

## **Proposal for amendments to the proposal for the 02 series amendment text to UN Regulation No. 131 (Advanced Emergency Braking Systems for heavy duty vehicles)**

### **Submitted by the experts from the Informal Working Group on Advanced Emergency Braking Systems for heavy duty vehicles**

The text reproduced below was prepared by the experts from the Informal Working Group on Advanced Emergency Braking Systems (AEBS) for heavy duty vehicles in order to supplement the proposal of document GRVA/2022/7 to improve the text. The modifications to the text of document GRVA/2022/7 are marked in bold for new and strikethrough for deleted characters.

## **I. Proposal**

*Insert a new Introduction, to read:*

**“The original intention of this Regulation was to establish uniform provisions for advanced emergency braking systems (AEBS) fitted to motor vehicles of the categories M2, M3, N2 and N3 primarily used under monotonous highway driving conditions. This revision of Regulation 131 extends the scope to new scenarios like city driving.**

**While, in general, those vehicle categories will benefit from the fitment of an AEBS, there are sub-groups where the benefit is rather uncertain because of their specific usage (e.g. buses with standing passengers i.e. Classes I, II and A, category G vehicles, construction vehicles, etc.). Regardless from the benefit, there are other sub-groups where the installation of AEBS would be technically difficult or not feasible (e.g. position of the sensor on vehicles of category G, construction vehicles mainly used in off-road areas and gravel tracks, special purpose vehicles and vehicles with front mounted equipment, etc.). In some cases, there may be a possibility of false emergency braking events because of vehicle design constraints.**

**The AEBS is designed to deal with specific critical traffic situations with an operational intervention as an assistance system for the driver. This Regulation cannot cover all the traffic conditions and infrastructure features in the type-approval process; this Regulation recognises that the performances required in this Regulation cannot be achieved in all conditions (vehicle condition, road adhesion, weather conditions, noise of external radar sources, deteriorated road infrastructure and traffic scenarios etc. may affect the system performances). While the system should meet the expected performance under the specified conditions, actual conditions and features in the real world may additionally influence performance and should not result in false warnings or false braking to the extent that they encourage the driver to switch the system off. Some other conditions affecting the performance may indeed be encountered in the future (e.g. new infrastructure type). The list may then be upgraded to acknowledge for the gained experience.**

**The system shall automatically detect a potential forward collision with another vehicle and with a pedestrian crossing the path of the vehicle, provide the driver with a warning and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating the severity of a collision.**

**The system shall only operate in driving situations where braking will avoid or mitigate the severity of an accident and shall avoid intervening in uncritical driving situations. In the case of a failure in the system, the safe operation of the vehicle shall not be endangered.**

**The system shall provide as a minimum an acoustic or haptic warning, which may also be a sharp deceleration, so that an inattentive driver is made aware of a critical situation,**

if time permits. There are, however, situations where a warning cannot be given in time for the driver to appropriately react, such as collisions with pedestrian or with strongly decelerating preceding vehicles. In these cases, the warning may be given at the time that an emergency brake intervention starts.

During any action taken by the system (the warning and emergency braking phases), the driver can, at any time through a conscious action like an accelerator kick-down or a swerving action that results in enough change of direction not to hit the target, take control and override the system.

While from a traffic safety perspective, it would be appreciable to require automated collision avoidance for all heavy vehicles up to their maximum driving speed, the prevention of false positive reactions limits the current maximum performance. This revision of Regulation 131 is accounting for the fact that active safety systems in general have made a giant leap over the 2010's with respect to their performance in avoiding or mitigating accidents with an ever increasing variety of collision partners.

There should be an ambition to produce Advanced Emergency Braking systems for heavy vehicles that go beyond what is required in this revision of Regulation 131, namely: to avoid accidents with other vehicles up to the maximum driving speed, to avoid accidents with pedestrians up to speeds comparable to those required from passenger cars (see UN Regulation No.152) and to avoid collisions with bicycles. To support this level of ambition, the state of technology should be closely monitored and requirements in this regulation regularly adapted as appropriate.”

*Paragraph 1*, amend to read (reference to footnote/\* moved up to the introductory sentence):

This Regulation applies to the approval/\* of vehicles of Category M<sub>2</sub>, M<sub>3</sub>, N<sub>2</sub> and N<sub>3</sub><sup>3</sup> with regard to an on-board system to

- (a) Avoid or mitigate the severity of a rear-end in lane collision with a preceding vehicle,
- (b) Avoid or mitigate the severity of an impact with a pedestrian. \*/

*Paragraph 2.15.*, amend to read:

2.15. "Dry road affording good adhesion" means a road with a sufficient nominal<sup>3</sup> Peak Braking Coefficient (PBC) ~~of 0.9~~ that would permit:

- (a) A mean fully developed deceleration of at least 9m/s<sup>2</sup>; or
- (b) The design maximum deceleration of the relevant vehicle;

whichever is lower.

*Paragraph 2.16.*, amend to read:

2.16. "Sufficient nominal Peak Braking Coefficient (PBC)": means a road surface friction coefficient of

- (a) 0.9, when measured using the American Society for Testing and Materials (ASTM) of E1136-19 standard reference test tyre in accordance with ASTM Method E1337-19 at a speed of 40 mph
- (b) 1.017, when measured using either:
  - (i) The American Society for Testing and Materials (ASTM) of F2493-20 standard reference test tyre in accordance with ASTM Method E1337-19 at a speed of 40 mph; or
  - (ii) The k-test method specified in Appendix 2 to Annex 6 of Regulation No. 13-H.; **or**

- (c) **the required value to permit the design maximum deceleration of the relevant vehicle, when measured using the k-test method in Appendix 2 to Annex 13 of Regulation No. 13.**

*Paragraph 4.2.*, amend to read:

- 4.2. An approval number shall be assigned to each type approved; its first two digits (~~at present~~ 00 corresponding to the 00 series of amendments) shall indicate ...

*Paragraph 5.1.2.*, amend to read:

- 5.1.2. The effectiveness of AEBS shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by ~~fulfilling the technical requirements and respecting the transitional provisions of the 05 compliance~~ **with the 05 or later** series of amendments to UN Regulation No. 10.

*Paragraph 5.1.4.3.*, amend to read:

- 5.1.4.3. A deactivation warning, if the vehicle is equipped with a means to deactivate the AEBS, shall be given when the system is deactivated. This shall be as specified in paragraph ~~5.4.3.~~ **5.4.4.**

*Paragraph 5.1.4.3.*, amend to read:

- 5.1.7. Any vehicle fitted with an AEBS shall meet the performance requirements of UN Regulation No. 13 in its 11 series of amendments for vehicles of Category M<sub>2</sub>, M<sub>3</sub>, N<sub>2</sub>, N<sub>3</sub> and shall be equipped with an anti-lock ~~system braking function~~ **system** in accordance with the performance requirements of Annex 13 to UN Regulation No. 13 in its 11 series of amendments.

*Paragraph 5.1.4.3.*, amend to read:

- 5.1.8. In situations where the deceleration is limited in empty load conditions, and provided this would be demonstrated by the vehicle manufacturer to the technical services, the requirements applicable to the vehicle with a mass in running order in the tables of paragraphs 5.2.1.4. and 5.2.2.4. shall be deemed fulfilled if the impact speed requirements are met with an added mass on the rear axle, calculated to implement an  $\alpha$  value between 1.3 and 1.5, ~~with:~~

**with**  $\alpha = W_r/W \times L/H$ , where:

- (a)  $W_r$  is the rear axle load.
- (b)  $W$  is the subject vehicle mass.
- (c)  $L$  is the subject vehicle wheelbase.
- (d)  $H$  is the subject vehicle centre of gravity height in running order.

Additionally, the relative impact speed shall be measured with a vehicle mass in running order, and the result appended to the test report. The ~~unladen/mass in running order~~ vehicle shall reach a relative avoidance speed reduced by  $\alpha/1.3$  **when in configuration of “mass in running order”**.

*Paragraph 5.2.1.1.*, amend to read:

- 5.2.1.1. Collision warning

When a collision with a preceding vehicle of category M, N or O is detected in the same lane with a relative speed above that speed up to which the subject vehicle is able to avoid the collision (within the conditions specified in paragraph 5.2.1.4), is imminent, a collision warning shall be provided as specified in paragraph 5.5.1., and shall be triggered at the latest 0.8 seconds before the start of emergency braking.

However, in case the collision cannot be anticipated in time to give a collision warning 0.8 seconds ahead of an emergency braking, a collision warning as

specified in paragraph 5.5.1. shall be provided no later than the start of the emergency braking.

The collision warning may be aborted if the conditions prevailing a collision are no longer present.

This shall be verified according to paragraphs 6.4. and 6.5. ~~[Additionally, the specifications not covered in paragraphs 6.4. and 6.5. may be verified with a reproduceable and repeatable appropriate test method.]~~

*Paragraph 5.2.1.2., amend to read:*

5.2.1.2. Emergency braking

When the system has detected the possibility of an imminent collision, there shall be a braking demand of at least 4 m/s<sup>2</sup> to the service braking system of the vehicle. This does not prohibit higher deceleration demand values than 4 m/s<sup>2</sup> during the collision warning for very short durations, e.g. as haptic warning to stimulate the driver's attention.

The emergency braking may be aborted, or the deceleration demand reduced below the threshold above (as relevant), if the conditions prevailing a collision are no longer present or the risk of a collision has decreased.

This shall be verified according to paragraphs 6.4. and 6.5. ~~[Additionally, the specifications not covered in paragraphs 6.4. and 6.5. may be verified with a reproduceable and repeatable appropriate test method.]~~

*Paragraph 5.2.1.4., amend to read:*

5.2.1.4. Speed reduction by braking demand

In absence of driver's input which would lead to interruption according to paragraph 5.3.2., the AEBS shall be able to achieve a relative impact speed that is less or equal to the maximum relative impact speed as shown in the following table, **provided:**

(a) ~~For collisions with unobstructed and constantly travelling or stationary vehicles of category M, N, O<sub>3</sub> and O<sub>4</sub>;~~

(b) ~~On flat, horizontal and dry roads affording good adhesion;~~

(c) ~~No trailer is coupled to the motor vehicle and the mass of the motor vehicle is between maximum mass and mass in running order conditions;~~

(d) ~~In situations where the anticipated impact point is displaced by not more than 0.2 m compared to the vehicle longitudinal centre plane;~~

(e) ~~In ambient illumination conditions of at least 1000 Lux without blinding of the sensors (e.g. direct blinding sunlight);~~

(f) ~~In absence of weather conditions affecting the dynamic performance of the vehicle (e.g. no storm, not below 0°C);~~

(g) ~~When driving straight with no curve, and not turning at an intersection~~

(h) ~~In absence of conditions resulting from the usage of the vehicle which are directly affecting the braking performance (e.g. brake temperature, severe uneven load distribution)~~

~~ALTERNATIVE 1 [It is recognised that the performances required in this table may not be fully achieved in other conditions than those listed above. However, the system shall not deactivate or unreasonably switch the control strategy in these other conditions. This shall be demonstrated in accordance with Annex 3 of this Regulation.]~~

~~ALTERNATIVE 2 [In other conditions the system shall not deactivate or unreasonably switch the control strategy. This shall be demonstrated in accordance with chapter 6 and Annex 3 of this Regulation.] (European Joint Research Center proposal)~~

- (a) **vehicle external influences allow for the required deceleration, i.e.:**
  - the road is flat, horizontal and dry affording good adhesion;
  - the weather conditions do not affect the dynamic performance of the vehicle (e.g. no storm, not below 0°C);
- (b) **the vehicle state itself allows for the required deceleration, e.g.:**
  - the tyres are in an appropriate state and properly inflated;
  - the brakes are properly operational (brake temperature, pads condition etc.);
  - there is no severe uneven load distribution;
  - No trailer is coupled to the motor vehicle and the mass of the motor vehicle is between maximum mass and mass in running order conditions;
- (c) **there are no external influences affecting the physical sensing capabilities, i.e.:**
  - the ambient illumination conditions are at least 1000 Lux and there is no extreme blinding of the sensors (e.g. direct blinding sunlight, highly RADAR-reflective environment);
  - the target vehicle is not extreme with regard to the Radar Cross Section (RCS) or the shape/silhouette (e.g. above 5<sup>th</sup> percentile of RCS of all M1 vehicles)
  - there are no significant weather conditions affecting the sensing capabilities of the vehicle (e.g. no heavy rain, dense fog, snow, dirt);
  - there are no overhead obstructions close to the vehicle;
- (d) **the situation is unambiguous, i.e.:**
  - the preceding vehicle belongs to category M, N, O3 or O4, is unobstructed, clearly separated from other objects in the driving lane and constantly travelling or stationary;
  - the vehicle longitudinal centre planes are displaced by not more than 0.2 m;
  - the direction of travel is straight with no curve, and the vehicle is not turning at an intersection and following its lane.

**When conditions deviate from those listed above, the system shall not deactivate or unreasonably switch the control strategy. This shall be demonstrated in accordance with chapter 6 and Annex 3 of this Regulation.**

*Paragraph 5.2.2.1., amend to read:*

5.2.2.1. Collision warning

When the AEBS has detected the possibility of a collision with a pedestrian crossing the road at a constant speed of not more than 5 km/h, within the conditions specified in paragraph 5.2.2.4., a collision warning as specified in paragraph 5.5.1. shall be provided no later than the start of the emergency braking.

The collision warning may be aborted if the conditions prevailing a collision are no longer present.

This shall be verified according to paragraphs 6.6. ~~–[Additionally, the specifications not covered in paragraphs 6.6. may be verified with a reproduceable and repeatable appropriate test method.]~~

*Paragraph 5.2.2.2., amend to read:*

5.2.2.2. Emergency braking

When the system has detected the possibility of an imminent collision, there shall be a braking demand of at least 4 m/s<sup>2</sup> to the service braking system of the vehicle. This does not prohibit higher deceleration demand values than 4 m/s<sup>2</sup> during the collision warning for very short durations, e.g. as haptic warning to stimulate the driver's attention.

The emergency braking may be aborted, or the deceleration demand reduced below the threshold above (as relevant), if the conditions prevailing a collision are no longer present or the risk of a collision has decreased.

This shall be verified according to paragraph 6.6. ~~[Additionally, the specifications not covered in paragraph 6.6. may be verified with a reproduceable and repeatable appropriate test method.]~~

*Paragraph 5.2.2.4., amend to read:*

5.2.2.4. Speed reduction by braking demand

In absence of driver's input which would lead to interruption according to paragraph 5.3.2., the AEBS shall be able to achieve an impact speed that is less or equal to the maximum relative impact speed as shown in the following table, **provided:**

- ~~(a) With unobstructed perpendicularly crossing pedestrians with a lateral speed component of not more than 5 km/h;~~
- ~~(b) In unambiguous situations (e.g. not multiple pedestrians);~~
- ~~(c) On flat, horizontal and dry roads affording good adhesion;~~
- ~~(d) No trailer is coupled to the motor vehicle and the mass of the motor vehicle is between maximum mass and mass in running order conditions;~~
- ~~(e) In situations where the anticipated impact point is displaced by not more than 0.2 m compared to the vehicle longitudinal centre plane;~~
- ~~(f) In ambient illumination conditions of at least 2000 Lux without blinding of the sensors (e.g. direct blinding sunlight).~~
- ~~(g) In absence of weather conditions affecting the dynamic of the vehicle (e.g. no storm, not below 0°C) and~~
- ~~(h) When driving straight with no curve, and not turning at an intersection.~~
- ~~(i) In absence of situations resulting from the usage of the vehicle which are directly affecting the braking performance (e.g. brake temperature, severe uneven load distribution)~~

~~ALTERNATIVE 1 [It is recognised that the performances required in this table may not be fully achieved in other conditions than those listed above. However, the system shall not deactivate or unreasonably switch the control strategy in these other conditions. This shall be demonstrated in accordance with Annex 3 of this Regulation.]~~

~~ALTERNATIVE 2 [In other conditions the system shall not deactivate or unreasonably switch the control strategy. This shall be demonstrated in accordance with chapter 6 and Annex 3 of this Regulation.] (JRC proposal)~~

- (a) pedestrians are unobstructed and perpendicularly crossing with a lateral speed component of not more than 5 km/h;**
- (b) vehicle external influences allow for the required deceleration, i.e.:**
  - the road is flat, horizontal and dry affording good adhesion;
  - the weather conditions do not affect the dynamic performance of the vehicle (e.g. no storm, not below 0°C);
- (c) the vehicle state itself allows for the required deceleration, e.g.:**
  - the tyres in an appropriate state and properly inflated;
  - the brakes are properly operational (brake temperature, pads condition etc.);
  - there is no severe uneven load distribution;
  - No trailer is coupled to the motor vehicle and the mass of the motor vehicle is between maximum mass and mass in running order conditions;

- (d) there are no external influences affecting the physical sensing capabilities, i.e.:
  - the ambient illumination conditions are at least 2000 Lux and there is no extreme blinding of the sensors (e.g. direct blinding sunlight, highly RADAR-reflective environment);
  - there are no significant weather conditions affecting the sensing capabilities of the vehicle (e.g. no heavy rain, dense fog, snow, dirt);
  - there are no overhead obstructions close to the vehicle;
- (e) the situation is unambiguous, i.e.:
  - there are not multiple pedestrians crossing in front of the vehicle.
  - the silhouette of the pedestrian and the type of movement relate to a human being.
  - the anticipated impact point is displaced by not more than 0.2 m compared to the vehicle longitudinal centre plane.
  - the direction of travel is straight with no curve, and the vehicle is not turning at an intersection and following its lane.
  - there are no multiple objects close by to the pedestrian and an unambiguous object separation is given.

When conditions deviate from those listed above, the system shall not deactivate or unreasonably switch the control strategy. This shall be demonstrated in accordance with chapter 6 and Annex 3 of this Regulation.

*Paragraph 5.3.1. to 5.3.2., amend to read:*

- 5.3. Interruption by the Driver
- 5.3.1. The AEBS shall provide ~~the~~ **appropriate and robust** means for the driver to interrupt the collision warning and the emergency braking.
- 5.3.2. In both cases above, this interruption may be initiated by any positive action (e.g. kick-down~~-operating the~~ **or a swerving action that results in enough change of direction indicator control to not hit the target**) that indicates the driver is aware of the emergency situation. The vehicle manufacturer shall provide a list of these positive actions to the technical service at the time of type approval, and it shall be annexed to the test report.

*Paragraph 5.4.1.4., amend to read:*

- {5.4.1.4. It shall not be possible to manually deactivate the AEBS at a speed above [10] km/h.} **For every manual deactivation requested by the driver as referenced in paragraph 5.4.1.2., the AEBS shall be automatically reinstated latest after 15 minutes. Additionally, it shall be possible for the driver to reactivate AEBS at any time, including whilst driving.**

*Insert a new Paragraph 5.4.1.5., to read:*

- 5.4.1.5. Notwithstanding the requirements of paragraph 5.4.1.4., the AEBS may provide a technical means for the driver to deactivate the system, following a unique procedure, in case of any situation impairing the operation of the system (e.g. sensor mounting damage by an accident). The manufacturer shall provide information about these situations in the vehicle owner's handbook or by any other communication means in the vehicle.**

**Additionally, the unique procedure shall be possible only while the vehicle is at standstill for a minimum time duration of 2 minutes with the master control switch active and shall require a more complex procedure than the one specified in paragraph 5.4.1.2 for manual deactivation (e.g. require at least three different deliberate actions).**

Paragraph 5.4.2.3., amend to read:

- 5.4.2.3. Where automatic deactivation of the AEBS function is a consequence of the driver manually switching off the **vehicle stability function** ESC of the vehicle, this deactivation of the AEBS shall require at least two deliberate actions by the driver.

Insert a new Paragraph 5.4.3., to read (and re-number the following paragraphs):

- 5.4.3. Notwithstanding the requirements of paragraphs 5.4.1.1. and 5.4.1.4., the AEBS may provide a technical means to deactivate the system for specific applications (e.g. front mounted equipment like snow plough) where the operation of the system may be impaired.**

**This technical means shall not be made available to the driver (e.g. be only possible with a unique operation by an authorized workshop).**

**Additionally, the deactivation warning specified in 5.1.4.3. may be suppressed, at the earliest 15 seconds after the initiation of each new ignition cycle.**

Paragraph 5.5.3., amend to read:

- 5.5.3. Where an optical means is used as part of the collision warning, the optical signal may be the flashing of the failure warning signal specified in paragraph 5.5.4.

Paragraph 6.1.1., amend to read:

- 6.1.1. ~~The test shall be performed on a flat, dry concrete or asphalt surface affording good adhesion.~~ **Test surface**

- 6.1.1.1. The test shall be performed on a flat, dry, concrete or asphalt road affording good adhesion.**

- 6.1.1.2. The test surface has a consistent slope between level and 1 per cent.**

Paragraph 6.2.1., amend to read:

- 6.2.1. Test mass

The vehicle shall be tested:

- (a) **At the maximum mass;**

~~(ab)~~ **If this is deemed justified (e.g. if lower performance is expected when the sensors may miss the target (e.g. at due to low mass conditions), the technical service may test** at the mass in running order with an additional mass of maximum 125 kg where this additional mass includes the measuring equipment and a possible second person who is responsible for noting the results in order to demonstrate compliance with the requirements referring to the mass in running order, ~~and otherwise.~~

- ~~(b)~~ ~~At the maximum mass~~

The load distribution shall be according to the manufacturer's recommendation and be annexed to the test report. No alteration shall be made once the test procedure has begun.

During the series of test runs, the fuel level may decrease but shall never fall below 50 per cent.

Paragraph 6.3.1., amend to read:

- 6.3.1. The target used for the vehicle detection tests shall be a regular high-volume series production passenger car of Category M<sub>1</sub> or alternatively a "soft target" representative of a **passenger** vehicle in terms of its identification characteristics applicable to the sensor system of the AEBS under test according to ISO 19206-3:2021. The reference point for the location of the vehicle shall be the most rearward point on the centreline of the vehicle.



Paragraph 6.4., amend to read:

6.4. Warning and Activation Test with a Stationary Vehicle Target

The subject vehicle shall approach the stationary target in a straight line for at least two seconds prior to the functional part of the test with a subject vehicle to target centreline offset of not more than 0.2 m.

Tests shall be conducted with a vehicle travelling at the following speeds, with a tolerance of +/- 2 km/h, **but not beyond the range specified in paragraph 5.2.1.3.**, for all tests:

- (a) 20 km/h;
- (b) Maximum required impact avoidance speed as shown in paragraph 5.2.1.4, and
- (c) Either:
  - (i) Maximum required impact avoidance speed, as shown in paragraph 5.2.1.4., + 8 km/h (e.g. for a vehicle derived from M1/N1, the test shall be conducted at 58 km/h), or
  - (ii) Maximum design speed, whichever is lower,

~~for respectively M<sub>2</sub>, M<sub>3</sub>, N<sub>2</sub> and N<sub>3</sub> Categories. If this is deemed justified, the technical service may test any other speeds listed in the tables in paragraph 5.2.1.4. and within the prescribed speed range as defined in paragraph 5.2.1.3.~~

**If this is deemed justified, the technical service may test in any test condition within those specified in paragraph 5.2.1.4., with any other speeds listed in the tables in paragraph 5.2.1.4. and within the prescribed speed range as defined in paragraph 5.2.1.3. The Technical Service may verify that the control strategy is not unreasonably changed or the AEBS switched off in other conditions than those specified in paragraph 5.2.1.4. The report of this verification shall be appended to the test report.**

The functional part of the test shall start with;

- (a) the subject vehicle travelling at the required test speed within the tolerances and within the lateral offset prescribed in this paragraph, and
- (b) a distance corresponding to a Time To Collision (TTC) of at least 4 seconds from the target.

The tolerances shall be respected between the start of the functional part of the test and the system intervention.

Paragraph 6.5., amend to read:

6.5. Warning and Activation Test with a Moving Vehicle Target

The subject vehicle and the moving target shall travel in a straight line, in the same direction, for at least two seconds prior to the functional part of the test with a subject vehicle to target centreline offset of not more than 0.2m.

Tests shall be conducted with a vehicle travelling at the following relative speeds to the target, with a tolerance of +/- 2 km/h for all tests, **and a target travelling at 20 km/h, with a tolerance of +0/-2 km/h for both the target and the subject vehicles, but at speeds not beyond the range specified in paragraph 5.2.1.3.:**

- (a) 20 km/h (e.g. target travelling at 20 km/h, vehicle travelling at 40 km/h, relative speed is 20 km/h);
- (b) Maximum required impact avoidance speed as shown in paragraph 5.2.1.4. (e.g. maximum required impact avoidance speed for a N<sub>3</sub> vehicle is 70 km/h, target is travelling at 20 km/h, subject vehicle speed is 90 km/h ~~à speed limiter speed~~), and
- (c) Either:

- (i) Maximum required impact avoidance speed, as shown in paragraph 5.2.1.4., + 8 km/h (e.g. for a target travelling at 20 km/h and a M<sub>3</sub> vehicle > 8 tons, the test shall be conducted at 20 + 70 + 8 = 98 km/h), or
- (ii) Maximum design speed (e.g. for a target travelling at 20 km/h, speed limiter speed of approximately 89 km/h for an N<sub>3</sub>),  
~~Whichever is lower;~~

~~for respectively M<sub>2</sub>, M<sub>3</sub>, N<sub>2</sub> and N<sub>3</sub> categories and target travelling at 20 km/h (with a tolerance of +0/-2 km/h for the target vehicles). If this is deemed justified, the Technical Service may test any other speeds for subject vehicle and target vehicle within the speed range as defined in paragraph 5.2.1.3.~~

**If this is deemed justified, the technical service may test in any test condition within the conditions specified in paragraph 5.2.1.4. and with any other speeds listed in the tables in paragraph 5.2.1.4. and within the prescribed speed range as defined in paragraph 5.2.1.3. Outside of the conditions of Paragraph 5.2.1.4., the Technical Service may verify that the control strategy is not unreasonably changed or the AEBS switched off. The report of this verification shall be appended to the test report.**

The functional part of the test shall start with

- (a) the subject vehicle travelling at the required test speed within the tolerances and within the lateral offset prescribed in this paragraph,
- (b) the moving target travelling at the required test speed and within the tolerances of this paragraph; and
- (c) a distance corresponding to a Time To Collision (TTC) of at least 4 seconds from the target.

The tolerances shall be respected between the start of the functional part of the test and the system intervention.

*Paragraph 6.6.1., amend to read:*

6.6. Warning and Activation Test with a Pedestrian Target

6.6.1. The subject vehicle shall approach the impact point with the pedestrian target in a straight line for at least two seconds prior to the functional part of the test with an anticipated subject vehicle to impact point centreline offset of not more than 0.2 m.

The functional part of the test shall start when the subject vehicle is travelling at a constant speed and is at a distance corresponding to a TTC of at least 4 seconds from the collision point.

The pedestrian target shall travel in a straight line perpendicular to the subject vehicle's direction of travel at a constant speed of 5 km/h +0/-0.4 km/h, starting not before the functional part of the test has started. The pedestrian target's positioning shall be coordinated with the subject vehicle in such a way that the impact point of the pedestrian target on the front of the subject vehicle is on the longitudinal centreline of the subject vehicle with a tolerance of not more than 0.1 m if the subject vehicle would remain at the prescribed test speed throughout the functional part of the test and does not brake.

Tests shall be conducted with a vehicle travelling at the following speeds, with a tolerance of +/- 2 km/h for all tests **but not beyond the range specified in paragraph 5.2.2.3.,:**

- (a) 20 km/h
- (b) Maximum required collision avoidance speed, and
- (c) Either:

- (i) Maximum required impact avoidance speed as shown in paragraph 5.2.2.4., + 8 km/h (e.g. for a vehicle derived from M1/N1, the test shall be conducted at 34 km/h), or
- (ii) Maximum design speed,  
~~Whichever is lower,~~

~~for respectively M<sub>2</sub>, M<sub>3</sub>, N<sub>2</sub> and N<sub>3</sub> categories. The technical service may test any other speeds listed in the table in paragraph 5.2.2.4. and within the prescribed speed range as defined in paragraphs 5.2.2.3.~~

**If this is deemed justified, the technical service may test in any test condition within the conditions specified in paragraph 5.2.2.4, and with any other speeds listed in the table in paragraph 5.2.2.4. and within the prescribed speed range as defined in paragraphs 5.2.2.3. Outside of the conditions of Paragraph 5.2.2.4., the Technical Service may verify that the control strategy is not unreasonably changed or the AEBS switched off. The report of this verification shall be appended to the test report.**

The functional part of the test shall start with

- (a) the subject vehicle travelling at the required test speed within the tolerances and within the lateral offset prescribed in this paragraph,
- (b) the pedestrian target travelling at the required test speed within the tolerances specified in this paragraph and
- (c) a distance corresponding to a Time To Collision (TTC) of at least 4 seconds from the target.

The tolerances shall be respected between the start of the functional part of the test and the system intervention.

The test prescribed above shall be carried out with a child pedestrian "soft target" defined in 6.3.2.

*Paragraph 6.8.1., amend to read:*

“6.8.1. For vehicles equipped with means to manually deactivate the AEBS, turn the ignition (start) switch to the "on" (run) position and deactivate the AEBS. The warning signal mentioned in paragraph 5.4.3. **5.4.4.** above shall be ...”

*Paragraph 6.9.1., amend to read:*

6.9.1. Any of the above test scenarios, where a scenario describes one test setup at one subject vehicle speed at one load condition of one category (Vehicle to Vehicle, Vehicle to Pedestrian), shall be performed two times. If one of the two test runs fails to meet the required performance, the test may be repeated once. A test scenario shall be accounted as passed if the required performance is met in two test runs. The number of failed tests runs within one category shall not exceed:

- (a) 10.0 per cent (%) of the performed test runs for the Vehicle to Vehicle tests; **and**
- (b) 10.0 per cent (%) of the performed test runs for the Vehicle to Pedestrian tests; ~~and~~

*Paragraph 7.1.1., amend to read:*

7.1.1. Consider that the modifications made do not have an adverse effect on the conditions of the granting of the approval and grant an extension of approval;  
**or**

...

*Paragraph 12.2., amend to read:*

†12.2. Transitional provisions applicable to the 02 series of amendments

- 12.2.1. As from the official date of entry into force of the 02 series of amendments, no Contracting Party applying this Regulation shall refuse to grant or refuse to accept type approvals under this Regulation as amended by the 02 series of amendments.
- 12.2.2. As from [~~20XX~~ **1 September 2025**], Contracting Parties applying this Regulation shall not be obliged to accept type approvals to the preceding series of amendments, first issued after [~~20XX~~ **1 September 2025**].
- 12.2.3. Until [~~20XX+3~~ **1 September 2028**], Contracting Parties applying this Regulation shall accept type approvals to the preceding series of amendments, first issued before [~~20XX~~ **1 September 2025**].
- 12.2.4. As from [~~20XX+3~~ **1 September 2028**], Contracting Parties applying this Regulation shall not be obliged to accept type approvals issued to the preceding series of amendments to this Regulation.
- 12.2.5. Notwithstanding the transitional provisions above, Contracting Parties who start to apply this Regulation after the date of entry into force of the most recent series of amendments are only obliged to accept type approval granted in accordance with the 01 series of amendments.
- 12.2.6. Contracting Parties applying this Regulation may grant type approvals according to any preceding series of amendments to this Regulation.
- 12.2.7. Contracting Parties applying this Regulation shall continue to grant extensions of existing approvals to any preceding series of amendments to this Regulation}.

*Annex 1 (Communication), amend to read:*

- 1. Trademark:.....
- ...
- 5. Brief description of vehicle:.....  
~~[Mass in running order: .... Kg]~~  
~~[Maximum mass: .... Kg]~~
- 6. Date of submission of vehicle for approval: .....
- ...

*Insert a new footnote 10 in False Reaction scenarios of Annex 3 - Appendix 2, to read:*

False Reaction scenarios<sup>10</sup>

- <sup>10</sup> **Until proper values for HDVs are defined, the values for each scenario may be changed in agreement between the technical service and the manufacturer. It is recognized that the parameters described in subparagraph 2 of each scenario are based on passenger cars data.**

*Insert a new footnote 11 in Scenario 1 of Annex 3 - Appendix 2, to read:*

Left turn or Right turn at the intersection<sup>11</sup>

- <sup>11</sup> **This scenario is only applicable to vehicles of category M2, M3≤ 8t and N2≤8t.**

*Paragraph 1.2. in Scenario 1, amend to read:*

- 1.2. An example of the detail scenario:  
 ... The TTC to the oncoming vehicle is not more than 1.7 seconds at when the overlap ratio between the subject vehicle and the oncoming vehicle becomes 0 per cent (%).

*Paragraph 2.2. in Scenario 2, amend to read:*

- 2.2. An example of the detail scenario:

... The TTC to the forward vehicle is not more than 2.5 seconds at when the overlap ratio between the subject vehicle and the forward vehicle becomes 0 per cent (%).

*Paragraph 3.2. in Scenario 3, amend to read:*

3.2. An example of the detail scenario:

... The TTC to the stationary object is not more than 1.1 second at when the overlap ratio between the subject vehicle and the stationary vehicle becomes 0 per cent (%), or at when the offset ratio between the subject vehicle and the centre of the stationary pedestrian target becomes -100 per cent (%).

*Paragraph 4.2. in Scenario 3, amend to read:*

4.2. An example of the detail scenario:

... During changing the lane, the speed of the subject vehicle is constant, and the TTC to the signboard is not more than 3.3 seconds at when the offset ratio between the subject vehicle and the centre of the signboard becomes -100 per cent (%).

## **II. JUSTIFICATIONS**

See accompanying presentation GRVA-12-09 and GRVA-11-27-Rev.1.