

GRRF informal group on AEBS for light vehicles

MOTOR VEHICLES WITH REGARD TO THE ADVANCED EMERGENCY BRAKING SYSTEMS (AEBS)

Table of topics

In red: additional items proposed by Hirose san (co-chair of the informal group)

| Item | Sub-item | Background | Proposal of AEBS-03 | AEBS-04 |
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| AEBS definition | Advanced Emergency Braking System | To define the associated definitions | Means a system which can 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. The Advanced Emergency Braking System shall include a Collision Warning Phase and an Emergency Braking Phase. | C/P definition of R131 |
| | Emergency Braking Phase | | Means the phase starting when the AEBS emits an automatic braking demand to the service braking system of the vehicle. | |
| | Collision Warning | | Means the phase directly preceding the emergency braking phase, during which the | |

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| | Phase | | AEBS warns the driver of a potential forward collision. | |
| | <ul style="list-style-type: none"> - Definition of the targets? - Definition of the AEBS relative to their target detection? | We have three targets. (Car, Pedestrian, Bicycle) | No need for 3 definitions, the different tests address this. | |
| AEBS activation | Activation | To define when AEBS Shall/may/shall not activate/default ON | <p>The speed range for AEBS activation should be absolute velocity.</p> <p>The system shall be default ON</p> | |
| | Regulated upper speed | To define the upper speed limit for regulating AEBS. (This does not prohibit manufacturers to implement AEBS above this speed.) | <p>50km/h for subject vehicle in stationary target scenario C2C</p> <p>60km/h for subject vehicle in moving target (20 km/h) scenario C2C</p> <p>50/60 km/h for subject vehicle in C2P and C2B scenarii</p> | <p>Values 50/60 will be checked later for pedestrians and cyclists (based on accident data).</p> <p>For C2C, contracting parties to review absolute vs. relative velocities for inter-</p> |

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| | | | | <p>urban scenario. Higher speeds for C2C may be considered in a later phase including moving target (interested parties eg AUS to provide data) All to review GRRF-83-17</p> |
| | Regulated lower speed | To define the lower speed limit for regulating AEBS. (This does not prohibit manufacturers to implement AEBS below this speed.) | 10km/h (note: lower speed might be higher for C2P) | <p>All to check the relevant lower speed for C2P and C2B (based on accident data) Lower velocities are covered by GRSG-VRU-Proxi Check consistency with Pedestrian Protection in GSR</p> |
| | Deactivation | To define the manual deactivation requirements. | The driver should have the ability to deactivate the system in a “not too easy” manner: 2-action control and stationary vehicle | All to internally review if this is acceptable Industry to provide technical justifications |

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| | Override | To define the overriding requirements | The AEBS shall provide the means for the driver to interrupt the AEBS by any positive action that indicates that the driver is aware of the emergency situation. | |
| | Activation calculation | To define the calculation methodology for determining activation of the AEBS (Dynamic calculation during real world driving conditions or static calculation used as a tool for certification) | <p>The proposed calculation should be used to determine the fixed performance criteria within the Regulation.</p> <p>Agreement for C2C:</p> <ul style="list-style-type: none"> - Timing for deceleration: <ul style="list-style-type: none"> o OICA/D: earliest time for braking should be based on a vehicle deceleration of 3,0m/s² o NL: earliest time for braking should be based on a vehicle deceleration of 6,4m/s² - Speed reduction: <ul style="list-style-type: none"> o Principle of the graph of Slide 5 of OICA document adopted by the group o The vehicle should not be required to brake before the LPS. o However, parameters that determine the shape of the | <ul style="list-style-type: none"> - AUS, UK and all to review the relevancy of the principles - Accident data parameters to be checked against agreed principles by the interested parties - Review agreed principles whether applicable C2P and C2B - OICA to provide data on M1/N1 dynamics in relation to LPS - D to argument with test data on M1 vehicle |

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| | | | <p>graph still open for discussions</p> <ul style="list-style-type: none"> ○ These parameters include <ul style="list-style-type: none"> ▪ lateral acceleration (or LPS) ▪ lateral displacement ▪ maximum longitudinal acceleration ▪ jerk (objection from CLEPA: there should not be any requirement on that value, yet it should be part of the calculation) ○ full collision avoidance: <ul style="list-style-type: none"> ▪ OICA: up to 32,6 km/h; ▪ D: 42 km/h | <p>dynamics.</p> <ul style="list-style-type: none"> - Timing for deceleration: participants to review (also linked it to accident data target) - Speed reduction: participants to review key parameters within the calculation (see adjacent column) - D to review lateral acceleration: <ul style="list-style-type: none"> ○ For the debate, need to know whether it is a single lane change, or a double/triple one. Single lane change vs. avoidance. |

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| | | | | <ul style="list-style-type: none"> ○ HW for D: to provide data |
| | Emergency Braking phase performance | To define the physical performance of the Emergency Braking Phase. (speed reduction). | The emergency braking performance shall be based on 6.4m/s ² vs. 9,0 m/s ² at the minimum TTC when comparing LPS and LPB. | Review whether LPS is necessary for pedestrians D to supply experiment data on time for avoidance manoeuvres, for addressing J 2-stage LPS. |
| HMI | Activation / deactivation warning | To define the requirement and, if necessary, the corresponding test. | requirements for false activation should be inspired by UNECE R131 | Test to reviewed |
| | Failure warning | | Requirements should be inspired by UNNECE R131 | Test to reviewed |
| | Automatic deactivation | | Requirements should be inspired by UNNECE R131 | Test to reviewed |
| | Collision Warning activation | To define when the collision warning should be activated in relation to [TTC/EBP] | Informal group agreed that a collision warning in ineffective at speeds < 30 km/h | OICA to review the need for a collision warning phase at high speeds (30<s<50 km/h) |
| Test | Stationary | To define: | <ul style="list-style-type: none"> • Only the static (50 km/h absolute speed) | Review target vehicle |

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| Scenarios | Vehicle Target | <ul style="list-style-type: none"> • Subject Vehicle speed • Subject vehicle pre conditioning • Test condition requirements • Collision warning requirements • Emergency braking phase requirements • Target requirements | <p>and moving scenarios (20/60) from ENCAP for vehicle detection should be considered.</p> <ul style="list-style-type: none"> • pedestrians daylight scenario at 50% impact should only be considered. • Nightlight scenario considered relevant with regard to accident data, yet to be covered at a later stage of the regulation. • Subject vehicle pre conditioning based on existing standards e.g. brake and tyre conditioning. • Test condition requirements shall be inspired by UNECE R131 e.g. environmental conditions, functional part of test. • Bicycle scenario: OICA proposes crossing bicycle at 15 km/h 50% impact | speed for moving target scenario once max speed for full avoidance has been determined. |
| | Moving Vehicle Target | | | To be reviewed: unobscured adult or obscured child |
| | Braking Vehicle Target | | | Distinguished requirements between test conditions and real world |
| | Pedestrian Target | | | Industry HW: Pre-conditioning inspired from R13H + justifications for pre-conditioning |
| | Bicycle Target | | | Bicycle scenario: All to review implementation dates and OICA proposal of crossing bicycle at 15 km/h 50% |

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| | | | | <p>impact HW: collision warning provided by at least two modes selected from acoustic, haptic or optical?</p> <ul style="list-style-type: none"> • C2B: NL to review the Bicycle speed according to the TNO research CATS <p>To be confirmed:</p> <ul style="list-style-type: none"> • C2C: R131 approach as it is not design prescriptive • C2P: EuroNCAP/J- NCAP for the time being as it is the only one available • C2B: EuroNCAP for the time being as it is the only one available |

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| | Failure detection | | | HW |
| | Deactivation | | | HW |
| | False Reaction test | | | HW |
| PTI | | | <p>R131 mirroring:</p> <p>5.6. Provisions for the periodic technical inspection</p> <p>5.6.1. At a periodic technical inspection it shall be possible to confirm the correct operational status of the AEBS by a visible observation of the failure warning signal status, following a "power-ON" and any bulb check.</p> <p>In the case of the failure warning signal being in a common space, the common space must be observed to be functional prior to the failure warning signal status check.</p> <p>5.6.2. At the time of type approval, the means to protect against simple unauthorized modification of the operation of the failure warning signal chosen by the manufacturer shall be confidentially outlined.</p> <p>Alternatively, this protection requirement is fulfilled when a secondary</p> | |

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| | | | means of checking the correct operational status of the AEBS is available. | |
| Implementation strategy | | <p>To define the implementation strategy for the vehicle, pedestrian and cyclist detection requirements.</p> <p>The group should focus its work on vehicle detection first and develop the principle behind the calculations for minimum performance requirements etc. Once this is agreed for vehicle detection it can be carried over to pedestrian and then to cyclist, with the appropriate changes.</p> | | <p>All to review the phase-in of the scenarii according to the request from GRRF-86.</p> <p>All to check the feasibility of a gtr.</p> <p>Need for harmonization of the requirements and test methods</p> |

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| | | Whether pedestrian detection is included is RXXX-00 should be dependent upon the time taken to discussion vehicle detection requirements. If it takes too long then pedestrian requirements can be included in RXXX-01. | | |