommentar [SP7]: Trailer brakes its own weight. EBS should be able to know all parameters from the trailer.

Probably helpful to require EBS?

Kommentar [BO8]: How does the towing vehicle knows how long each trailer is and where the detection area beside the vehicle begins/ends in this combination? Or does the towing vehicle always provide a detection area with the max. possible length for any combination?

- Para. 7.1.2. (Lateral detection range), para. 5.2.1. (Lane Keeping) and para. 5.2.5. (Detection the risk of a collision) must be fulfilled technology neutral → no need for communication between truck/trailer, as e.g., this can be done from the truck.
- As an example, please see the range defined for BSIS:

Kommentar [BO9]: If possible for all combinations: Agree

Kommentar [SP10]: Agree, and would suggest to remove any requirements for detection distances.

BSIS_range.pptx

6. With regard to the requirements on the severity level of the impact up to which the data should remain retrievable from the DSSAD, the references to UN Regulations Nos. 94, 95 or 137 is not relevant for vehicles other than M1 or N1. A solution should be found, including the validation method for the certification.

    - Industry is in discussions for a solution.