

E/ECE/324
E/ECE/TRANS/505

Rev.2/Add.AEBS

30 January 20XX

AGREEMENT

**CONCERNING THE ADOPTION OF UNIFORM TECHNICAL PRESCRIPTIONS
FOR WHEELED VEHICLES, EQUIPMENT AND PARTS WHICH CAN BE FITTED
AND/OR BE USED ON WHEELED VEHICLES AND THE CONDITIONS FOR
RECIPROCAL RECOGNITION OF APPROVALS GRANTED ON THE BASIS OF
THESE PRESCRIPTIONS */**

(Revision 2, including the amendments which entered into force on 16 October 1995)

Addendum AEBS: Regulation No. AEBS+1

Date of entry into force: XXX

**UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR
VEHICLES WITH REGARD TO THE ADVANCED EMERGENCY BRAKING
SYSTEM**



UNITED NATIONS

*/ Former title of the Agreement:

Agreement Concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958.

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AEBS/LDWS-TF02-03 (rev 1)
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AEBS/LDWS-TF02-03 (rev 1)

Regulation No. AEBS

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLES
WITH REGARD TO THE ADVANCED EMERGENCY BRAKING SYSTEM

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1. SCOPE AND PURPOSE

- 1.1. This Regulation applies to the advanced emergency braking system of vehicles of category M₂, N₂, M₃ and N₃^{1/}.

Proposal 1 by Japan (AEBS/LDWS-TF02-07):

Insert a new paragraph 1.2 and to renumber existing paragraph 1.2 to 1.3:

- 1.2. *Contracting Parties may mandate the fitment of AEBS to specific category among M2, M3, N2 and N3 in their territory. In this case, at the time of application of this Regulation, Contracting Parties shall notify to the Secretary-General of the United Nations that they intend to mandate the fitment of AEBS specified in this regulation in their territory for which vehicle.*

Justification

Since the traffic accident situation in each country may differ, any Contracting Party may prefer mandating the fitment of AEBS specified by the technical requirement of this regulation to the specific vehicle. To achieving this demand under the mutual recognition under 1958 agreement, if Contracting Party want to require to install AEBS to the specific vehicle, it is necessary to declare it to other Contracting Party beforehand. This amendment proposal is based on ECE116 and the document ECE/TRANS/WP.29/2009/129 .

TF02:

- 1.2. Contracting Parties shall issue or accept approvals **with respect** to vehicles equipped with AEBS detecting both moving and stationary targets unless they notify to the Secretary-General of the United Nations their option **to issue or accept approvals with respect to** ~~for~~ vehicles equipped with AEBS detecting moving targets only. Such notification shall have effect in accordance with the time scales laid down in Article 1, paragraphs 6. and 7. of the 1958 Agreement (E/ECE/TRANS/505/Rev.2).

action point from TF01:

Japan to consider, for the purpose of developing a draft regulatory text for an AEBS for "moving targets", the possibility of accepting higher decelerations than the ones proposed in document AEBS/LDWS-02-10 (page 12, paragraph 5.2.1.2.1.5.).

^{1/} As defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document TRANS/WP.29/78/Rev.1/Amend.2, as last amended by Amend.4).

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 /an emergency situation}~~ [UR1] and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating a collision.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 2.3. "Advanced Emergency Braking System (AEBS)" means a system which can **automatically** detect ~~{a potentially potential forward collision /an emergency situation}~~ and **automatically** activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating a collision.

TF02:

- 2.4. "Time to collision" means the delay remaining between the instant considered and the time of the collision between the subject vehicle and the target vehicle, notwithstanding any alteration of speeds and directions during that delay.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 2.4. "Time to collision" means the delay remaining between the instant **being** considered and the time of the collision between the subject vehicle and the target vehicle, notwithstanding any alteration of speeds and directions during that delay.

TF02:

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- 2.5. “Remaining reaction time” means the particular time to collision when the instant considered is defined by the vehicle manufacturer as permitting the driver to undertake an action successfully avoiding the collision.

Proposal 2 by Japan (AEBS/LDWS-TF02-07):

Insert before the definition of "remaining reaction time" the following definitions (and renumber the definition of "remaining reaction time" and all definitions thereafter accordingly):

- 2.5. "Minimum time of braking for avoiding collision under ordinary driving" means the particular time to collision from the latest start of braking for collision avoidance under ordinary driving to collision.
- 2.6. "Minimum time of steering for avoiding collision under ordinary driving" means the particular time to collision from the latest start of steering for collision avoidance under ordinary driving to collision.
- 2.7. "Minimum time of manoeuvre for avoiding collision under ordinary driving" means the minimum time for avoiding collision under ordinary driving by braking or steering, whichever is shorter.

Justification

To specify the suspension of service brake activation

TF02:

- 2.5. “Subject vehicle” means the vehicle being subject to testing.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 2.5. “Subject vehicle” means the vehicle being ~~subject to testing~~ tested.

TF02:

- 2.6. “Target vehicle” or “target” means a target simulating the bulk and the radar cross section of a regular passenger car of category M1 AA saloon 1/

Proposal 3 by Japan (AEBS/LDWS-TF02-07):

Amend the definition of "target vehicle" as follows:

“Target ~~vehicle obstacle~~” ~~or~~ “~~target~~” means a target simulating the bulk ~~or and~~ the radar cross section of a regular passenger car of category M1 AA saloon 1/

Justification

Since there are bulk and a reflector as targets, “obstacle” is appropriate for this paragraph than “vehicle”. Either of bulk or a reflector can be used in a test. To specify the situation, the above paragraph is amended.

TF02:

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 2.6. “Target vehicle” or “target” means a ~~target simulating the bulk and the radar cross section of a regular~~ high volume series production passenger car of category M1 AA saloon 1/ or an object representative of such a vehicle in terms of its identification characteristics applicable to the sensor system of the AEBS under test.

TF02:

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Proposal by CLEPA (AEBS/LDWS-TF02-06):

2.7. “Soft target” means a target that will suffer minimum damage or cause damage to the subject vehicle in the event of a collision.

TF02:

2.7. “Stationary target” means a target fixed on the ground on the axis of the test course.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

2.78. “Stationary target” means a target ~~fixed on the ground on the axis of the test course~~ that the AEBS has never identified as a moving target.

TF02:

2.8. “Moving target” means a target having a speed of at least 15 km/h along the axis of the test course and in the same direction as the subject vehicle.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

2.89. “Moving target” means a target ~~having~~ travelling at a speed of at least ~~15~~ 20 km/h ~~along the axis of the test course and~~ in the same direction and in the same lane as the subject vehicle which may subsequently slow to a halt.

TF02:

- 2.9. “Radar cross section (RCS)” means a measure of how detectable an object is with a radar.
- 2.10. “Collision mitigation” means the actions taken by the system, such as the detection of a stationary obstacle, the computing of the relevant data and the activation of the service brakes, for significantly decreasing the impact speed.
- 2.11. “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.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- ~~2.9. “Radar cross section (RCS)” means a measure of how detectable an object is with a radar.~~
- ~~2.10. “Collision mitigation” means the actions taken by the system, such as the detection of a stationary obstacle, the computing of the relevant data and the activation of the service brakes, for significantly decreasing the impact speed.~~
- ~~2.11. “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.~~

TF02:

AEBS/LDWS-TF02-03 (rev 1)

3. APPLICATION FOR APPROVAL

- 3.1. The application for approval of a vehicle type with regard to the advanced emergency braking system shall be submitted by the vehicle manufacturer or by his authorized representative.
- 3.2. It shall be accompanied by the documents mentioned below in triplicate and include the following particulars:
- 3.2.1. a description of the vehicle type with regard to the items mentioned in paragraph 2 above, together with dimensional drawings and a documentation package which gives access to the basic design of the AEBS and the means by which it is linked to other vehicle systems or by which it directly controls output variables. The numbers and/or symbols identifying the vehicle type shall be specified; and
- 3.2.2. particulars of the primary reference marks in sufficient detail to enable them to be readily identified and the position of each in relation to the others and to the "R" point verified.
- 3.3. A vehicle representative of the vehicle type to be approved shall be submitted to the Technical Service conducting the approval tests.

4. APPROVAL

- 4.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraph 5. below, approval of that vehicle shall be granted.
- 4.2. An approval number shall be assigned to each type approved; its first two digits (00 for the Regulation in its initial form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to the same vehicle type equipped with another type of AEBS, or to another vehicle type.
- 4.3. Notice of approval or of refusal or withdrawal of approval pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 1 and photographs and/or plans supplied by the applicant being in a format not exceeding A4 (210 x 297 mm), or folded to that format, and on an appropriate scale.
- 4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation, an international approval mark conforming to the model described in Annex 2, consisting of:

- 4.4.1 a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval 2/;
- 4.4.2. the number of this Regulation, followed by the letter "R", a dash and the approval number to the right of the circle prescribed in paragraph 4.4.1. above.
- 4.5. If the vehicle conforms to a vehicle type approved under one or more other Regulations, annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1. need not be repeated; in such a case, the Regulation and approval numbers and the additional symbols shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1. above.
- 4.6. The approval mark shall be clearly legible and be indelible.
- 4.7. The approval mark shall be placed close to or on the vehicle data plate.

2/ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Serbia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece, 24 for Ireland, 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus, 29 for Estonia, 30 (vacant), 31 for Bosnia and Herzegovina, 32 for Latvia, 33 (vacant), 34 for Bulgaria, 35 (vacant), 36 for Lithuania, 37 for Turkey, 38 (vacant), 39 for Azerbaijan, 40 for The former Yugoslav Republic of Macedonia, 41 (vacant), 42 for the European Community (Approvals are granted by its Member States using their respective ECE symbol), 43 for Japan, 44 (vacant), 45 for Australia, 46 for Ukraine, 47 for South Africa, 48 for New Zealand, 49 for Cyprus, 50 for Malta, 51 for the Republic of Korea, 52 for Malaysia, 53 for Thailand, 54 and 55 (vacant) and 56 for Montenegro. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify or accede to the Agreement Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

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5. SPECIFICATIONS

Action point from TF01:

OICA to draft text for a "moving target" test method (maximum deceleration, other criteria if necessary) and a possible approach for a draft regulatory text reflecting the system currently on the market in Europe.

See document AEBS/LDWS-TF02-05

TF02:

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.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 5.1.1. Subject to the requirements of paragraph 12, any vehicle fitted with an AEBS ~~complying with the definition of~~ as defined in paragraph 2.3 shall ~~meet the performance requirements contained in paragraphs 5.1 to 5.5.4.~~ ~~comply with the provisions~~ of this regulation and shall be equipped with an anti-lock ~~devi~~ee system meeting the requirements of Regulation No. 13 Annex 13.

TF02:

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

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 5.1.2. Any AEBS fitted on a vehicle, shall ~~comply~~ not be adversely affected by magnetic or electrical fields. (This shall be demonstrated by compliance with the requirements of Regulation No. 10, 02 series of amendments) ~~on electromagnetic interferences~~.

TF02:

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 5.1.3. Conformity with the safety aspects of complex electronic control systems shall be shown by meeting the requirements of Annex 3.

TF02:

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5.2. Performance requirements

5.2.1. When tested in the conditions of paragraphs 6.1. to 6.5., the AEBS shall:

- 5.2.1.1. provide the driver with the warning specified in paragraph 5.5.1. when tested in accordance with the provisions of paragraph 6.6. (reaction time warning test);

Proposal 4 by Japan (AEBS/LDWS-TF02-07):

Rephrase the wording of point 5.2.1.1 as follows:

- 5.2.1.1. provide the driver with the warning specified in paragraph 5.5.1. **at the latest the driver response time [0.8 sec] prior to the activation of the service braking system. Notwithstanding the provision above, in case the system detects the situation where the activation of the service braking system is needed within the time shorter than driver response time [0.8 sec], the driver may be warned less than [0.8 sec] prior to the activation of the service braking system or at the time of the activation of the serviced braking system.** when tested in accordance with the provisions of paragraph 6.6. (reaction time warning test);

Justification

Same as AEBS/LDWS-02-10. Only wording refined.

- 1) In principle, the first priority is to warn the driver at the time when the driver is able to take over the braking task.
- 2) However, there is a case in the real field where it is not feasible to detect the future emergency situation which needs the automatic braking activation some time before it actually happens and secure the time for the driver to react to the warning. In this case, it is more profitable to allow the system to activate the service braking system when it detect the emergency situation without the specified preceding warning than to oblige the system to suspend the activation of the service braking system for the prior warning.

TF02:

5.2.1.2. activate the subject vehicle service braking system when tested in accordance with the provisions of paragraph 6.7. (braking system activation test) and

Proposal 5 by Japan (AEBS/LDWS-TF02-07):

Rephrase the wording of point 5.2.1.2 and add points 5.2.1.2.1 to 5.2.1.2.1.2 as follows:

5.2.1.2. suspend the activation of the service braking system until TTC falls down to Minimum time of maneuver for avoiding collision under ordinary driving specified in paragraph 5.2.1.2.1. and activate the service braking system after passing the suspended time above to reduce the relative speed in accordance with paragraph 6.6.2.3. and 6.6.3.3.

5.2.1.2.1. Minimum time of maneuver for avoiding collision under ordinary driving

5.2.1.2.1.1. Minimum time of braking for avoiding collision under ordinary driving

The minimum time of braking for avoiding collision under ordinary driving shall be determined by the formula: $T1 = 0.0317 \times Vr + 1.54$.

Where T1 is minimum time of braking (second) for avoiding collision under ordinary driving and Vr is relative speed (km/h).

5.2.1.2.1.2. Minimum time of steering for avoiding collision under ordinary driving

The minimum time of steering for avoiding collision under ordinary driving shall be calculated by the following formula.

$$T2 = 0.0142 \times R + 1.62$$

Where, T2 is the lower limit time for collision avoidance by normal steering (second) and R is overlapping ratio(%).

The overlapping ratio may be decided by the manufacturer within the maximum of 100%.

Justification

- 1) Moved the provision to describe the performance values to the "Test requirement". Braking performance requirement shall be decided respectively upon the clear test conditions, because there are various types of disturbance which affect the recognition of the situation by the AEBS and sometimes restrict the decision to start the braking.
- 2) It is necessary for the AEBS to avoid the interference with the driver's ordinary maneuver. Therefore the operation of the service braking system should be inhibited when the driver takes any maneuver to avoid the collision like lane change under the ordinary driving conditions. (Same concept as the initial draft proposal AEBS/LDWS-01-05)
- 3) To increase the flexibility of the system design, the overlapping ratio may be decided by the manufacturer. (New proposal)

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Proposal 5 by Japan (AEBS/LDWS-TF02-07) - continued:

Related action point from TF01:

Japan to consider, for the purpose of developing a draft regulatory text for an AEBS for "moving targets", the possibility of accepting higher decelerations than the ones proposed in document AEBS/LDWS-02-10 (page 12, paragraph 5.2.1.2.1.5.).

TF02:

- 5.2.1.3. provide the driver with the warning specified in paragraph 5.5.2. 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 to 90 km/h, unless manually de-activated as per paragraph 5.4. below.

Action point from 2nd IG meeting:

OICA to provide a draft text proposal about speed range of system activation, taking into account the possible presence of a speed limiter

TF02:

Proposal by CLEPA (AEBS/LDWS-TF02-06):

Amend § 5.2 on performance requirements as follows:

5.2. Performance requirements

~~5.2.1. When tested in the conditions of paragraphs 6.1. to 6.5., the AEBS shall:~~

5.2.1.1. ~~provide the~~ The driver shall be provided with the warning specified in paragraph 5.5.1. when tested in accordance with the provisions of paragraphs ~~6.6.~~ 6.5.2. and 6.5.3. (reaction time warning tests);

5.2.1.2. ~~activate the~~ The subject vehicle service braking system shall be automatically activated when tested in accordance with the provisions of paragraphs ~~6.7.~~ 6.5.4., 6.5.5, and 6.5.6. (braking system activation tests) ~~and~~.

5.2.3. The driver shall be provided no visual, acoustic or haptic warning signals when tested in accordance with the provisions of paragraphs 6.5.7., 6.5.8., and 6.5.9. (false warning tests)

5.2.4. The driver shall be provided with the warning specified in paragraph 5.5.3. when tested in accordance with the provisions of paragraph ~~6.8.~~ 6.5.10. (non-failure loss of functionality warning test).

5.2.5. The driver shall be provided with the warning specified in paragraph 5.4.2. when tested in accordance with the provisions of paragraph ~~6.8.~~ 6.5.11. (manual disablement warning test).

5.2.1.36. ~~provide the~~ The driver shall be provided with the warning specified in paragraph 5.5.2. when tested in accordance with the provisions of paragraph ~~6.8.~~ 6.5.12. (~~malfunction detection~~ failure warning test).

5.2.27. The AEBS shall be active at least within the vehicle speed range of ~~15~~ 20 km/h to ~~90~~ 120 km/h, unless manually or automatically de-activated as per paragraph 5.4. or paragraph 5.5.3. below.

TF02:

AEBS/LDWS-TF02-03 (rev 1)

5.3. The driver shall always have the capability of overriding the AEBS.

Action point from 2nd IG meeting:

Alternative wording proposed at 2nd IG meeting

“The driver shall at all times be able to override the operation of the advanced emergency braking system. This override may be initiated by any reaction that indicates that the driver is aware of the pending situation”

OICA and UK to provide a draft text covering the overriding capabilities

TF02:

Proposal by CLEPA (AEBS/LDWS-TF02-06):

5.3. The driver shall always have the capability of overriding the AEBS **until the moment of collision.**

TF02:

Proposal 6 by Japan (AEBS/LDWS-TF02-07):

Rephrase the wording of point 5.3. as follows:

5.3. The AEBS shall have some sort of means by which the driver can at any time indicate that the driver is intentionally driving and override the service braking system operation by the AEBS.

Justification

- 1) Japan agrees to mandate to have means by which the driver can override the system.
- 2) As for the regulation “The system” should be the subject instead of “The driver”
- 3) Limit the overriding function into the service braking activation. The inappropriate warnings could be allowed even the driver can not suppress it because the destruction of the warning is negligible from the safe driving point of view.

TF02:

5.4. When a vehicle is equipped with a means to disable the AEBS function, the following conditions shall apply as appropriate:

Proposal by CLEPA (AEBS/LDWS-TF02-06):

5.4. When a vehicle is equipped with a **manual** means to disable the AEBS function, the following conditions shall apply as appropriate:

TF02:

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

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 5.4.1. The AEBS function shall be automatically reinstated at the initiation of each new ignition “on” (run) cycle.

TF02:

- 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 5.5.2. below may be used for this purpose.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 5.4.2. A ~~constant~~ flashing optical warning signal shall inform the driver that the AEBS function has been disabled. The yellow warning signal specified in paragraph 5.5.23. below may be used for this purpose.

TF02:

Proposal 7 by Japan (AEBS/LDWS-TF02-07):

Add point 5.4.3. as follows:

5.4.3 The mean to disable the AEBS function shall have a structure which prevent the driver in the driver's seat operating the mean easily. e.g. Locating the mean not to be reached easily by the driver in the driver's seat or having the cover on the means.

Justification

Off switch should be used only when a trouble like sensor installation deformation. Easy usage by the driver should be eliminated by some means.

TF02:

AEBS/LDWS-TF02-03 (rev 1)

5.5. Warning requirements

5.5.1. The remaining reaction time warning referred to in paragraph 6.6. shall be by means of an optical, audible or haptic warning signal, or any combination thereof.

Proposal 8 by Japan (AEBS/LDWS-TF02-07):

Amend point 5.5.1 to read:

5.5.1. The ~~remaining reaction time collision~~ warning referred to in paragraph ~~6.6~~ **5.2.1.1.** shall **use at least two means among audible, haptic and optical warning signals** ~~be by means of an optical, audible or haptic warning signal, or any combination thereof.~~

Justification

Follow the HMI principle under the discussion by ITS informal group

TF02:

Proposal by CLEPA (AEBS/LDWS-TF02-06):

5.5.1. The remaining reaction time warning referred to in paragraph ~~6.6:~~ **5.2.1.** shall be by means of an ~~optical, audible~~ **visual, acoustic** or haptic warning signal, or any combination thereof.

In the case of a haptic warning, if a brake application is made it shall not exceed a duration of 0.8 seconds or result in a vehicle speed reduction greater than 5 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.

TF02:

- 5.5.2. The malfunction warning referred to in paragraph 6.8. shall be by means of a yellow optical warning signal.
- 5.5.3. 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.
- 5.5.4. 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.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 5.5.2. The ~~malfunction failure~~ warning referred to in paragraph ~~6.8.~~ 6.5.13. shall be by means of a ~~constant~~ yellow optical warning signal.
The warning signal shall remain displayed as long as the failure or defect persists and the ignition (start) switch is in the 'on' (run) position.
- 5.5.3. In the case that the AEBS has the ability to shut its-self down due to a non-failure loss of functionality, e.g. temporary sensor blindness, the driver shall be provided with a warning signal indicating that the system is temporarily unavailable.
The warning signal shall be a flashing yellow optical warning signal.
A description of the non-failures that lead to loss of functionality shut down shall be provided by the vehicle manufacturer at the time of type-approval.
- 5.5.34. 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).
In the case of activation in the "on" (run) position the warning signal(s) shall be deactivated after a short period of time, as defined by the vehicle manufacturer, unless there is a failure or defect present in the system.
This requirement does not apply to tell-tales shown in a common space.
- 5.5.45. The optical warning signals shall be clearly visible even by daylight; and the satisfactory condition of the signal ~~must be~~ easily verifiable, by the driver from the driver's seat.

TF02:

AEBS/LDWS-TF02-03 (rev 1)

Proposal 9 by Japan (AEBS/LDWS-TF02-07):

Add point 5.6. to 5.6.1.4 as follows:

5.6. Prevention of over reliance of the driver

5.6.1. When the collision is avoided by the activation of the service braking system:

5.6.1.1. maximum deceleration during the activation of the service braking system shall be 6m/s² or more.

5.6.1.2. the jerk of the subject vehicle shall be 12m/s³ or more.

5.6.1.3. the subject vehicle shall get closer to the target until the distance is 1m or less.

5.6.1.4. if the subject vehicle comes to the stop, the service brake shall be released at the latest 3sec after the stop.

Justification

To avoid the driver's over reliance following points are necessary.

- 1) to give the feeling of discomfort (5.6.1.1. and 5.6.1.2.)
- 2) to give the feeling of fear (5.6.1.3.)
- 3) to make the driver understand that he should take the driving responsibility (5.6.1.4.)

TF02:

6. TEST PROCEDURE

Action point from TF01:

OICA to draft text for a "moving target" test method (maximum deceleration, other criteria if necessary) and a possible approach for a draft regulatory text reflecting the system currently on the market in Europe.

See document AEBS/LDWS-TF02-05

TF02:

6.1. Test conditions

6.1.1. The test shall be performed on a flat surface affording good adhesion.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

6.1.1. The tests shall be performed on a flat surface affording good adhesion.

TF02:

6.1.2. The ambient temperature shall be between 0° C and 45° C.

6.1.4. The horizontal visibility range shall be greater than 1 km.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

6.1.43. 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.

TF02:

AEBS/LDWS-TF02-03 (rev 1)

- 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%.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 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%~~ 3 km/h.
 - 6.2.3. Time ~~and delays~~ shall be measured with an accuracy of +/- 1%.
 - 6.2.4. Decelerations shall be measured with an accuracy of +/- 0.1 m/s².

TF02:

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 moving at a minimum speed of 15 km/h and braking the subject vehicle up to collision avoidance.

Action point from TF01:

All Contracting Parties are kindly invited to verify their proving ground capabilities in terms of testing the systems performance on curved roads. As a reminder, 2 km can be considered a standard highway radius of curvature, and 250 m is considered the radius of curvature of a tight curve on motorways.

TF02:

Proposal by CLEPA (AEBS/LDWS-TF02-06):

~~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 moving at a minimum~~

TF02:

AEBS/LDWS-TF02-03 (rev 1)

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.

- 6.4.2. The AEBS shall be configured in accordance with the instructions provided by the vehicle manufacturer. In the case where the AEBS is equipped with a user-adjustable warning threshold, each test shall be performed twice: once with the warning threshold set at its earliest setting, and once with the warning threshold set at its latest setting. No alteration shall be made once the test procedure has begun.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

~~6.4.2. The AEBS shall be configured in accordance with the instructions provided by the vehicle manufacturer. In the case where the AEBS is equipped with a user-adjustable warning threshold, each test shall be performed twice: once with the warning threshold set at its earliest setting, and once with the warning threshold set at its latest setting. No alteration shall be made once the test procedure has begun.~~

TF02:

- 6.5. Target vehicle
- 6.5.1. The target used for the test shall have the bulk of a regular passenger car of category M1 AA saloon and a total radar cross section (RCS) of at least $2 \text{ m}^2 \pm 1 \%$.
- 6.5.2. When the target carries radar reflector(s),
- 6.5.2.1. the reflector(s) shall be oriented toward the subject vehicle;
- 6.5.2.2. the reflectors shall be placed between 0.09 m to 1.00 m height; and
- 6.5.2.3. the structure supporting the reflector(s) on the target shall not reflect radio waves emitted by the subject vehicle AEBS.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- 6.54. Target vehicle
- 6.54.1. The target used for the tests shall be either ~~have the bulk of a regular~~ high volume series production passenger car of category M1 AA saloon ~~and a total radar cross section (RCS) of at least $2 \text{ m}^2 \pm 1 \%$~~ or a “soft target” representative of such a vehicle in terms of its identification characteristics applicable to the sensor system of the AEBS under test.
- 6.54.2. When the soft target carries radar reflector(s) the total radar cross section shall be $2 \text{ m}^2 \pm 1 \%$,
- 6.54.2.1. the reflector(s) shall be oriented toward the subject vehicle;
- 6.54.2.2. the reflectors shall be placed between 0.09 m to 1.00 m height; and
- 6.54.2.3. ~~the any~~ structure supporting the reflector(s) on the target shall not reflect radio waves emitted by the subject vehicle AEBS

TF02:

AEBS/LDWS-TF02-03 (rev 1)

Proposal 10 by Japan (AEBS/LDWS-TF02-07):

Amend point 6.5 as follows:

- 6.5. Target ~~vehicle-obstacle~~
- 6.5.1. The target used for the test shall have the bulk of a regular passenger car of category M1 AA saloon and/or a **radar reflector(s)total radar cross section (RCS) of at least 2 m² +/- 1%.**
- 6.5.2. When the target carries radar reflector(s),
- 6.5.2.1. the reflector(s) shall be oriented toward the subject vehicle;
- 6.5.2.2. **The target used for the test shall be made of two reflectors. Radar Cross Section (RCS) of each reflector is until 15 dBsm. If a radar reflectivity is smaller than two reflectors with each radar cross section (RCS) of 15 dBsm, the test may use the different target obstacle.**
- 6.5.2.3. **The reflectors shall be placed on a horizontal line perpendicular to the axis of the test course, distant 1.7m from each other, and symmetrically to the axis of the test course, oriented toward the subject vehicle.**
- 6.5.2.24. the reflectors shall be placed between 0.09 m to 1.00 m height. **However, if the height of the forward obstacle sensor of the test vehicle exceeds 1 m, the height of the reflector may be raised to the height of the sensor.;** and
- 6.5.2.35. the structure supporting the reflector(s) on the target shall not reflect radio waves emitted by the subject vehicle AEBS.

Justification

Same as AEBS/LDWS-02-10 proposal 10

These amendments are added to clarify requirements of (1) RCS of the reflector and (2) the height of the target.

(1) RCS of the reflector: Japan carried out the experiments which measured RCS. And we compared the passenger vehicle with the reflector in RCS. This result shows that RCS of two reflectors (15dBsm×2) is equal to the passenger vehicle.

(2) The corner reflector has stronger directivity than the actual vehicle. To simulate the real condition, the corner reflector may be placed up around the height of the radar.

Proposal 10 by Japan (AEBS/LDWS-TF02-07) - continued:

TF02:

6.5.3. Stationary target

The stationary target shall be positioned such that its component nearest to the subject vehicle is positioned at the collision point on the axis of the test course.

6.5.4. Moving target

The moving target shall be moving on the axis of the test course at a constant speed comprised between 5 km/h and 70 km/h.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

~~6.5.3. Stationary target~~

~~The stationary target shall be positioned such that its component nearest to the subject vehicle is positioned at the collision point on the axis of the test course.~~

~~6.5.4. Moving target~~

~~The moving target shall be moving on the axis of the test course at a constant speed comprised between 5 km/h and 70 km/h.~~

TF02:

AEBS/LDWS-TF02-03 (rev 1)

- 6.5.5. Details that enable the target vehicle to be specifically identified shall be recorded in the vehicle type-approval documentation.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

- ~~6.5.5.4.3.~~ Details that enable the targets ~~vehicle~~ to be specifically identified shall be recorded in the vehicle type-approval documentation.

TF02:

- 6.6. Remaining reaction time warning test
- 6.6.1. 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. The AEBS shall perform a check of lamp function as specified in paragraph 5.5.3. of this Regulation.
- 6.6.2. Warning test with stationary target
- 6.6.2.1. Drive the vehicle, enter the vehicle the test course and smoothly track the lane so that the posture of the vehicle is stable. Perform three trials at the respective constant speeds of 20 km/h, 40 km/h and 80 km/h.
- 6.6.2.2. The AEBS shall warn the driver as mentioned in paragraph 5.2.1.1. at the latest when the remaining reaction time has fallen below 1,5 s.
- 6.6.2.3. If the AEBS did not warn the driver as mentioned in paragraph 6.6.2.2. above, discontinue the test.
- 6.6.3. Warning test with moving target
- 6.6.3.1. Drive the moving target as in paragraph 6.5.4.

- 6.6.3.2. Increase the subject vehicle speed and perform three trials at the relative speed between the subject vehicle and the target equalling to 20 km/h, 40 km/h and 60 km/h.
- 6.6.3.3. The AEBS shall warn the driver as mentioned in paragraph 5.2.1.1. at the latest when the remaining reaction time has fallen below 1,5 s.
- 6.6.3.4. If the AEBS did not warn the driver as mentioned in paragraph 6.6.3.3. above, discontinue the test.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

6.65. ~~Remaining reaction time warning test~~ Tests

6.65.1. ~~Optical warning signal verification test~~

- 6.5.1.1. 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.

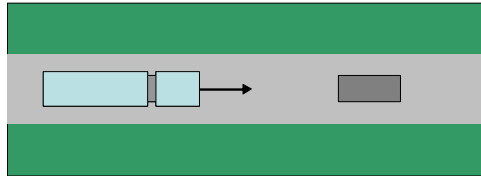
~~and the ignition locking system in the "Lock" or "Off" position, activate the ignition locking system to the "On" or "Run" position. The AEBS shall perform a check of lamp function as specified in paragraph 5.5.3. of this Regulation.~~

TF02:

AEBS/LDWS-TF02-03 (rev 1)

Proposal by CLEPA (AEBS/LDWS-TF02-06) - continued:

6.65.2. Warning test with stationary target



~~6.65.2.1. Drive the vehicle, enter the vehicle the test course and smoothly track the lane so that the posture of the vehicle is stable.~~

The subject vehicle shall travel in a straight line for a minimum distance of 50m towards the standing target vehicle with a vehicle centreline offset of not more than 0.5m. The target vehicle shall be a ‘soft target’ representative of a M1 AA saloon category vehicle.

Perform ~~three trials~~ 2 tests at ~~the respective~~ constant speeds of ~~20 km/h~~, 40 km/h and 80 km/h.

6.65.2.2. The AEBS shall warn the driver as mentioned in paragraph 5.2.1.1. ~~at the latest when the remaining reaction time has fallen below 1,5 s.~~ as specified below:

V_{Ego} (km/h)	V_{CO} (km/h)	Time to collision (s)	Latest Warning (m)
80	0	1.9	41
40	0	0.9	10

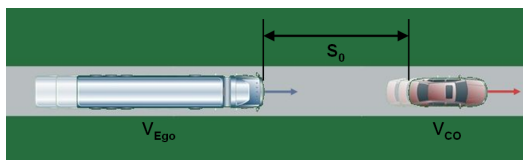
~~6.6.2.3. If the AEBS did not warn the driver as mentioned in paragraph 6.6.2.2. above, discontinue the test.~~

6.5.2.3. Subsequent to the warning(s) a 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 or brake pedal, shall result in the AEBS actions being overridden.

TF02:

Proposal by CLEPA (AEBS/LDWS-TF02-06) - continued:

6.65.3. Warning test with moving target



6.65.3.1. ~~Drive the moving target as in paragraph 6.5.4.~~ The subject vehicle and the moving target vehicle shall travel in a straight line for a minimum distance of 50m, in the same direction, with a vehicle centreline offset of not more than 0.5m. The target vehicle shall be a 'soft target' representative of a M1 AA saloon category vehicle.

Perform 2 tests with the subject vehicle travelling at a constant speed of 60 km/h and 80 km/h and the target vehicle travelling at a speed of 20 km/h in both cases (closing speeds of 40 km/h and 60 km/h respectively).

~~6.6.3.2. Increase the subject vehicle speed and perform three trials at the relative speed between the subject vehicle and the target equalling to 20 km/h, 40 km/h and 60 km/h.~~

6.65.3.32. The AEBS shall warn the driver as mentioned in paragraph 5.2.1.1. ~~at the latest when the remaining reaction time has fallen below 1,5 s.~~ as specified below:

V_{Ego} (km/h)	V_{CO} (km/h)	Time to collision (s)	Latest Warning (m)
80	20	2.3	39
60	20	1.9	21

~~6.6.3.4. If the AEBS did not warn the driver as mentioned in paragraph 6.6.3.3. above, discontinue the test.~~

6.5.3.3. Subsequent to the warning(s) a 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 or brake pedal, shall result in the AEBS actions being overridden.

TF02:

AEBS/LDWS-TF02-03 (rev 1)

Proposal 11 by Japan (AEBS/LDWS-TF02-07):

Amend point 6.6. to 6.6.3.4. as follows:

6.6. Test

6.6.1. Bulb check function test

6.6.1.1. 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. The AEBS shall perform a check of lamp function as specified in paragraph 5.5.3. of this Regulation.

6.6.2. Performance test with stationary target

6.6.2.1. Drive the vehicle, enter the vehicle the test course and smoothly track the lane so that the posture of the vehicle is stable. Perform three trials at the respective constant speeds of 40 km/h and 80 km/h.

6.6.2.2. The AEBS shall warn the driver as mentioned in paragraph 5.2.1.1.

6.6.2.3. The AEBS shall activate the service braking system and reduce the subject vehicle speed as shown on the table XX.

Table XX

Subject vehicle speed	Minimum subject vehicle speed reduction
40km/h	6km/h
80km/h	10km/h

6.6.3. Performance test with moving target

6.6.3.1. Drive the moving target as in paragraph 6.5.4. and drive the subject vehicle, enter the test course and smoothly track the lane so that the posture of the vehicle is stable. Perform three trials at the respective relative speeds between the subject vehicle and the target equalling to 40 km/h and 60 km/h.

6.6.3.2. The AEBS shall warn the driver as mentioned in paragraph 5.2.1.1.

6.6.3.3. The AEBS shall activate the service braking system and reduce the relative speed as shown on the table YY.

Proposal 11 by Japan (AEBS/LDWS-TF02-07) - continued

Table YY

Relative speed	Minimum relative speed reduction
40km/h	[14]km/h (heavy duty trucks with GVW of 20t or more)
60km/h	[18]km/h (heavy duty trucks with GVW of 20t or more)

Justification

- 1) Modified the order of the tests for better efficiency.
- 2) Took “speed reduction” to measure the performance of service brake activation to replace “service brake activation mandating time and the average deceleration”. For better understanding it is reasonable to specify the performance by the speed reduction which is directly linked to the collision energy reduction.
- 3) Deleted the subject vehicle speed of 20km/h for stationary target and relative speed of 20km/h for moving target. One representative for normal road and one for motor way is enough.
- 4) Performance for stationary target is the same as initial draft proposal AEBS/LDWS 01-05 i.e. speed reductions are equal to the sum of 3.3m/s² for 0.5sec when subject vehicle speed is 40km/h, and 3.3m/s² for 0.8sec when subject vehicle speed is 80km/s.
- 5) New specifications for moving target. When taking the possibilities of the interference between the AEBS brake operation and the driver’s ordinary maneuver and inappropriate operation on the normal road into consideration, the values on the table YY is feasible limits. At this moment, performance requirement only for the heavy duty trucks with GVW of 20t or more can be decided, which is the reason why the figures are in [].

TF02:

AEBS/LDWS-TF02-03 (rev 1)

Proposal 12 by Japan (AEBS/LDWS-TF02-07):

Add new point 6.6.4. as follows and renumber the following paragraphs:

6.6.4. Test of deactivation of service braking to the obstacles outside the lane

6.6.4.1. Test course

6.6.4.1.1 Tests course shall be flat and have a straight lane for the subject vehicle with the width of 3.5m and the space beside the lane for the obstacles outside the lane as appropriate.

6.6.4.2. Obstacles outside the lane

6.6.4.2.1. The obstacles outside lane shall be two vehicles in the same direction as the subject vehicle put in the both right and left adjacent space symmetrically to the lane for the subject vehicle with the distance of 0.5m each from the edge of the lane to the near side of the vehicle.

6.6.4.3. Test

6.6.4.3.1. Drive from more than 60m behind the obstacles outside the lane and trace the centre of the lane at the constant speed of 40km/h, until passing over the obstacles outside the lane. Repeat the same test three times.

6.6.4.3.2. Not to operate the braking system which may cause any affect on the AEBS operation.

6.6.4.3.3. The AEBS shall not activate the service braking system except the warning brake.

Justification

Same as AEBS/LDWS-02-10 proposal 13. Only wording refined.

The verification test of deactivation of braking control to obstacle outside the test lane is added. This deactivation test of AEBS is proposed as a minimum requirement. Please refer to AEBS/LDW-01-06 on page 34.

TF02:

6.7. Braking system activation test

6.7.1. With the 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.

6.7.2. Braking system activation with stationary target

6.7.2.1. Drive the vehicle, enter the vehicle the test course and smoothly track the lane so that the posture of the vehicle is stable. Perform three trials at the respective constant speeds of 20 km/h, 40 km/h and 80 km/h.

6.7.2.2. The AEBS shall:

6.7.2.2.1. activate the service braking system as mentioned in paragraph 5.2.1.2. at the latest at a time to collision equalling 0,8 s, and

6.7.2.2.2. provoke an average deceleration of at least 3,3 m/s².

6.7.2.3. If the AEBS did not activate the service braking system as mentioned in paragraph 6.7.2.2. above, discontinue the test.

6.7.3. Braking system activation with moving target

6.7.3.1. Drive the moving target as in paragraph 6.5.4. and drive the subject vehicle, enter it the test course and smoothly track the lane so that the posture of the vehicle is stable.

6.7.3.2. Perform three trials at the relative speed between the subject vehicle and the target equalling to 20 km/h, 40 km/h and 60 km/h.

6.7.3.3. The AEBS shall:

6.7.3.3.1. activate the service braking system as mentioned in paragraph 5.2.1.2. at a time to collision equalling 0,8 s, and

6.7.3.3.2. provoke an average deceleration of at least 3,3 m/s².

6.7.3.4. If the AEBS did not activate the service braking system as mentioned in paragraph 6.7.3.3. above, discontinue the test.

AEBS/LDWS-TF02-03 (rev 1)

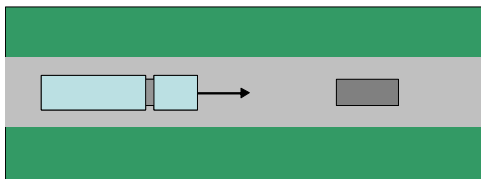
Proposal by CLEPA (AEBS/LDWS-TF02-06):

~~6.7. Braking system activation test~~

~~6.7.1. With the 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.~~

~~6.7.2. Braking system activation with stationary target~~

6.5.4.



~~6.7.2.1. Drive the vehicle, enter the vehicle the test course and smoothly track the lane so that the posture of the vehicle is stable.~~

6.5.4.1. The subject vehicle shall travel in a straight line for a minimum distance of 50m towards the standing target vehicle with a vehicle centreline offset of not more than 0.5m. The target vehicle shall be a 'soft target' representative of a M1 AA saloon category vehicle.

Perform a test at a speed of 80 km/h. The speed shall be maintained constant until the (initial) AEBS driver warning signal, after which there shall be no adjustment of any vehicle control by the driver.

~~6.7.2.2. The AEBS shall:~~

6.5.4.2.

6.5.4.2.1. provide a driver warning as in paragraph 6.5.2.

~~6.7.2.2.1.~~

6.5.4.2.2 activate the service braking system as mentioned in paragraph 5.2.2. to level as set by the vehicle manufacturer at a time to collision equalling 0,8 s at the latest.

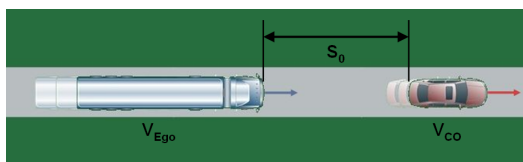
~~6.7.2.2.2. provoke an average deceleration of at least 3,3 m/s²~~

~~6.7.2.3. If the AEBS did not activate the service braking system as mentioned in paragraph 6.7.2.2. above, discontinue the test.~~

Proposal by CLEPA (AEBS/LDWS-TF02-06) - continued:

~~6.7.3.~~

6.5.5. Braking system activation with moving target



~~6.7.3.1. Drive the moving target as in paragraph 6.5.4. and drive the subject vehicle, enter it the test course and smoothly track the lane so that the posture of the vehicle is stable.~~

6.5.5.1. The subject vehicle shall travel in a straight line for a minimum distance of 50m towards the moving target vehicle with a vehicle centreline offset of not more than 0.5m. The target vehicle shall be a 'soft target' representative of a M1 AA saloon category vehicle.

Perform 2 tests with the subject vehicle travelling at a constant speed of 60 km/h and 80 km/h and the target vehicle travelling at a speed of 20 km/h in both cases (closing speeds of 40 km/h and 60 km/h respectively). The speed shall be maintained constant until the (initial) AEBS driver warning signal, after which there shall be no adjustment of any vehicle control by the driver.

~~6.7.3.2. Perform three trials at the relative speed between the subject vehicle and the target equalling to 20 km/h, 40 km/h and 60 km/h.~~

~~6.7.3.3.~~ The AEBS shall:

6.5.5.2.

6.5.5.2.1. provide a driver warning as in paragraph 6.5.3.

~~6.7.3.3.1.~~

6.5.5.2.2. activate the service braking system as mentioned in paragraph 5.2.4.2. at a time to collision equalling 0,8 s at the latest, and

~~6.7.3.3.2.~~

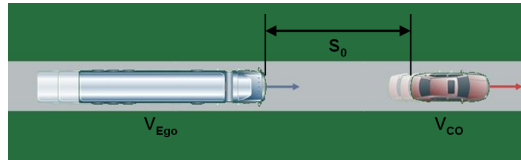
6.5.5.2.3. ~~provoke an average deceleration of at least 3,3 m/s².~~ initiate a full brake application.

~~6.7.3.4. If the AEBS did not activate the service braking system as mentioned in paragraph 6.7.3.3. above, discontinue the test.~~

AEBS/LDWS-TF02-03 (rev 1)

Proposal by CLEPA (AEBS/LDWS-TF02-06) - continued:

6.5.6. Braking system activation with moving target slowing to a stop



6.5.6.1. The subject vehicle and the target vehicle shall travel in the same direction in a straight line for a minimum distance of 50m with a separating distance of 70m and a vehicle centreline offset of not more than 0.5m. The target vehicle shall be a ‘soft target’ representative of a M1 AA saloon category vehicle.

Perform a test at a speed of 60 km/h. The speed of the subject vehicle shall be maintained constant until the (initial) AEBS driver warning signal, after which there shall be no adjustment of any vehicle control by the driver. The target shall decelerate at 5m/s^2 to a standstill.

6.5.6.2. The AEBS shall:

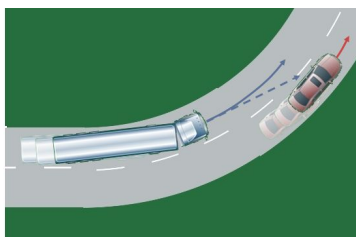
6.5.6.2.1. provide a driver warning as in paragraph 6.5.3.

6.5.6.2.2. activate the service braking system as mentioned in paragraph 5.2.2. at a time to collision equalling 0,8 s, and

6.5.6.2.3. initiate a full brake application.

Proposal by CLEPA (AEBS/LDWS-TF02-06) - continued:

6.5.7. Adjacent vehicle curve test (false warning test)

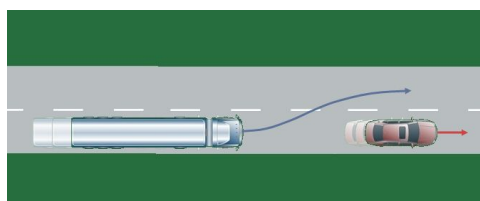


6.5.7.1. The subject vehicle shall approach and pass the target vehicle at a closing speed of 10 km/h when both vehicles are travelling in the centre of adjacent lanes, each 3.5m wide, with the inner marking of the inside lane having a 125m radius of curvature. The target vehicle shall travel at a constant speed of 40 km/h.

The test shall be conducted twice, once with a right hand curve and once with a left hand curve.

6.5.7.2. There shall be no action from the AEBS.

6.5.8. Overtaking manoeuvre test (false warning test)



6.5.8.1. 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.

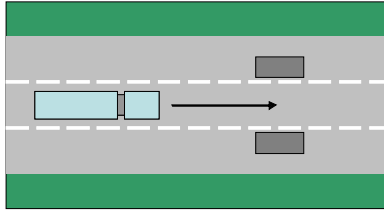
The subject vehicle shall start the overtaking manoeuvre at a distance of less than 15m from the target vehicle.

6.5.8.2. There shall be no action from the AEBS.

AEBS/LDWS-TF02-03 (rev 1)

Proposal by CLEPA (AEBS/LDWS-TF02-06) - continued:

6.5.9. Alley way test (false warning test)



6.5.9.1. The subject vehicle shall approach and pass between 2 target vehicles travelling in the same direction in adjacent lanes. The three lanes shall be straight with the centre lane being 3.5m wide.

The target vehicles shall travel at the outer edge of the centre lane markings at a constant speed of 20 km/h, with their off-set to each other being not more than 1.5m.

The subject vehicle shall have a constant speed of 50 km/h.

6.5.9.2. There shall be no action from the AEBS.

6.5.10. Non-failure loss of functionality test

6.5.10.1. If the AEBS has a non-failure loss of functionality function(s), a loss of function chosen from those identified by the vehicle manufacturer shall be simulated.

6.5.10.2. The appropriate warning signal shall be activated and deactivated when the loss of functionality is simulated and regained.

6.5.11. Manual disablement test

6.5.11.1. 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 the AEBS is automatically reinstated when the ignition start switch is in the “on” (run) position.

- 6.8. Malfunction detection
- 6.8.1. Simulate a AEBS malfunction, for example by disconnecting the power source to any AEBS component, disconnecting any electrical connection between AEBS components, or misaiming the sensor(s). When simulating an AEBS malfunction, the electrical connections for the telltale lamps shall not be disconnected.
- 6.8.2. Drive the vehicle for up to 60 minutes along any portion of the test course.
- 6.8.3. The sum of the total cumulative drive time under paragraph 6.8.2. shall be the lesser of 60 minutes or the time at which the AEBS malfunction telltale illuminates in accordance with paragraph 5.5.2.
- 6.8.4. If the AEBS malfunction indicator did not illuminate in accordance with paragraph 5.5.2. as required, discontinue the test.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

~~6.8. Malfunction detection~~ Failure warning test

~~6.5.12.~~

~~6.8.1.~~

~~6.5.12.1.~~ Simulate ~~a~~ an AEBS ~~malfunction failure~~, for example by disconnecting the power source to any AEBS component, disconnecting any electrical connection between AEBS components, or misaiming the sensor(s). When simulating an AEBS ~~malfunction failure~~, the electrical connections for the ~~telltale lamps~~ driver warning signal and optional manual off-switch shall not be disconnected.

~~6.8.2. Drive the vehicle for up to 60 minutes along any portion of the test course.~~

~~6.8.3. The sum of the total cumulative drive time under paragraph 6.8.2. shall be the lesser of 60 minutes or the time at which the AEBS malfunction telltale illuminates in accordance with paragraph 5.5.2.~~

6.5.12.2. The AEBS failure warning signal shall be activated without delay and remain activated while the vehicle is being driven and is re-activated after a subsequent ignition “off” ignition “on” cycle.

~~6.8.4. If the AEBS malfunction indicator did not illuminate in accordance with paragraph 5.5.2. as required, discontinue the test.~~

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7. MODIFICATION OF VEHICLE TYPE AND EXTENSION OF APPROVAL

- 7.1. Every modification of the vehicle type as defined in paragraph 2.2. above shall be notified to the Administrative Department which approved the vehicle type. The department may then either:
- 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;
- 7.1.2. consider that the modifications made affect the conditions of the granting of the approval and require further tests or additional checks before granting an extension of approval.
- 7.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.3. above to the Contracting Parties to the Agreement which apply this Regulation.
- 7.3. The Competent Authority shall inform the other Contracting Parties of the extension by means of the communication form which appears in Annex 2 to this Regulation. It shall assign a serial number to each extension, to be known as the extension number.

8. CONFORMITY OF PRODUCTION

- 8.1. Procedures concerning conformity of production shall conform to the general provisions defined in Appendix 2 to the Agreement (E/ECE/324-E/ECE/TRANS/505/Rev.2) and meet the following requirements:
- 8.2. A vehicle approved pursuant to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements of paragraph 5. above;
- 8.3. The Competent Authority which has granted approval may at any time verify the conformity of control methods applicable to each production unit. The normal frequency of such inspections shall be once every two years.

9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 9.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 8. above are not complied with.
- 9.2. If a Contracting Party withdraws an approval it had previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by sending them a communication form conforming to the model in Annex 1 to this Regulation.

10. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of vehicle approved in accordance with this Regulation, he shall so inform the authority which granted the approval, which in turn shall forthwith inform the other Contracting Parties to the Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

11. NAMES AND ADDRESSES OF THE TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS

The Contracting Parties to the Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Administrative Departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval are to be sent.

12. INTRODUCTORY PROVISIONS

12.1. As from the date of entry into force of this Regulation, Contracting Parties applying this Regulation shall not:

(a) Refuse to grant ECE approval for a type of vehicle under this Regulation; or

(b) Prohibit the sale or entry into service of a vehicle

if the vehicle falls within the scope of this Regulation and complies with the requirements of this Regulation.

Annex 1

COMMUNICATION

(Maximum format: A4 (210 x 297 mm))



issued by :

Name of administration:

.....
.....
.....

concerning: 2/

- APPROVAL GRANTED
- APPROVAL EXTENDED
- APPROVAL REFUSED
- APPROVAL WITHDRAWN
- PRODUCTION DEFINITELY DISCONTINUED

of a type of vehicle with regard to the lane departure warning system pursuant to Regulation No. AEBS

Approval No.: Extension No.:

1. Trademark:
2. Type and trade name(s):
3. Name and address of manufacturer:
4. If applicable, name and address of manufacturer's representative:
.....
5. Brief description of vehicle:
6. Data to enable the identification of reference point "R" of the seating position designated for the driver in relation to the primary reference marks:
.....
7. Identification, place and relative positions of the primary reference marks:
8. Date of submission of vehicle for approval:
9. Technical Service performing the approval tests:

10. Date of report issued by that service:
11. Number of report issued by that service:
12. Approval with regard to the AEBS is granted/refused: 2/
13. Place:
14. Date:
15. Signature:
16. Annexed to this communication are the following documents, bearing the approval number indicated above:

..... dimensional drawings

..... exploded view or photograph of the passenger compartment
17. Any remarks:

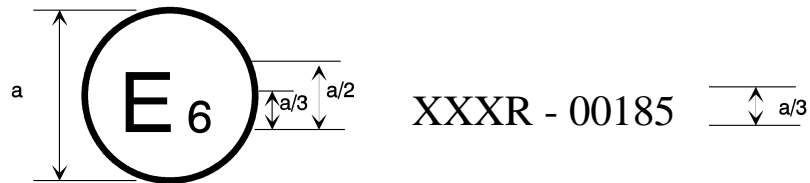
1/ Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in the Regulation).

2/ Delete what does not apply.

Annex 2

ARRANGEMENTS OF APPROVAL MARKS

(see paragraphs 4.4. to 4.4.2. of this Regulation)



a = 8 mm min

The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in Belgium (E6) with regard to the AEBS pursuant to Regulation No. AEBS. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No. XXX in its original form.

Proposal by CLEPA (AEBS/LDWS-TF02-06):

Annex 3

SPECIAL REQUIREMENTS TO BE APPLIED TO THE SAFETY ASPECTS OF COMPLEX ELECTRONIC VEHICLE CONTROL SYSTEMS

1. GENERAL

This Annex defines the special requirements for

TF02:
