

Proposals from the Informal Working Group on AEBS

To construct
New UN Regulation

Short Version

This presentation show the draft proposal for a new UN Regulation on AEBS (GRVA-01-02)

Guidance from GRVA

Especially the red frame in this ppt shows that guidance from GRVA is necessary.

Informal Working Group on AEBS for Light Vehicles

Activities based on TOR (GRRF-84-03)

IWG meetings 3rd meeting in Brussels (19-20 February 2018)
4th meeting in Tokyo (16-17 May 2018)
5th meeting in London (26-27 June 2018)

Draft proposal for 1st GRVA in September 2018
(Informal document GRVA-01-02)

EC and Japan propose
an amendment of TOR
(Informal document
GRVA-01-09)

IWG meetings 6th meeting in Paris (1-2 October 2018)
~~7th meeting in Brussels (1st week of December 2018)~~
7th meeting in Geneva or Brussels (12-13 November 2018)

Draft proposal for 2nd GRVA in January 2019 as Working document

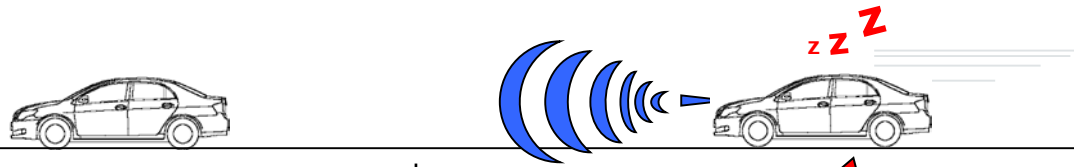
- ✓ Scope
- ✓ Definitions
- ✓ Specifications
 - General
 - Warnings, Emergency braking, False reaction avoidance
 - Car to Car (C2C) scenario
 - Car to Pedestrian (C2P) scenario
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 - Interruption by the Driver
 - Manual deactivation
 - Warning Indication
 - Provisions for the Periodic Technical Inspection
- ✓ Remaining open issues (including Test Procedure)

Green means common specifications in each scenario

Informal Working Group on AEBS for Light Vehicles Specifications - Car to car scenario – Rear-end collision

Moving and Stationary targets

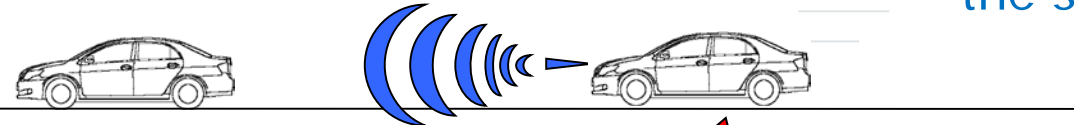
1st Stage
Collision Warning



Collision warning:
At the latest 0,8 seconds before
the start of emergency braking

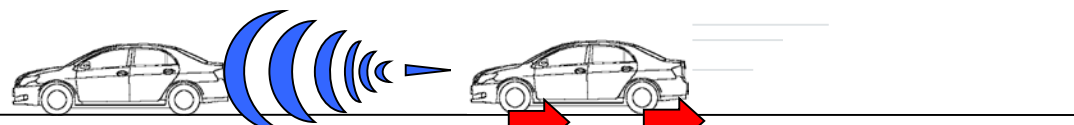
Activation Speed:
The system shall be active at least
within the vehicle speed range between
10 km/h and 60 km/h and at all vehicle
load conditions

2nd Stage
Emergency Braking



Emergency Braking:
Average braking demand of at least
[3.8 m/s² deceleration, with at least a
peak at 6.43 m/s² or fully cycling ABS,]

Damage Mitigation or Collision Avoidance



Informal Working Group on AEBS for Light Vehicles

Specifications - Car to car scenario - Speed reduction by braking demand

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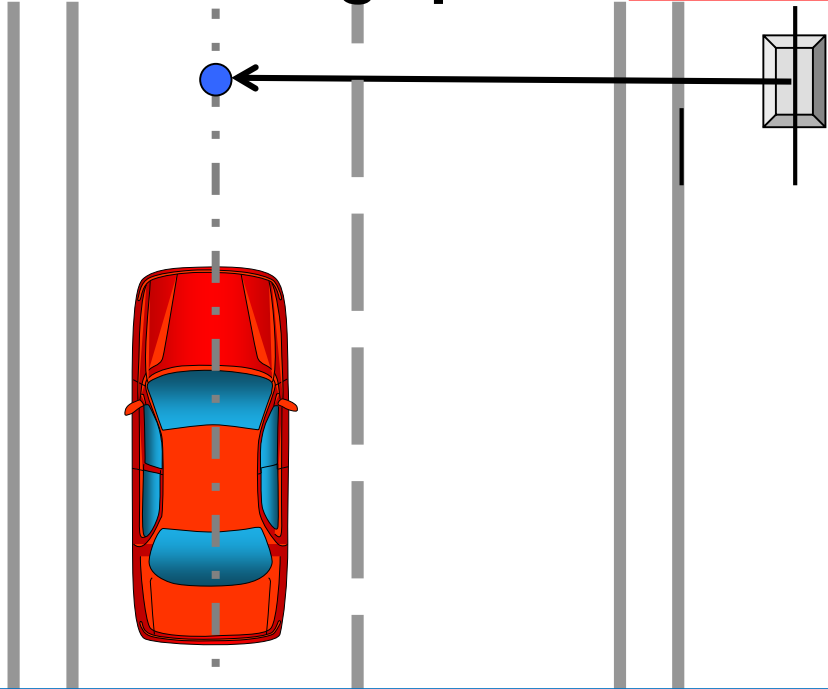
The table show the speed reduction in each relative speed for **M1** vehicle. About **N1** vehicle, IWG still need further discussion. The speed reduction shall be demonstrated according to the test procedure.

Based on discussion of last point to steer and last point to brake

Informal Working Group on AEBS for Light Vehicles

Specifications - Car to pedestrian scenario – Crossing collision

Walking speed: **5 km/h**



Collision Warning:

When the AEBS has detected the possibility of a collision with a pedestrian crossing the road, a collision warning shall be provided, and shall be provided no later than the start of emergency braking intervention.

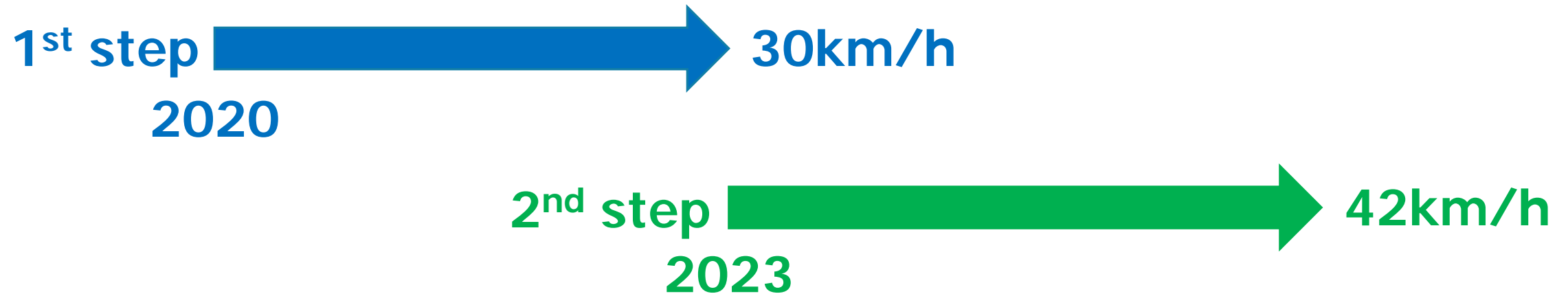
Emergency Braking:

When the system has detected the possibility of an imminent collision, an emergency braking shall emit an average braking demand of at least $[3.8 \text{ m/s}^2]$ deceleration, with at least a peak at 6.43 m/s^2 or fully cycling ABS].

Activation Speed:

The system shall be active at least within the vehicle speed range between $[20]$ km/h and 60 km/h and at all vehicle load conditions

IWG discussed step approach for the speed reduction of **M1** vehicle. About **N1** vehicle, IWG still need further discussion.



1st step(2020) is Collision avoidance until 30 km/h.
2nd step(2023) is Collision avoidance until 42 km/h.

Informal Working Group on AEBS for Light Vehicles

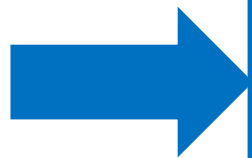
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1st step (EIF i.e. ca 2020 in UNECE) ↵

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2nd step (2023 in UNECE – i.e. 2023 in EU) ↵

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The speed reduction shall be demonstrated according to the test procedure. Based on same approach of Car to Car scenario

Guidance from GRVA

The phases of implementation would also need guidance from GRVA. In particular it is proposed that car to car requirements (42 km/h collision avoidance) as well as car to pedestrian with reduced performance (collision avoidance at 30 km/h only) would apply from the date of entry into force (original version of the regulation from 2020 for new types) whereas the car to pedestrian with higher speed (42 km/h) would apply in a second step (2023 for new types). The introduction phase for car to bicycle could then come later.

Informal Working Group on AEBS for Light Vehicles Specifications - Car to bicycle scenario – Crossing and Same direction

Speed of bicycle: [15 km/h]

Crossing

Same direction

Activation Speed:
The system shall be active at least within the vehicle speed range between 10 km/h and [30 km/h] and at all vehicle load conditions

For car to cyclist, the group agreed from accident data that the two most relevant scenarios are a cyclist crossing (similar to pedestrian scenario) and a cyclist driving in the same direction as the car (similar to car to car scenario). However, for the latter, it seems that steering is much more efficient than braking, so the usefulness of such a braking test needs to be checked again.

Guidance from GRVA

The group still faces difficulty in agreeing on performance requirements for the car to bicycle collision given the lack of vehicles with this technology on the market (only one vehicle was tested under EuroNcap in 2018). One alternative would be to require simply a warning in a first step or to discuss this issue again after the finalization of the discussion on cars and pedestrians.

Informal Working Group on AEBS for Light Vehicles Specifications - Manual deactivation

- [5.4. Manual deactivation ↵
- When a vehicle is equipped with a means to deactivate the AEBS function, the following conditions shall apply as appropriate: ↵
- 5.4.1. The AEBS 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 deactivated. The yellow warning signal specified in Paragraph 5.5.4. below may be used for this purpose. ↵
 - 5.4.3. The AEBS control shall be installed so as to comply with the relevant requirements and transitional provisions of UN Regulation No. 121, 01 series of amendments or any later series of amendments. ↵
 - 5.4.4. The AEBS control shall be designed a in such a way that its operation shall not be possible with less than two deliberate actions. ↵
 - 5.4.5. It shall not be possible to deactivate the AEBS at a speed above 10 km/h.] ↵

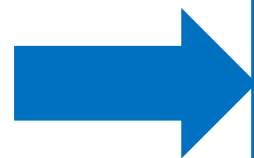
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The group also discussed the possibility of a manual deactivation of the AEBS function. The compromise reached was that such a switch could be allowed but switching off the AEBS should not be too easy. However this compromise was not unanimously supported by all Contracting parties.

Informal Working Group on AEBS for Light Vehicles

Remaining open issues (including Test Procedure)

Remaining open issues are indicated in square brackets in the document. One major issue is the minimum requirements that shall be required when the vehicle is outside test conditions (e.g. different mass, different road conditions). In addition for both car to car and car to pedestrian, few issues remain opened for some particular cases (e.g. for vans derived from trucks approved under Regulation R 13).



IWG still need further discussion for these issues.

- 1. Explanation of C2C and C2P requirements**
(Page 5 - 9)
- 2. Implementation of AEBS (Step approach)**
(Page 8 and 10)
- 3. Car to Bicycle scenario** (Page 11 - 12)
- 4. Manual deactivation** (Page 13)

**Thank you
for your attention**

**IWG meetings 6th meeting in Paris (OICA office)
(1-2 October 2018: Next week of this GRVA)**

Appendix

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To construct
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Full Version

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- ✓ Remaining open issues (including Test Procedure)

Green means common specifications in each scenario

1. **Scope** ↵

This Regulation applies to the approval of vehicles of Category M1 and N1 with regard to an on-board system to avoid or mitigate the severity of a rear-end in lane collision with a passenger car or to avoid or mitigate the severity of an impact with a vulnerable road user. ↵



Category M1 and N1

Scenarios:

Car to Car (C2C) scenario

Vulnerable road user:

Car to Pedestrian (C2P) scenario

Car to Bicycle (C2B) scenario

2. Definitions ↵

For the purposes of this Regulation: ↵

- 2.1. "*Advanced Emergency Braking System (AEBS)*" means a system which can automatically detect an imminent forward collision and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating-a collision. ↵

Other definitions:

"Emergency Braking "Collision Warning"

"Vehicle Type with Regard to its Advanced Emergency Braking System"

"Subject Vehicle" "Soft Target (Vehicle Target, Pedestrian Target and Cyclist Target)"

"Common Space" "Self-Check" "Time to Collision (TTC)"

Informal Working Group on AEBS for Light Vehicles Specifications - General

5.1. General ↵

- 5.1.1. Any vehicle fitted with an AEBS complying with the definition of Paragraph 2.1. above shall meet the performance requirements contained in Paragraphs 5.1. to 5.6.2. of this Regulation and shall be equipped with an anti-lock braking function in accordance with the performance requirements of Annex 6 to Regulation No.13-H 01 Series of amendments for vehicles of Category M1 and N1 or of Annex 13 to Regulation No. 13 11 Series of amendments for vehicles Category N1. ↵
- 5.1.2. The effectiveness of AEBS shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by fulfilling the technical requirements and respecting the transitional provisions of Regulation No. 10 05 series of amendments. ↵
- 5.1.3. Conformity with the safety aspects of electronic control systems shall be shown by meeting the requirements of Annex 3. ↵



Reference of other regulations:
ABS(R13H and R13), EMC(R10), Annex CEL

Guidance from GRVA

Reference of other regulations:

The group would also need guidance on the way to refer to the latest version of UN Regulation No. 10 and to targets (ISO standard or copy/paste requirements) to ensure a coherent practice across the different GRs (e.g. target used for cyclist detection by trucks currently discussed in GRSG).

Informal Working Group on AEBS for Light Vehicles Specifications - Warnings

5.1.4. Warnings ↵

In addition to the collision warnings described in paragraphs 5.2.1.1., 5.2.2.1. and 5.2.3.1., the system shall provide the driver with appropriate warning(s) as below: ↵

5.1.4.1. A failure warning when there is a failure in the AEBS that prevents the requirements of this Regulation of being met. The warning shall be as specified in Paragraph 5.5.4. ↵

5.1.4.1.1. There shall not be an appreciable time interval between each AEBS self-check, and subsequently there shall not be an appreciable delay in illuminating the warning signal, in the case of an electrically detectable failure. ↵

[5.1.4.2. A deactivation warning, if the vehicle is equipped with a means to manually deactivate the AEBS, shall be given when the system is deactivated. This shall be as specified in Paragraph 5.4.2.] ↵



Failure warning (inc. self-check)
Deactivation warning

Informal Working Group on AEBS for Light Vehicles

Specifications - Emergency braking, False reaction avoidance

5.1.5. Emergency braking ↵

Subject to the provisions of paragraph 5.3.1. and 5.3.2., the system shall provide emergency braking interventions described in paragraphs 5.2.1.2., 5.2.2.2. and 5.2.3.2. having the purpose of significantly decreasing the speed of the subject vehicle. ↵

5.1.5. False reaction avoidance ↵

The system shall be designed to minimise the generation of collision warning signals and to avoid autonomous braking in situations where the driver would not recognise an impending [forward or crossing] collision. This shall be demonstrated in accordance with Paragraph 6.11. of this Regulation. ↵



Emergency braking

The requirements follow each scenario

False reaction avoidance

Para. 6.10. False Reaction Avoidance Test

Informal Working Group on AEBS for Light Vehicles

Specifications - Car to car scenario – Rear-end collision

Moving and Stationary targets

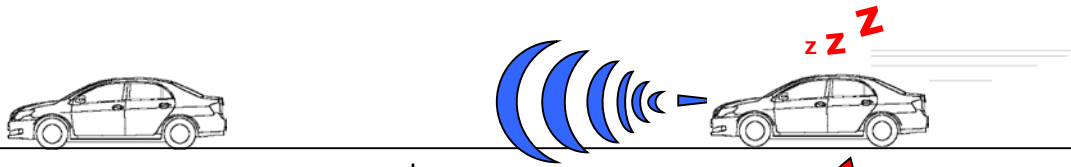
Collision warning:
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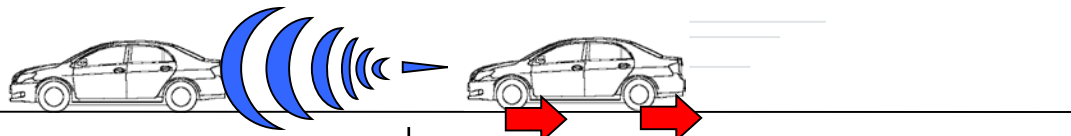
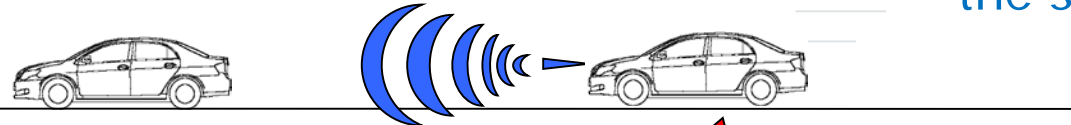
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Damage Mitigation or Collision Avoidance

1st Stage
Collision Warning



2nd Stage
Emergency Braking



Informal Working Group on AEBS for Light Vehicles

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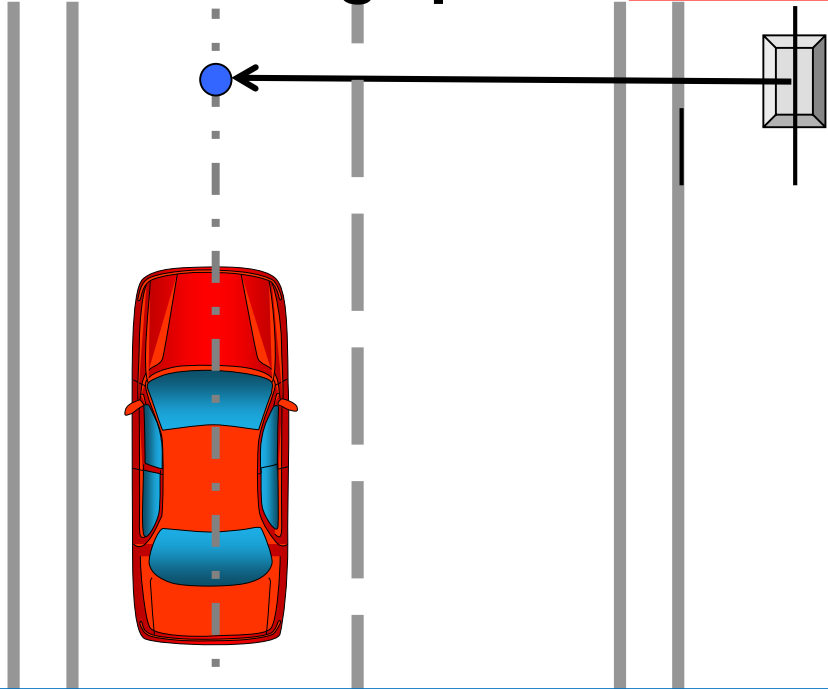
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Based on discussion of last point to steer and last point to brake

Informal Working Group on AEBS for Light Vehicles

Specifications - Car to pedestrian scenario – Crossing collision

Walking speed: **5 km/h**



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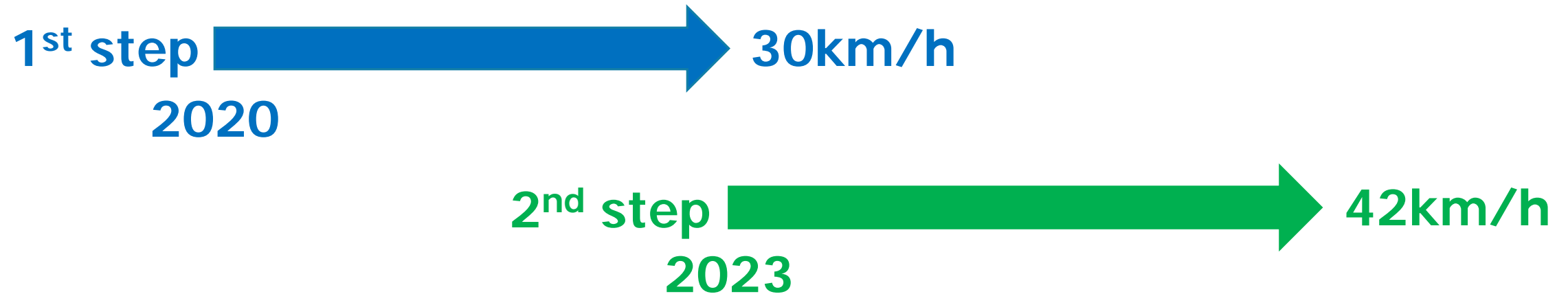
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The system shall be active at least within the vehicle speed range between $[20]$ km/h and 60 km/h and at all vehicle load conditions

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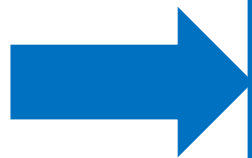
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Informal Working Group on AEBS for Light Vehicles Specifications - Car to bicycle scenario – Crossing and Same direction

Speed of bicycle: [15 km/h]

Crossing



Same direction



Activation Speed:

The system shall be active at least within the vehicle speed range between 10 km/h and [30 km/h] and at all vehicle load conditions

For car to cyclist, the group agreed from accident data that the two most relevant scenarios are a cyclist crossing (similar to pedestrian scenario) and a cyclist driving in the same direction as the car (similar to car to car scenario). However, for the latter, it seems that steering is much more efficient than braking, so the usefulness of such a braking test needs to be checked again.

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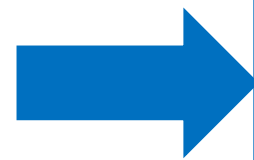
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Informal Working Group on AEBS for Light Vehicles Specifications - Interruption by the Driver

5.3. Interruption by the Driver ↵

5.3.1. The AEBS shall provide the means for the driver to interrupt the collision warning and the emergency braking. ↵

5.3.2. In both cases above, this interruption may be initiated by any positive action (e.g. kick-down, operating the direction indicator control) that indicates that the driver is aware of the emergency situation. The vehicle manufacturer shall provide a list of these positive actions to the technical service at the time of type approval and it shall be annexed to the test report. ↵



This requirement based on the requirement of AEBS for large trucks (R131).

Informal Working Group on AEBS for Light Vehicles Specifications - Manual deactivation

- [5.4. Manual deactivation ↵
- When a vehicle is equipped with a means to deactivate the AEBS function, the following conditions shall apply as appropriate: ↵
- 5.4.1. The AEBS 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 deactivated. The yellow warning signal specified in Paragraph 5.5.4. below may be used for this purpose. ↵
 - 5.4.3. The AEBS control shall be installed so as to comply with the relevant requirements and transitional provisions of UN Regulation No. 121, 01 series of amendments or any later series of amendments. ↵
 - 5.4.4. The AEBS control shall be designed a in such a way that its operation shall not be possible with less than two deliberate actions. ↵
 - 5.4.5. It shall not be possible to deactivate the AEBS at a speed above 10 km/h.] ↵

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The group also discussed the possibility of a manual deactivation of the AEBS function. The compromise reached was that such a switch could be allowed but switching off the AEBS should not be too easy. However this compromise was not unanimously supported by all Contracting parties.

Informal Working Group on AEBS for Light Vehicles Specifications – Warning Indicator

- 5.5. Warning Indication ↵
- 5.5.1. The collision warning referred to in Paragraphs 5.2.1.1., 5.2.2.1., 5.2.3.1.1. and 5.2.3.1.2. shall be provided by at least two modes selected from acoustic, haptic or optical. ↵
- 5.5.2. A description of the warning indication and the sequence in which the collision warning signals are presented to the driver shall be provided by the vehicle manufacturer at the time of type-approval and recorded in the test report. ↵
- 5.5.3. Where an optical means is used as part of the collision warning, the optical signal may be the flashing of the failure warning signal specified in Paragraph 5.5.4. ↵
- 5.5.4. The failure warning referred to in Paragraph 5.1.4.1. shall be a constant yellow optical warning signal. ↵
- 5.5.5. Each 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 (initial system (power-on)). This requirement does not apply to warning signals shown in a common space. ↵
- 5.5.6. The optical warning signals shall be visible even by daylight; the satisfactory condition of the signals must be easily verifiable by the driver from the driver's seat. ↵
- 5.5.7. When the driver is provided with an optical warning signal to indicate that the AEBS is temporarily not available, for example due to inclement weather conditions, the signal shall be constant and yellow in colour. The failure warning signal specified in Paragraph 5.5.4. above may be used for this purpose. ↵



This paragraph described about Collision warning, Failure warning. These requirement based on the requirement of AEBS for large tracks (R131).

Informal Working Group on AEBS for Light Vehicles Specifications – Provisions for the Periodic Technical Inspection

5.6. Provisions for the Periodic Technical Inspection ↵

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. ↵

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. ↵

5.6.2. At the time of type approval, the means to protect against simple unauthorised 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. ↵



This requirement based on existing the regulation of AEBS for large trucks (R131).

Informal Working Group on AEBS for Light Vehicles

Remaining open issues (including Test Procedure)

Remaining open issues are indicated in square brackets in the document. One major issue is the minimum requirements that shall be required when the vehicle is outside test conditions (e.g. different mass, different road conditions). In addition for both car to car and car to pedestrian, few issues remain opened for some particular cases (e.g. for vans derived from trucks approved under Regulation R 13).



IWG still need further discussion for these issues.

**Thank you
for your attention**

**IWG meetings 6th meeting in Paris (OICA office)
(1-2 October 2018: Next week of this GRVA)**