

Proposals from the Informal Working Group on AEBS

For a
New UN Regulation

This presentation show the proposal for a new UN Regulation on AEBS (GRVA-2019-05)

The objective is a vote in GRVA in January 2019 for the first stage of this Regulation. Pending and open issues are clarified by GRVA.

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)



IWG meetings 6th meeting in Paris (1-2 October 2018)
7th meeting in Geneva (13-14 November 2018)



Proposal for 2nd GRVA in January 2019 as Working document (GRVA-2019-05)

- ✓ Scope
- ✓ Definitions
- ✓ Specifications
 - General
 - Car to Car (C2C) scenario
 - Car to Pedestrian (C2P) scenario
 - Car to Bicycle (C2B) scenario
 - Interruption by the Driver
 - Manual deactivation
 - Warning Indication
 - Provisions for the Periodic Technical Inspection
- ✓ Test Procedure for each scenario
- ✓ Failure Detection Test , Deactivation Test

Green means common specifications in each scenario

- 1. Manual deactivation**
- 2. Requirement of N1 full cab vehicle**
- 3. Implementation of Car to Pedestrian scenario**
- 4. Maximum Impact Speed above 45 km/h
for Car to Pedestrian scenario in 2nd step**
- 5. Reference of standards**

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

- [5.4. Manual deactivation
- 5.4.1. When a vehicle is equipped with a means to manually deactivate the AEBS function, the following conditions shall apply as appropriate:
 - 5.4.1.1. The AEBS function shall be automatically reinstated at the initiation of each new ignition cycle.
 - 5.4.1.2. The AEBS control shall be designed in such a way that manual deactivation shall not be possible with less than two deliberate actions.
 - 5.4.1.3. The AEBS control shall be installed so as to comply with the relevant requirements and transitional provisions of UN Regulation No. 121 in its 01 series of amendments or any later series of amendments
 - 5.4.1.4. It shall not be possible to deactivate the AEBS at a speed above 10 km/h.
- 5.4.2. When the vehicle is equipped with a means to automatically deactivate the AEBS function, for instance in situations such as off-road use, being towed, being operated on a dynamometer, being operated in a washing plant, in case of a non-detectable misalignment of sensors, the following conditions shall apply as appropriate:
 - 5.4.2.1. The vehicle manufacturer shall provide a list of situations and corresponding criteria where the AEBS function is automatically deactivated to the technical service at the time of type approval and it shall be annexed to the test report.
 - 5.4.2.2. The AEBS function shall be automatically reactivated as soon as the conditions that led to the automatic deactivation are not present anymore.
- 5.4.3. 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.]

Guidance from GRVA

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 - Car to car scenario – Rear-end collision

Moving and Stationary targets

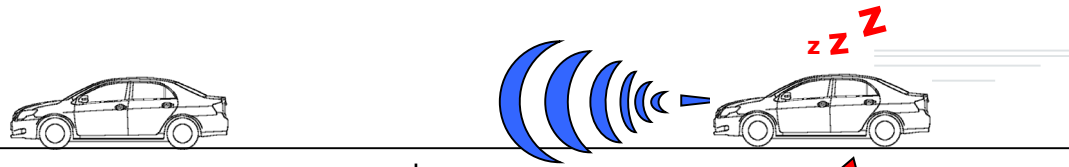
Collision warning:
At the latest 0,8 seconds before
the start of emergency braking

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

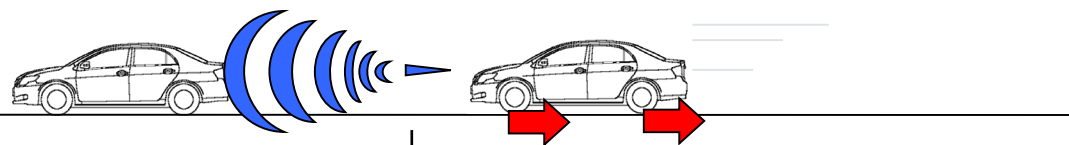
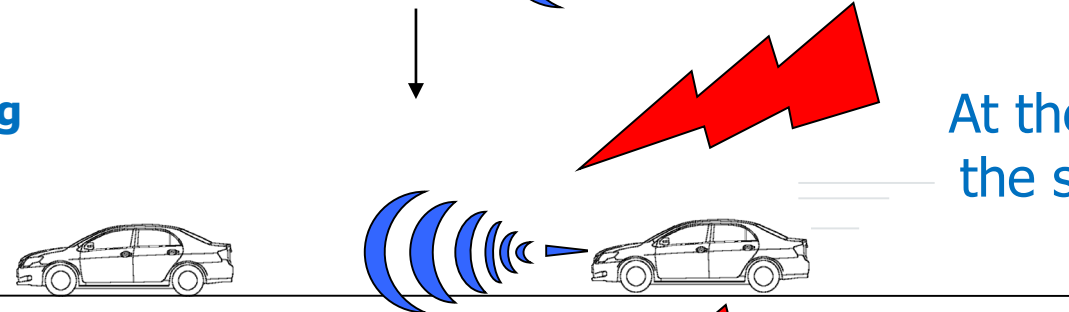
Emergency Braking:
A braking demand of at least 5.0 m/s^2 to
the service braking system of the vehicle

Damage Mitigation or Collision Avoidance

**1st Stage
Collision Warning**



**2nd Stage
Emergency Braking**



Informal Working Group on AEBS for Light Vehicles

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

Collision avoidance for **M1** vehicle:

Stationary: until 40km/h (Laden), until 42km/h (Unladen)

Moving: until 40km/h (Laden), until 42km/h (Unladen)

Collision avoidance for **N1** vehicle:

Stationary: until 38km/h (Laden), until 42km/h (Unladen)

Moving: until 38km/h (Laden), until 42km/h (Unladen)

Maximum relative Impact Speed (km/h) for M1 vehicle

Relative Speed (km/h)	Stationary		Moving	
	Laden	Unladen	Laden	Unladen
10	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00
42	10.00	0.00	-	0.00
45	15.00	15.00	-	-
50	25.00	25.00	-	-
55	30.00	30.00	-	-
60	35.00	35.00	-	-

Maximum relative Impact Speed (km/h) for N1 vehicle

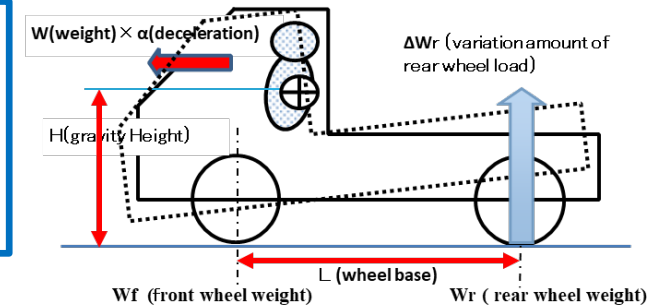
Relative Speed (km/h)	Stationary		Moving	
	Laden	Unladen	Laden	Unladen
10	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00
40	10	0.00	-	0.00
42	15	0.00	-	0.00
45	20.00	15.00	-	-
50	25.00	25.00	-	-
55	35.00	30.00	-	-
60	40.00	35.00	-	-

Informal Working Group on AEBS for Light Vehicles Specifications - Car to car scenario - Speed reduction by braking demand

Collision avoidance for **N1 full cab** vehicle:

Stationary: until 30km/h (Laden), until 35km/h (Unladen)

Moving: until 30km/h (Laden), until 35km/h (Unladen)



$$\Delta W_r \times L = W \times \alpha \times H$$

$$\Delta W_r = \alpha \times W \times \frac{H}{L}$$

Informal document AEBS-07-10(OICA-CLEPA):

N1 full cab vehicle need to limit deceleration at 7m/s for avoiding the rear wheel load.

The light truck must be limit the rear wheel braking force in order to avoid rear wheel locking for the light vehicle.

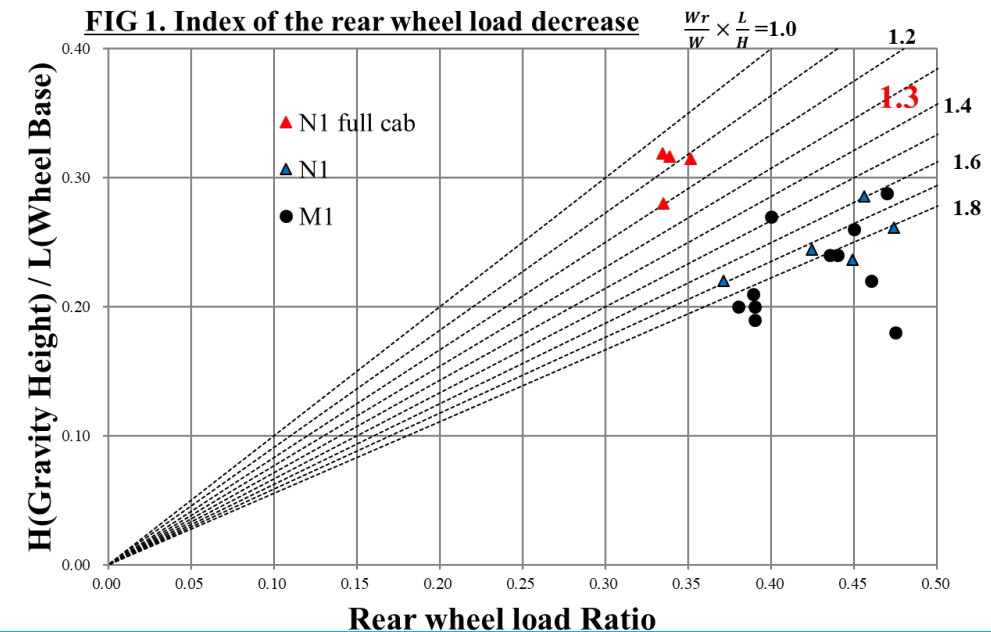
Proposal:

In case of “ $\alpha = \frac{W_r}{W} \times \frac{L}{H} \leq 1.3$ ” $\alpha = 1.3$ means N1 full cab vehicle

Maximum relative impact speed is 35km/h @unladen

Guidance from GRVA

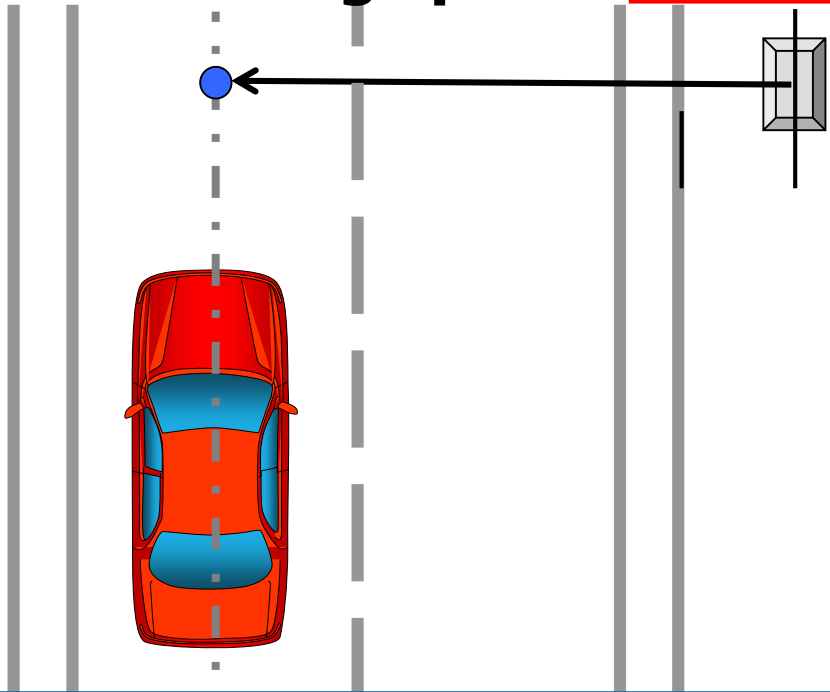
The group discussed this issue.
The requirement of N1 full cab vehicle is open issue.



Informal Working Group on AEBS for Light Vehicles

Specifications - Car to pedestrian scenario – Crossing collision

Walking speed: 5 km/h



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

Collision Warning:

When the AEBS has detected the possibility of a collision with a pedestrian crossing the road at a constant speed of 5 km/h, 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, there shall be a braking demand of at least 5.0 m/s² to the service braking system of the vehicle.

Collision avoidance for **M1** vehicle:

Requirement A : until 30km/h (Laden), until 30km/h (Unladen)

Requirement B : until 40km/h (Laden), until 42km/h (Unladen)

Collision avoidance for **N1** vehicle:

Requirement A : until 30km/h (Laden), until 30km/h (Unladen)

Requirement B : until 40km/h (Laden), until 42km/h (Unladen)

Collision avoidance for **N1 Full Cab** vehicle:

Requirement A : until 20km/h (Laden), until 25km/h (Unladen)

Requirement B : until 30km/h (Laden), until 35km/h (Unladen)

Guidance from GRVA

N1 full cab vehicle are also issues of **Guidance from GRVA.**

IWG discussed two requirements for car to pedestrian.

Guidance from GRVA

There are 2 options.

- (1) Requirement B* apply from 2023.
- (2) Two requirements as step approach
 - Requirement A apply from 2020.
 - Requirement B apply from 2023.

*Difference between the requirement A and B is the volume of speed reduction.

Industry hopes option (2) in order to have more technical development term for the requirement B.

Informal Working Group on AEBS for Light Vehicles

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

Maximum Impact Speed (km/h) for M₁ - second step

<i>Subject vehicle speed (km/h)</i>	<i>Laden</i>	<i>Unladen</i>
20	0.00	0.00
25	0.00	0.00
30	0.00	0.00
35	0.00	0.00
40	0.00	0.00
42	10.00	0.00
45	[15.00]	[15.00]
50	[25.00]	[25.00]
55	[30.00]	[30.00]
60	[35.00]	[35.00]

Maximum Impact Speed (km/h) for N₁ - second step

<i>Subject vehicle speed (km/h)</i>	<i>Laden</i>	<i>Unladen</i>
20	0.00	0.00
25	0.00	0.00
30	0.00	0.00
35	0.00	0.00
40	0.00	0.00
42	10.00	0.00
45	[15.00]	[15.00]–
50	[25.00]	[25.00]
55	[30.00]	[30.00]
60	[35.00]	[35.00]

Guidance from GRVA

Maximum Impact Speed above 45 km/h in 2nd step have a square bracket.

Informal Working Group on AEBS for Light Vehicles Specifications - Car to bicycle scenario

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.

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 several vehicle was tested under EuroNcap in 2018).

Proposal to GRVA

The informal working group agreed to consider Car to Bicycle at a later stage (e.g. 3rd GRVA: September 2019), when more data is available.

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

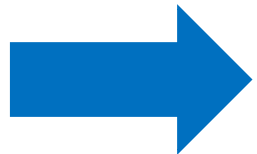
Speed of bicycle: **15 km/h**

Crossing

Same direction

Activation Speed:
The system shall be active at least within the vehicle speed range between 20 km/h and 60 km/h and at all vehicle load conditions

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).



Part of Para. 5.2.1.4.

The system shall not deactivate or drastically change the control strategy in these other conditions. This shall be demonstrated in accordance with Annex 3 of this Regulation.

Informal Working Group on AEBS for Light Vehicles

Test procedure - Targets

Target	ISO Number
Car	ISO 19206-1 (Publication date: 2018-12)
Pedestrian	ISO 19206-2 (Publication date: 2018-12)
Bicycle	ISO/CD 19206-4 (This isn't final version)

**Reference to ISO standards:
The group agreed to refer a
fix version of ISO, and
copy/paste in the regulation
the content of the ISO
standard.**

Guidance from GRVA

Reference of standard:

The group would also need guidance on the way to refer 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).

**Thank you
for your attention**

**IWG meetings 8th meeting in Japan (Tokyo)
(15-16 May 2019)**