

Identical text between R131 and the skeleton appears in green. / Yellow highlights proposals, comments, items for discussion

R131 (current)	AEBS-HDV-03-02 – V2	Comments (red text is extracted from AEBS-HDV-03-02)
<p>Introduction</p> <p>The intention of this Regulation is to establish uniform provisions for Advanced Emergency Braking Systems (AEBS) fitted to motor vehicles of the categories M₂, M₃, N₂ and N₃¹ primarily used under monotonous highway driving conditions.</p> <p>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 they are primarily used in other conditions than highway conditions (e.g. buses with standing passengers i.e. Classes I, II and A¹, category G vehicles¹, 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 G¹, 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.</p> <p>In addition, systems intended for vehicles not equipped with a pneumatic rear-axle suspension require the integration of advanced sensor technology to take into account the variation of the pitch angle of the vehicle.</p> <p>The system shall automatically detect a potential forward collision, 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 in the event that the driver does not respond to the warning.</p> <p>The system shall only operate in driving situations where braking will avoid or mitigate the severity of an accident, and shall take no action in normal driving situations.</p> <p>In the case of a failure in the system, the safe operation of the vehicle shall not be endangered.</p>	<p>Introduction (from R152)</p> <p>The intention of this Regulation is to establish uniform provisions for Advanced Emergency Braking Systems (AEBS) fitted to motor vehicles of the Categories M₁ and N₁ primarily used within urban driving conditions.</p> <p>The system shall automatically detect a potential forward collision, provide the driver with an appropriate warning and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating the severity of a collision in the event that the driver does not respond to the warning.</p> <p>In the case of a failure in the system, the safe operation of the vehicle shall not be endangered.</p> <p>During any action taken by the system, the driver can, at any time through a conscious action, e.g. by a steering action or an accelerator kick-down, take control and override the system.</p> <p>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, deteriorated road infrastructure and traffic scenarios etc. may affect the system performances). Actual conditions and features in the real world should not result in false warnings or false braking to the extent that they encourage the driver to switch the system off.</p> <p>This Regulation is an "if-fitted" regulation. It shall not prevent contracting parties from mandating the fitting of AEBS approved in accordance to this Regulation.</p>	<p>New introduction to be developed.</p>

<p>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.</p> <p>During any action taken by the system (the warning and emergency braking phases), the driver can, at any time through a conscious action, e.g. by a steering action or an accelerator kick-down, take control and override the system.</p> <p>The Regulation cannot include all the traffic conditions and infrastructure features in the type-approval process. Actual conditions and features in the real world should not result in false warnings or false braking to the extent that they encourage the driver to switch the system off."</p>		
<p>1. Scope and purpose</p> <p>This Regulation applies to the approval of vehicles of category M₂, N₂, M₃ and N₃¹ with regard to an on-board system to avoid or mitigate the severity of a rear-end in lane collision.</p>	<p>1. Scope</p> <p>This Regulation applies to the approval of vehicles of Category M₂, M₃, N₂ and N₃¹ with regard to an on-board system to</p> <p>(a) Avoid or mitigate the severity of a rear-end in lane collision [with a passenger car]</p> <p>(b) Avoid or mitigate the severity of an impact with a pedestrian,</p> <p>(c) Avoid or mitigate the severity of an impact with a bicycle cyclist.</p>	<p>Overlapping of scope between R131 and R152.</p> <ul style="list-style-type: none"> N2 and M2 could be covered by both R131 and R52, to VM choice. Justification: same AEBS on a N1 and a 'N2 derived from N1' should have the same requirements and be covered by the same regulation to avoid administrative burden. <p>Is collision avoidance/mitigation with other vehicles (category M2/M3/N/O) than passenger cars covered by this regulation?</p>
<p>2. Definitions</p> <p>2.1. "Advanced Emergency Braking System (AEBS)" means a system which can automatically detect a potential forward collision and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating a collision.</p> <p>2.8. "Collision warning phase" means the phase directly preceding the emergency braking</p>	<p>2. Definitions</p> <p>For the purposes of this Regulation:</p> <p>2.1. "Advanced Emergency Braking System (AEBS)" means a system which can automatically detect an imminent forward collision and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating-a collision.</p> <p>2.2. "Emergency Braking" means a braking demand emitted by the AEBS to the service braking system of the vehicle.</p>	<p>The definitions of Collision warning and emergency braking in R152 looks to be giving more flexibility for the design, compared to R131. The impact of the changes in the definitions should be reviewed once the requirements will be defined.</p>

¹

As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.6, para. 2 -

<p>2.9. "Emergency braking phase" means the phase starting when the AEBS emits a braking demand for at least 4 m/s² deceleration to the service braking system of the vehicle.</p>	<p>2.3. "Collision Warning " means a warning emitted by the AEBS to the driver when the AEBS has detected an imminent forward collision.</p>	
<p>2.2. "Vehicle type with regard to its Advanced Emergency Braking System" means a category of vehicles which do not differ in such essential respects as:</p> <p>(a) The manufacturer's trade name or mark;</p> <p>(b) Vehicle features which significantly influence the performances of the Advanced Emergency Braking System;</p> <p>(c) The type and design of the Advanced Emergency Braking System.</p>	<p>2.4. "Vehicle Type with Regard to its Advanced Emergency Braking System" means a category of vehicles which do not differ in such essential aspects as:</p> <p>(a) Vehicle features which significantly influence the performances of the Advanced Emergency Braking System;</p> <p>(b) The type and design of the Advanced Emergency Braking System.</p>	<p>Discussion point: What are different types for heavy vehicles that are by themselves different?</p> <ul style="list-style-type: none"> • Clarify the question from Chair. • Some first elements of potentially impacting vehicle characteristics on AEBS (while not necessarily changing "AEBS type") <ul style="list-style-type: none"> ○ LCVs vs HCVs ○ With / without O3/O4 trailer towing capabilities ○ Hydraulic vs pneumatic braking ○ Pneumatic vs leaf suspension <p>Industry supports keeping the wording of (a) and (b) as proposed in the skeleton document.</p>
<p>2.3. "Subject vehicle" means the vehicle being tested.</p> <p>2.7. "Soft target" means a target that will suffer minimum damage and cause minimum damage to the subject vehicle in the event of a collision.</p> <p>2.4. "Target" means a high volume series production passenger car of category M₁ AA saloon¹ or in the case of a soft target an object representative of such a vehicle in terms of its detection characteristics applicable to the sensor system of the AEBS under test.</p> <p>2.5. "Moving target" means a target travelling at a constant speed in the same direction and in the centre of the same lane of travel as the subject vehicle.</p> <p>2.6. "Stationary target" means a target at standstill facing the same direction and positioned on the</p>	<p>2.5. "Subject Vehicle" means the vehicle being tested.</p> <p>2.6. "Soft Target" means a target that will suffer minimum damage and cause minimum damage to the subject vehicle in the event of a collision.</p> <p>2.7. "Vehicle Target" means a target that represents a vehicle.</p> <p>2.8. "Pedestrian Target" means a soft target that represents a pedestrian</p> <p>2.9. "Bicycle Target" means a soft target that represents a bicycle with cyclist</p>	<p>The new definitions looks ok.</p>

<p>centre of the same test lane of travel as the subject vehicle.</p>		
<p>2.10. "Common space" means an area on which two or more information functions (e.g. symbol) may be displayed, but not simultaneously.</p>	<p>2.10. "Common Space" means an area on which two or more information functions (e.g. symbol) may be displayed, but not simultaneously.</p>	
<p>2.11. "Self-check" means an integrated function that checks for a system failure on a semi-continuous basis at least while the system is active.</p>	<p>2.11. "Self-Check" means an integrated function that checks for a system failure on a continuous basis at least while the system is active.</p>	<p>The word "continuous" is acceptable for electrically detectable failures, for the purpose of requirement in 5.1.4.1.1.</p> <p>Remark: the use of the word "continuous" is more questionable when it comes to other types of self-checks (e.g. a consistency check of wheel speed sensors values can only be done while the vehicle is driving, which makes the check not really "continuous", while being performed as soon as the conditions for the check are fulfilled...).</p>
<p>2.12. "Time to collision (TTC)" means the value of time obtained by dividing the distance between the subject vehicle and the target by the relative speed of the subject vehicle and the target, at an instant in time.</p>	<p>2.12. "Time To Collision (TTC)" means the value of time obtained by dividing the longitudinal distance (in the direction of travel of the subject vehicle) between the subject vehicle and the target by the longitudinal relative speed of the subject vehicle and the target, at any instant in time.</p>	<p>Only clarifications, looks OK</p>
	<p>2.13. "Dry road" means a road with a nominal peak braking coefficient of 0.9</p> <p>2.14. "Peak braking coefficient (PBC)": means the measure of tyre to road surface friction based on the maximum deceleration of a rolling tyre.</p>	<p>Dry road:</p> <ul style="list-style-type: none"> • Why is a definition of "dry road" needed? • All "dry roads" does not provide 0.9... • The definition of "dry road" is only used in 5.2.1.4, 5.2.2.4 and 5.2.3.4 (b). These requirements specify the domain where the requirements shall be fulfilled. Does it mean that below 0.9, it would be acceptable to not fulfil the collision avoidance requirements (provided technically justified). • Isn't it sufficient to measure the adhesion at the time of testing? <p>Do we need "Peak braking coefficient (PBC)" definitions in R131?</p>

	<p>2.15. "Initialisation" means the process of setting-up the operation of the system after switching ON the vehicle until it is fully functioning.</p>	
	<p>2.16. "Mass of a vehicle in running order" means the mass of an unladen vehicle with bodywork, including coolant, oils, at least 90 per cent of fuel, 100 per cent of other liquids, driver (75 kg) but except used waters, tools, spare wheel.</p> <p>2.17. "Maximum mass" means the maximum mass stated by the vehicle manufacturer to be technically permissible (this mass may be higher than the "permissible maximum mass" laid down by the national administration).</p>	<p>We will update the conditions of mass for the categories of 2 and 3.</p> <ul style="list-style-type: none"> • Are these definitions of the different “masses” compatible with WVTA or R13 definitions? • Mass of a vehicle in running order: <ul style="list-style-type: none"> ○ “Vehicle with bodywork”...? ○ We should not re-do R13 type approval test with the minimum possible vehicle mass... ○ The technical mass of a vehicle could be higher than the maximum homologated mass (e.g. construction vehicles may have a higher technical mass in construction areas, which is not considered for the AEBS approval) ○ We may have the following situation for a 6x4: <ul style="list-style-type: none"> ▪ 26t maximum on road ▪ 28t for the AEBS approval ▪ 32t for construction areas
<p>5. Specifications</p> <p>5.1. General</p> <p>5.1.1. Any vehicle fitted with an AEBS complying with the definition of paragraph 2.1. above shall meet the performance requirements contained in paragraphs 5.1. to 5.6.2. of this Regulation and shall be equipped with an anti-lock braking function in accordance with the performance requirements of Annex 13 to Regulation No. 13.</p>	<p>5. Specifications</p> <p>5.1. General requirements</p> <p>5.1. General requirements</p> <p>5.1.1. Any vehicle fitted with an AEBS complying with the definition of paragraph 2.1. above shall, when activated and operated within the prescribed speed ranges, meet the performance requirements:</p> <p>5.1.1.1. of paragraphs 5.1. and paragraphs 5.3. to 5.6. of this Regulation for all vehicles;</p> <p>5.1.1.2. of paragraph 5.2.1. of this Regulation for vehicles submitted to approval for Vehicle to car scenario;</p> <p>(See 5.1.7)</p>	<p>Meeting a requirement is an intrinsic characteristic of the vehicle with regard to the approved system (e.g. compliance to EMC R10, failure warning), it does not depend of the actual situation where the vehicle is.</p>

<p>No C2P requirements in R131</p>	<p>5.1.1.3. of paragraph 5.2.2. of this Regulation for vehicles submitted to approval for Vehicle to pedestrian scenario.</p>	
<p>No C2B requirements in R131</p>	<p>5.1.1.4. of paragraph 5.2.3. of this Regulation for vehicles submitted to approval for Vehicle to bicycle scenario.</p>	
<p>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 Regulation No. 10 by applying:</p> <p>(a) The 03 series of amendments for vehicles without a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries);</p> <p>(b) The 04 series of amendments for vehicles with a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries).</p>	<p>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 UN Regulation No. 10 05 series of amendments.</p>	<p>Cross reference to be checked.</p>
<p>5.1.3. Conformity with the safety aspects of complex electronic control systems shall be shown by meeting the requirements of Annex 4.</p>	<p>5.1.3. Conformity with the safety aspects of electronic control systems shall be shown by meeting the requirements of Annex 3.</p>	
<p><i>(paragraphs moved from their original position, for the best convenience of the comparison with the skeleton)</i></p> <p>5.2.1.2. A failure warning when there is a failure in the AEBS that prevents the requirements of this Regulation of being met. The warning shall be as specified in paragraph 5.5.4. below.</p> <p>5.2.1.2.1. There shall not be an appreciable time interval between each AEBS self-check, and subsequently there shall not be an appreciable delay in illuminating the warning signal, in the case of an electrically detectable failure.</p>	<p>5.1.4. Warnings and information</p> <p>In addition to the collision warnings described in paragraphs 5.2.1.1. and 5.2.2.1., the system shall provide the driver with appropriate warning(s) and information as below:</p> <p>5.1.4.1. A failure warning when there is a failure in the AEBS that prevents the requirements of this Regulation of being met. The warning shall be as specified in paragraph 5.5.4.</p> <p>5.1.4.1.1. There shall not be an appreciable time interval between each AEBS self-check, and subsequently there shall not be a delay in illuminating the warning signal, in the case of an electrically detectable failure.</p>	<p>Proposal to make one specific paragraph for warnings, distinct from a paragraph on “information to driver”.</p> <p>If that proposal would be agreed, appropriate numbering and headlines should be updated accordingly.</p>

	<p>5.1.4.1.2. If the system has not been initialised after a cumulative driving time of [15] seconds above a speed of [10] km/h, information of this status shall be indicated to the driver. This information shall exist until the system has been successfully initialised.</p> <p>5.1.4.1.3. Upon detection of any non-electrical failure condition (e.g. sensor blindness or sensor misalignment), the warning signal as defined in paragraph 5.1.4.1. shall be illuminated.</p>	<p>Justification:</p> <p>AEBS for M1 N1 is focussing on low speed / city driving, which probably justifies a threshold of 15 km/h, while AEBS for CVs is focussing on highway conditions, where the traffic and potential stationary targets may be less dense, thus giving less “opportunities” to check sensors.</p>
<p>(paragraphs moved from their original position, for the best convenience of the comparison with the skeleton)</p> <p>5.2.1.3. A deactivation warning, if the vehicle is equipped with a means to manually deactivate the AEBS, shall be given when the system is deactivated. This shall be as specified in paragraph 5.4.2. below.</p>	<p>5.1.4.2. 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.</p>	<ul style="list-style-type: none"> • Why deleting “manually”? • Is it to cover cases where for example: <ul style="list-style-type: none"> ○ An ABS or an ESC failure would lead to disable AEBS...? ○ A sensor would be blocked by an external factor (i.e. the system gets disabled but this is not a system failure)? • Item linked with paragraph 5.4.2
<p>See 5.2.2</p>	<p>5.1.5. Emergency braking</p> <p>Subject to the provisions of paragraphs 5.3.1. and 5.3.2., the system shall provide emergency braking interventions described in paragraphs 5.2.1.2., 5.2.2.2. and 5.2.3.2. having the purpose of significantly decreasing the speed of the subject vehicle.</p>	
<p>(paragraphs moved from their original position, for the best convenience of the comparison with the skeleton)</p> <p>5.2.4. The system shall be designed to minimize the generation of collision warning signals and to avoid autonomous braking in situations where the driver would not recognize an impending forward collision. This shall be demonstrated in accordance with paragraph 6.8. of this Regulation.</p>	<p>5.1.6. False reaction avoidance</p> <p>The system shall be designed to minimise the generation of collision warning signals and to avoid advanced emergency braking in situations where there is no risk of an imminent collision. This shall be demonstrated in the assessment carried out under Annex 3, and this assessment shall include in particular scenarios listed in Appendix 2 of Annex 3.</p>	<p>False reaction scenarios: are R152 scenarios acceptable and/or need to be adapted?</p>
<p>See 5.1.1</p>	<p>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 M₂, M₃, N₂, N₃ and shall be equipped with an anti-lock braking function in accordance with the performance</p>	

	<p>requirements of Annex 13 to UN Regulation No. 13 in its 11 series of amendments.</p>	
<p>5.2. Performance requirements</p> <p>5.2.1. The system shall provide the driver with appropriate warning(s) as below:</p> <p>5.2.1.1. A collision warning when the AEBS has detected the possibility of a collision with a preceding vehicle of category M, N or O in the same lane which is travelling at a slower speed, has slowed to a halt or is stationary having not being identified as moving. The warning shall be as specified in paragraph 5.5.1. above.</p>	<p>5.2. Specific Requirements</p> <p>5.2.1. Car to car scenario</p> <p>5.2.1.1. Collision warning</p> <p>When a collision with a preceding vehicle of Category M₁, in the same lane with a relative speed above that speed up to which the subject vehicle is able to avoid the collision, 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.</p> <p>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 shall be provided as specified in paragraph 5.5.1. and shall be provided no later than the start of emergency braking intervention.</p> <p>The collision warning may be aborted if the conditions prevailing a collision are no longer present.</p> <p>This shall be tested according to paragraphs 6.4. and 6.5.</p>	<p>The warning strategy is broadly different from R131.</p> <p>A relaxing of the warning requirements is more than welcome to permit the manufacturer to implement its own technical solutions/strategies.</p> <p>However, this should be carefully analyzed, in relation with the collision avoidance / mitigation requirements. At high speed, there may still be a need to warn the driver “sufficiently” ahead of the EMB. A false positive with only a warning is indeed far less critical compared to one with an EMB, thus it seems of interest to in first place still try stimulating driver’s reaction before to start an EMB. Consequently, if the required performance would increase in such a way that a much earlier start of EMB would be needed, the sensor range and the absolute distance to target may not be sufficient to build a sufficient level of confidence for starting a warning (an EMB?) phase.</p>
<p>5.2.2. Subsequent to the warning(s) of paragraph 5.2.1.1. above, and subject to the provisions of paragraphs 5.3.1. to 5.3.3. below, there shall be an emergency braking phase having the purpose of significantly decreasing the speed of the subject vehicle. This shall be tested in accordance with paragraphs 6.4. and 6.5. of this Regulation.</p>	<p>5.2.1.2. Emergency braking</p> <p>When the system has detected the possibility of an imminent collision, there shall be a braking demand of at least 5.0 m/s² 4 m/s² to the service braking system of the vehicle.</p> <p>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.</p> <p>This shall be tested in accordance with paragraphs 6.4. and 6.5. of this Regulation.</p>	<p>Justification:</p> <p>Proposal to use the same value as in current R131 definition, which is also consistent with the “emergency braking signal” requirement in paragraph 5.2.1.31. of UN R13. Such a deceleration will be anyway perceived as an emergency braking by the driver, while providing more room for the system design (i.e. more freedom for the system to adapt the EMB demand to the actual situation).</p> <p>The second sub-paragraph enables aborting the EMB when the risk disappears. The proposed change adds (or only clarifies?) the possibility for the system to reduce the deceleration demand (after an initial deceleration demand above [5m/s²]) in the case where the risk is only reduced, e.g. due to that the target moved ahead by 3m, the actual deceleration is higher than the minimum</p>

		expected value which has been used for the design etc.
<p>5.2.3. The system shall be active at least within the vehicle speed range of 15 km/h up to the maximum design speed of the vehicle, and at all vehicle load conditions, unless manually deactivated as per paragraph 5.4. below.</p>	<p>5.2.1.3. Speed range</p> <p>The system shall be active at least within the vehicle speed range between 10 km/h and 100 km/h for category M vehicle, 10 km/h and 90 km/h for category N vehicle and at all vehicle load conditions, unless deactivated as per paragraph 5.4.</p> <p>5.2.1.4. Speed reduction by braking demand</p> <p>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 tables specified in this paragraph:</p> <ul style="list-style-type: none"> (a) For collisions with unobstructed and constantly travelling or stationary targets; (b) On flat, horizontal and dry roads; (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 vehicle longitudinal centre planes are displaced by not more than 0.2 m; (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 or the detection capabilities of the vehicle (e.g. no storm, not below 0°C); (g) When driving straight with no curve, and not turning at an intersection 	<p>The requirement of V2C will be cover the high-speed range.</p> <p>b) Dry road means above 0.9 ?</p> <p>c) The maximum mass of the motor vehicle shall be considered, not the gross combination mass (since each vehicle is expected to brake its own mass).</p> <p>This regulation applies to the approval of single motor vehicles and not to combinations.</p> <p>AEBS performance cannot be expected with any kind of trailers (with overload, failing/unplugged ABS, poor braking, unadjusted response time etc.)</p> <p>d) note: R131 specifies an offset of not more than 0.5m (in the test section). But 0.2m is fine.</p> <p>6.4.1. 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 0.5 m.</p> <p>e) Lateral sunlight may also be a limiting factor (shadows on the road).</p> <p>f) weather conditions may not only affect the dynamic performance but also the detection capabilities</p> <p>The list from a) to g) can never be complete.</p>

It is recognised that the performances required in this table may not be fully achieved in other conditions than those listed above. **It is also recognized that some other conditions not named above may prevent the performances from being fully achieved (e.g. presence of overloaded trailer(s), failing motor vehicle or trailer ABS or ESC, high centre-of-gravity, moving loads, misleading lane markings, high brake temperature, specific surrounding environments affecting the detecting capabilities of the vehicle (e.g. tunnels or other “highly reflective environment”)).** 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.

We need clarity on the conditions which are not named in the list (a) to (g).

The need and the content of this amendment is linked to the acceptance of other proposals above. Below is an example:

At the end of a type-II test, R13 requires only 3.3m/s² for N3. In that case, AEBS won't prevent the collision as required in current 5.2.1.4. If this limitation is not explicit in the list of conditions (a) to (x), then it should be reflected in this paragraph.

Maximum relative Impact Speed (km/h) for M₂ and M₃ vehicle*

Relative Speed (km/h)	M ₂		M ₃	
	Stationary/ Moving		Stationary/ Moving	
	Maximum mass	Mass in running order	Maximum mass	Mass in running order
10				
20				
30				
40				
50				
60				
70				
80				
90				
100				

Discussion point:
 We can refer the calculation sheet proposed as GRVA-01-31.
 - Maximum deceleration (Max G)
 - Time to Max G
 - The value of LPS or LPB
 Confirmation of V2C scenario
 The requirement of R131 based on the difference of braking system.
 Same requirement for stationary/moving

* For relative speeds between the listed values (e.g. [53] km/h), the maximum relative impact speed (i.e. [30/30] km/h) assigned to the next higher relative speed (i.e. [55] km/h) shall apply.
 For masses above the mass in running order, the maximum relative impact speed assigned to the maximum mass shall apply.

- The split of requirements does not correspond to current R131 Annex 3.

The vehicle dynamics of LCVs is closer to M1 N1 (with regard to LPS / LPB) than to HCV combinations. Thus, they cannot have the same requirements. The split between row 1 and row 2 vehicles was based on actual tests which have been performed in Jeveresen (Germany), see documents AEBS-LDWS-18-02 and 03.

Additionally, CVs have different types of braking systems with fairly different response time for example:

- N3 with pneumatic braking
- M3 and LCVs may have pneumatic or hydraulic braking

- Achieving requirements on the warning and the emergency phase up to 100kph is a challenge which is not feasible for current / mid-term sensor technology: warning 1.4s before EMB at 80km/h means a sensor range of ~80m, while it may mean 110/120m at 100km/h. The distance also increases sensitivity of the detection to the shape of the road (a slight curvature generates measurement errors). The risk is high to get too frequent false positives.

		<p>This comment is maybe not valid with the new warning requirements in paragraph 5.2.1.1. However, we should be careful that the collision avoidance / mitigation performance requirements does not lead to so early warning that they cannot be given in time to stimulate driver reaction (to avoid false positive with EMB, an early warning may still be relevant).</p> <ul style="list-style-type: none">• Same requirements for stationary and moving targets is a big challenge given the higher difficulty to detect and classify stationary targets at high speed (now up to 100km/h, with a requirement to not “unreasonably switch the control strategy” at 110kph (for M3) or even 130kph for M2/N2). We have here a high risk to get frequent false positives, including EMB. A strategy based on “earlier warning and later braking” is maybe more relevant for stationary targets (compared to moving ones, where the detection is more robust).
--	--	---