

UN ECE GRRF AEBS and LDWS Informal Working Group

Proposed CLEPA amendments to AEBS “skeleton” document following the 5th Informal Group meeting (Berlin – April 2010)

Proposal 21-05-2010

Performance and Test Requirements

5.2. Performance requirements

5.2.1. The driver shall be provided with a warning(s) when the AEBS has detected the possibility of a collision with a preceding vehicle of category M₁, M₂, M₃, N₁, N₂, N₃, O₁, O₂, O₃ or O₄ which is travelling in the same lane, at slower speed, has slowed to a halt or is stationary and was not identified as moving by the AEBS.

5.2.1.1. The warning(s) shall be as specified in paragraph 5.3.1.

5.2.1.2. Subsequent to the start of the warning(s) a clear movement of any driver control that indicates that the driver is aware of the pending collision, e.g. operation of the turn indicator, change in position of the accelerator pedal, shall result in the AEBS actions being overridden.

5.2.1.3. In the case that the driver does not react to the warning(s) referred to in paragraph 5.3.1. the AEBS shall autonomously apply the brakes of the vehicle's service braking system.

This shall be checked by testing in accordance with the provisions of paragraph 6.4.2. (warning and braking system activation test with moving target) and paragraph 6.4.3. (warning and braking system activation test with a stationary target).

5.2.1.4. The AEBS shall be active at all vehicle load conditions between laden and unladen unless manually or automatically de-activated as per paragraph 5.2.3 or paragraph 5.2.4. In the case of a semi-trailer tractor, the unladen condition is with an unladen semi-trailer attached.

5.2.1.5. The AEBS shall be active at least within the vehicle speed range of 15 km/h to 100 km/h unless manually or automatically de-activated as per paragraph 5.2.3 or paragraph 5.2.4.

5.2.2. The AEBS should not react in terms of warning signal generation or autonomous braking to; oncoming vehicles either to the right or left, vehicles in adjacent lanes

either right or left or simultaneously both right and left, when carrying-out an overtaking manoeuvre to the right or left, or when overtaking in a right or left hand curve, in situations where the driver would not recognise a pending danger.

- 5.2.2.1. This shall be checked by testing in accordance with the provisions of paragraph 6.4.4. (overtaking manoeuvre false warning test).

- 5.2.3. If the vehicle is fitted with a driver controlled switch to disable the AEBS, the driver shall be provided with an optical flashing warning signal whenever the AEBS is disabled by this switch.

The yellow warning signal specified in paragraph 5.3.2. may be used for this purpose.

- 5.2.3.1. In the case where the AEBS is disabled, it shall be automatically reinstated at the next ignition “on”.

- 5.2.3.2. The manual disablement warning signal shall be checked by testing in accordance with the provisions of paragraph 6.4.5. (manual disablement warning test).

- 5.2.4. If the AEBS has the ability to shut itself down due to a non-failure loss of functionality, e.g. temporary sensor blindness, the driver shall be provided with a warning signal as specified in paragraph 5.2.3.

- 5.2.4.1. The vehicle manufacturer shall provide a list of the non-failures that would lead to a loss of functionality and they shall be attached to the test report.

- 5.2.5. The AEBS shall include a self check function, that will in the case of a failure, provide the driver with a failure warning signal as specified in paragraph 5.3.2. without appreciable delay.

- 5.2.5.1. The AEBS failure warning signal shall be checked by testing in accordance with the provisions of paragraph 6.4.6. (failure warning test).

5.3. Warning requirements

- 5.3.1. The warning signal referred to in paragraph 5.2.1. shall be at least in the form of either, 2 out of visual, acoustic, haptic, or 1 out of acoustic or haptic.

In the case of a haptic warning, if a brake application is made it shall not result in a vehicle speed reduction greater than 10 km/h

A description of the warning signal(s), and the sequence in which they are presented to the driver if there is more than one, shall be provided by the vehicle manufacturer at the time of type-approval and recorded in the test report.

- 5.3.2. The failure warning referred to in paragraph 5.2.5. shall be by means of a constant yellow optical warning signal.

The warning signal shall be displayed, even following an ignition 'off' 'on' cycle, as long as the failure or defect persists and the ignition (start) switch is in the 'on' (run) position.

5.4. Provisions for the periodic technical inspection

- 5.4.1. At a periodic technical inspection the AEBS shall pass/fail as a result of a visible observation of the failure warning signal status (off – pass, on – fail), following a bulb check.

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.

- 5.4.2. At the time of type-approval, the means to protect against unauthorized modification of the operation of the failure warning signal chosen by the manufacturer shall be confidentially outlined.

Alternatively, this protection requirement is fulfilled when a secondary means of checking the correct operational status of the AEBS is available.

6. TEST PROCEDURE

6.1. Test conditions

- 6.1.1. The tests shall be performed on a flat, dry concrete or asphalt surface affording good adhesion.
- 6.1.2. The ambient temperature shall be between 0° C and 45° C.
- 6.1.3. The horizontal visibility range shall be greater than 1 km.
- 6.1.4. The tests shall be performed when there is no wind liable to affect the results.

6.2. Accuracy of measurements

- 6.2.1. Distances shall be measured with an accuracy of +/- 5%.
- 6.2.2. Speeds shall be measured with an accuracy of +/- 3 km/h.
- 6.2.3. Time shall be measured with an accuracy of +/- 1%.
- 6.2.4. Decelerations shall be measured with an accuracy of +/- 0.1 m/s².

6.3. Vehicle conditions

6.3.1. Test weight

The vehicle shall be tested in the [laden/unladen] conditions of the Type-0 test as described in Annex 4 to Regulation N° 13. No alteration shall be made once the test procedure has begun.

In the case of a semi-trailer tractor, the unladen condition is representative of the load imposed by an unladen semi-trailer.

6.4. Tests

6.4.1. Optical warning signal verification test

- 6.4.1.1. With the subject vehicle stationary check that the optical warning signal(s) are activated when the ignition (start) switch is turned to the "on" (run) position or when the ignition (start) switch is in a position between the "on" (run) and "start" that is designated by the manufacturer as a check position.

The warning signal(s) shall then be automatically deactivated when ignition (start) switch is moved to the "on" (run) position or after a period of time as identified by the vehicle manufacturer in the case where the signal activation occurs in the "on" (run) position.

In the case where the warning signals are in a common space it is only necessary for the common space to activate and deactivate.

6.4.2. Warning and braking system activation test with moving target



- 6.4.2.1. The subject vehicle and the moving target vehicle shall travel in a straight line, in the same direction, for a minimum distance of 50m prior to the functional phase of the test with a vehicle centreline offset of not more than 0.5m. The target shall be representative of a M1 AA saloon category vehicle and may be a "soft target".

The functional phase shall start with subject vehicle travelling at a speed of 80 km/h, the target vehicle at 15 km/h and a separation distance of at least 120 m between them.

From the start of the functional phase until the end of the test there shall be no adjustment to any subject vehicle control by the driver.

- 6.4.2.2. In the functional phase of the test the AEBS shall:

6.4.2.2.1. start to warn the driver as required by paragraph 5.3.1. at a time of between 2.0 and 2.5 seconds before initiation of the autonomous full service brake application.

6.4.2.2.2. initiate an autonomous full brake application of the service braking system to achieve a mean full developed deceleration equal to or greater than 5 m/s^2 to prevent the subject vehicle colliding with the target vehicle.

6.4.3. Warning and braking system activation test with a stationary target

6.4.3.1. The subject vehicle shall approach the stationary target vehicle in a straight line for a minimum distance of 50m prior to the functional phase of the test with a vehicle centreline offset of not more than 0.5m. The target shall be representative of a M1 AA saloon category vehicle and may be a “soft target”.

The functional phase shall start when subject vehicle is travelling at a speed of 50 km/h and is a distance of at least 120 m from the target vehicle.

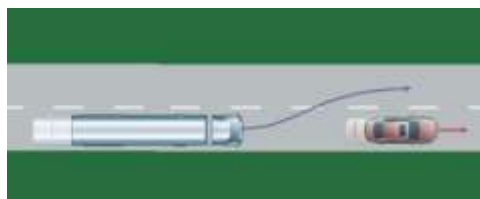
From the start of the functional phase until the point of collision there shall be no adjustment to any subject vehicle control by the driver.

6.4.3.2. In the functional phase of the test the AEBS shall:

6.4.3.2.1. start to warn the driver as required by paragraph 5.3.1. at a time to collision of between [2.5 and 1.5 seconds].

6.4.3.2.2. initiate an autonomous brake application of the service braking system to reduce the vehicle speed by at least 20% (10 km/h) at the time of collision with the target vehicle at any point in time following the start of the warning.

6.4.4. Overtaking manoeuvre false warning test



6.4.4.1. With both the subject vehicle and the target vehicles travelling initially in the centre of the same lane, the subject vehicle shall approach and overtake the target vehicle, using an adjacent lane, at a closing speed of 10 km/h. Each lane shall be

straight and 3.5m wide. The target vehicle shall travel at a constant speed of 40 km/h.

Prior to the start of the overtaking manoeuvre the turn indicator control shall be in the off position and there shall be no adjustment of any vehicle control by the driver other than a slow steering movement to correct for any drifting.

The subject vehicle shall start the overtaking manoeuvre at a distance identified by the vehicle manufacturer which is less than [15] m from the target vehicle.

In carrying-out the overtaking manoeuvre only the steering control shall be adjusted. Other driver controls, e.g. the turn indicator, shall not be activated.

6.4.4.2. There shall be no action from the AEBS.

6.4.5. Manual disablement warning test

6.4.5.1. If the vehicle is fitted with a means by which the driver can disable the AEBS, it shall be checked that its operation activates the appropriate signal and that a subsequent “off” “on” ignition cycle results in the AEBS being automatically reinstated.

6.4.6. Failure warning test

6.4.6.1. Simulate an electrical AEBS failure, for example by disconnecting the power source to any AEBS component, disconnecting any electrical connection between AEBS components. When simulating an AEBS failure, the electrical connections for the driver warning signal and optional manual off-switch shall not be disconnected.

6.4.6.2. On creating the failure and driving the vehicle, the warning signal shall be activated not later than 10 seconds after a speed of 15 km/h is exceeded and shall remain activated.

A subsequent stationary vehicle “off” “on” ignition cycle shall result in the warning signal being re-activated.