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1. SCOPE AND PURPOSE

- 1.1. This Regulation applies to the advanced emergency braking system of vehicles of category M₃ and N₃ equipped with EVSC.
- 1.2. Contracting Parties shall issue or accept approvals to vehicles equipped with AEBS detecting moving targets.

2. DEFINITIONS

For the purposes of this Regulation:

- 2.1. "Approval of a vehicle type" means the full procedure whereby a Contracting Party to the Agreement certifies that a vehicle type meets the technical requirements of this Regulation;
- 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:
- (a) the manufacturer's trade name or mark,
 - (b) vehicle features which significantly influence the performances of the Advanced Emergency Braking System,
 - (c) the type and design of the Advanced Emergency Braking System.
- 2.3. "Advanced Emergency Braking System (AEBS)" means a system which can automatically detect a potentially forward collision and activate the vehicle braking system to decelerate the vehicle with the purpose of **avoiding a collision**.
- 2.5. "Subject vehicle" means the vehicle being subject to testing.
- 2.6. "Target vehicle" means **a M1 vehicle used to simulate a forthcoming rear end collision situation during the AEBS test**.
- 2.10. "Collision avoidance" means the actions taken by the system, such as the obstacle detection, the computing of the relevant data and the activation of the service brakes, for slowing down the subject vehicle to a speed equal to or lower than the target vehicle speed.
- 2.11. "Emergency braking" means **the maximum braking applied by the AEBS system in purpose of avoiding an accident**.
- 2.12. "HMI" means **human machine interface**.

5. SPECIFICATIONS

5.1. General

5.1.1. Subject to the requirements of paragraph 12, any vehicle fitted with a AEBS complying with the definition of paragraph 2.3 shall meet the performance requirements contained in paragraphs 5.1 to 5.5.4. of this regulation and shall be equipped with an anti-lock device and EVSC.

5.1.2. Any AEBS fitted on a vehicle shall comply with the requirements of Regulation No. 10 on electromagnetic interferences.

5.2. Performance requirements

5.2.1. When tested in the conditions of paragraphs 6.1. to 6.9.1., the AEBS shall:

5.2.1.1. provide the driver with warning specified in paragraph 5.5.1. when tested in accordance with the provisions of paragraph 6.6.2. (functional test) at least 2s before applying emergency braking;

5.2.1.2. activate the subject vehicle service braking system when tested in accordance with the provisions of paragraph 6.6.2. in a manner that a collision is avoided.

5.2.1.3. provide the driver with the warning specified in paragraph 5.6.2. when tested in accordance with the provisions of paragraph 6.8. (malfunction detection test).

5.2.2. The AEBS shall be active at least within the vehicle speed range of 15 km/h up to the maximum vehicle speed unless manually deactivated as per paragraph 5.4. below.

5.3. The AEBS should provide HMI measures to interrupt the warning as well as the emergency braking.

5.3.1. In case of interrupting the warning or the emergency braking a residual optic and/or acoustic warning may be provided.

5.4. The AEBS system should provide HMI measures to disable the AEBS braking function.

5.4.1. The AEBS braking function shall be automatically reinstated at the initiation of each new ignition cycle.

- 5.4.2. A constant optical warning signal shall inform the driver that the AEBS function has been disabled. The yellow warning signal specified in paragraph 5.6.2. below may be used for this purpose.
- 5.4.3 A residual optic and/or acoustic collision warning may be provided as the AEBS system is disabled.
- 5.5 The AEBS should not be user adaptable.
- 5.6. Warning requirements
- 5.6.1. The collision warning should be provided by acoustic and haptic measures. A warning by optical measures may be provided. The service brake may be used to provide a haptic warning.
- 5.6.2. The malfunction warning referred to in paragraph 6.8. shall be by means of a yellow optical warning signal.
- 5.6.3. Any AEBS optical warning signal shall be activated either 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 (bulb check). This requirement does not apply to tell-tales shown in a common space.
- 5.6.4. The optical warning signals shall be visible even by daylight; the satisfactory condition of the signal must be easily verifiable by the driver from the driver's seat.

6. TEST PROCEDURE

6.1. Test conditions

6.1.1. The test shall be performed on a flat, **dry concrete or asphalt** surface.

6.1.2. The ambient temperature shall be between **-15° C** and 45° C.

6.1.4. The horizontal visibility should **allow observing the target at the test course during all states of the test.**

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 +/- 5%.

6.2.3. Time and delays shall be measured with an accuracy of +/- 1%.

6.3. Test course

The course shall be a segment of straight road of sufficient length in order to maintain the subject vehicle speeds required below and to allow detecting a target vehicle and braking the subject vehicle up to collision avoidance. **The test course may not include the roadway that is necessary to accelerate the subject vehicle to test speed. The lane width should be in between 2.8m and 3.5m.**

6.4. Vehicle conditions

6.4.1. Test weight

The vehicle shall be tested in the 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.

6.5. Target vehicle

6.5.1. The target vehicle should **be any regular M1 vehicle provided by the OEM.**

6.5.2. **The target vehicle shall be moving on the axis of the test course at a constant speed required below.**

6.6. AEBS test

6.6.1. Lamp check test

With the subject vehicle stationary and the ignition locking system in the "Lock" or "Off" position, activate the ignition locking system to the "On" or "Run" position. The AEBS shall perform a check of lamp function as specified in paragraph 5.5.3. of this Regulation.

6.6.2. Functional test

6.6.2.1. Drive the target as in paragraph 6.5.2.

6.6.2.2. Increase the subject vehicle to the test speed required below. Approach the target vehicle at the test track within the same lane.

6.6.2.3. The AEBS shall warn the driver as required in paragraphs 5.2.1 and 5.6.1.1..

6.6.2.4. If the AEBS did not warn the driver as mentioned in paragraph 6.6.3.3. above, discontinue the test.

6.6.2.5. Braking system activation test

Continue approaching the target within the same lane.. The AEBS system should activate the service brake and avoid a collision. If the AEBS does not activate the service brake sufficiently avoid the collision manually by braking and/or steering and discontinue the test.

6.6.2.6

Perform the test using all speed combinations following the table below

Subject speed	40 km/h	60 km/h	80 km/h
Target speed	10 km/h	10 km/h	10 km/h

6.8. Malfunction detection test

6.8.1. Simulate an AEBS malfunction, by disconnecting the power source to any AEBS component or by disconnecting any electrical connection between AEBS components. When simulating an AEBS malfunction, the electrical connections for the telltale lamps shall not be disconnected.

6.8.2. With the subject vehicle stationary and the ignition locking system in the "Lock" or "Off" position, activate the ignition locking system to the "On" or "Run" position.

Subsequent to the lamp check the AEBS system should immediately indicate the malfunction of the AEBS by at least illuminating the malfunction indicator.

6.8.3. If the AEBS malfunction indicator did not illuminate in accordance with paragraph 5.5.2. as required, discontinue the test.

6.9 AEBS disable test

6.9.1 With the subject vehicle stationary and the ignition locking system in the "Lock" or "Off" position, activate the ignition locking system to the "On" or "Run" position. Subsequent to the lamp check, activate the AEBS disable measure. The AEBS system should immediately indicate the status of being disabled by at least illuminating the indicator according to paragraph 5.4.1..