

# **Technical Requirements of UN-R 131 Advanced Emergency Braking Systems (AEBS)**

The 56<sup>th</sup> Asia Expert Meeting in Malaysia

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**JAPAN AUTOMOBILE STANDARDS INTERNATIONALIZATION CENTER**

## Introduction

The intention of this Regulation is to establish uniform provisions for Advanced Emergency Braking Systems (AEBS) fitted to motor vehicles of the categories **M<sub>2</sub>, M<sub>3</sub>, N<sub>2</sub> and N<sub>3</sub>** primarily used **under monotonous highway driving conditions**.

The system shall automatically detect a potential forward collision, **provide the driver with a warning and activate the vehicle braking system to decelerate the vehicle** with the purpose of avoiding or mitigating the severity of a collision in the event that the driver does not respond to the warning.

2.1.

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

2.12.

**"Time to collision (TTC)"** means the value of time obtained by dividing the distance between the subject vehicle and the target by the relative speed of the subject vehicle and the target, at an instant in time.

2.8.

**"Collision warning phase"** means **the phase directly preceding the emergency braking phase**, during which the AEBS warns the driver of a potential forward collision.

2.9.

**"Emergency braking phase"** means the phase starting when the AEBS **emits a braking demand for at least 4 m/s<sup>2</sup> deceleration** to the service braking system of the vehicle.

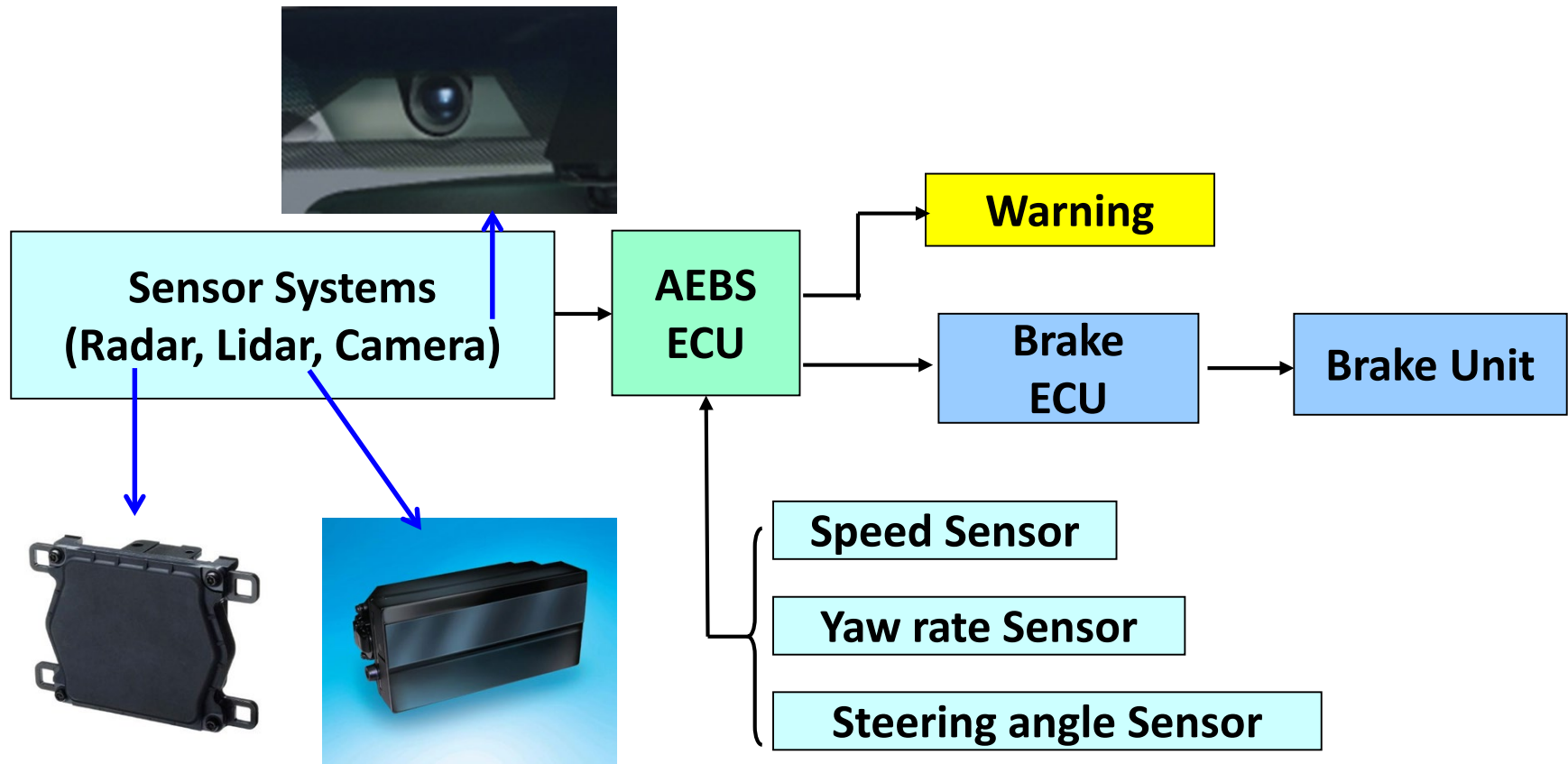
2.5.

**"Moving target"** means a target **travelling at a constant speed** in the same direction and in the centre of the same lane of travel as the subject vehicle.

2.6.

**"Stationary target"** means a target **at standstill** facing the same direction and positioned on the centre of the same test lane of travel as the subject vehicle.

## System Layout



### 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 13 to Regulation No. 13.

**Extract from 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 of Regulation No. 10**

**5.1.3.**

**Conformity with the safety aspects of complex electronic control systems shall be shown by meeting the requirements of Annex 4.**



#### 5.2.1.

The system shall provide the driver with appropriate warning(s) as below:

##### 5.2.1.1.

**A collision warning when the AEBS has detected the possibility of a collision** with a preceding vehicle of category M, N or O in the same lane which is travelling at a slower speed, has slowed to a halt or is stationary having not being identified as moving. The warning shall be as specified in paragraph 5.5.1. above\*/.

#### 5.5.1.

**The collision warning** referred to in paragraph 5.2.1.1. above shall be provided by **at least two modes selected from acoustic, haptic or optical.**

**The timing of the warning signals shall be such that they provide the possibility for the driver to react to the risk of collision and take control of the situation, and shall also avoid nuisance for the driver by too early or too frequent warnings. This shall be tested in accordance with the provisions of paragraphs 6.4.2. and 6.5.2. of this Regulation**

#### 5.2.1.2.

**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. below.**

#### 5.2.1.2.1.

**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.**

#### 5.5.4.

**The failure warning referred to in paragraph 5.2.1.2. above shall be a constant yellow optical warning signal.**

#### 5.2.1.3.

**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. below.

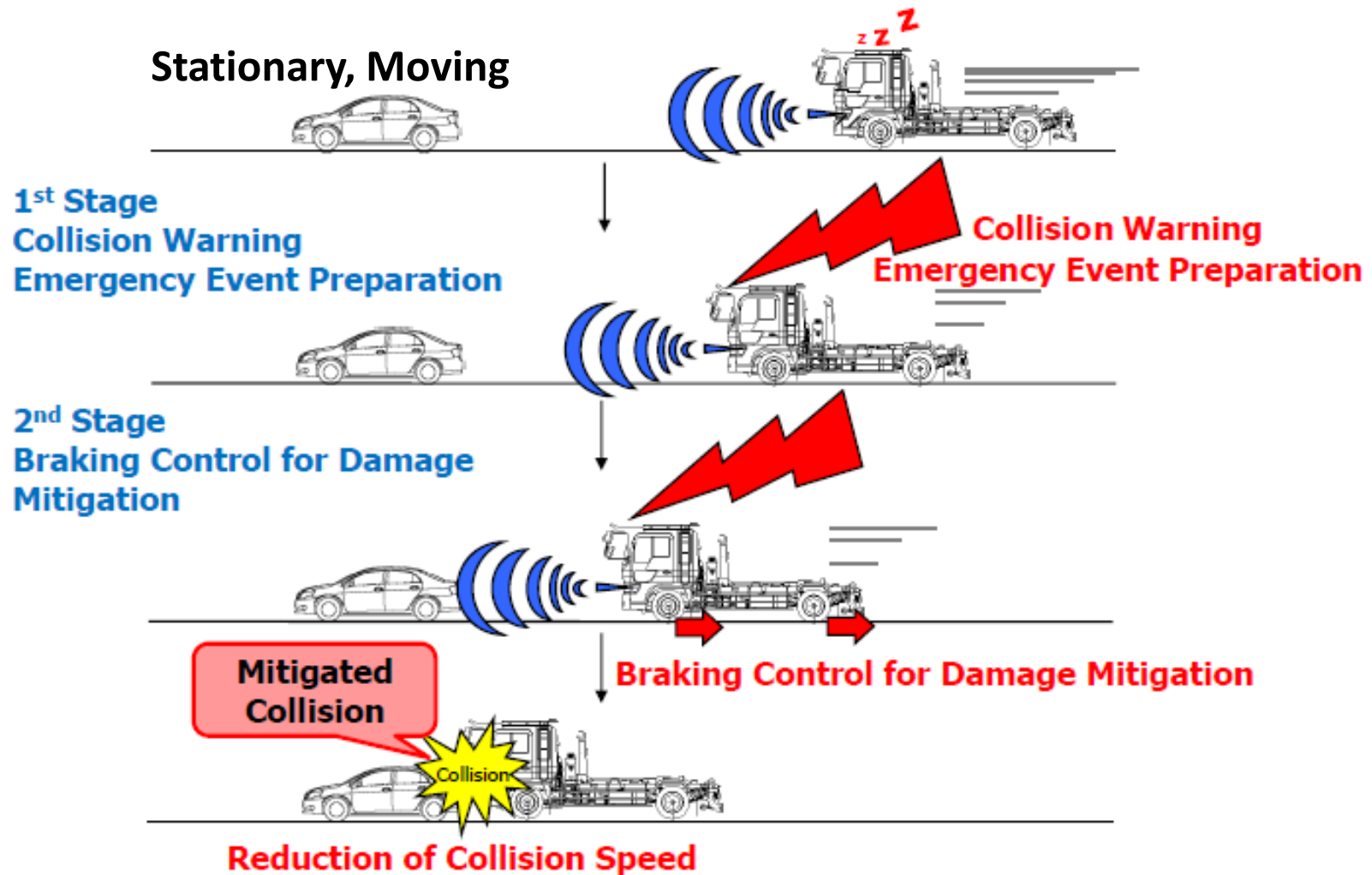
#### 5.4.2.

**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.**

#### 6.4.

Subsequent to the warning(s) of paragraph 5.2.1.1. above, and subject to the provisions of paragraphs 5.3.1. to 5.3.3. below, there shall be **an emergency braking phase having the purpose of significantly decreasing the speed of the subject vehicle.** This shall be tested in accordance with paragraphs 6.4. and 6.5. of this Regulation.

### 3. Performance requirements



# 3. Performance requirements

A	B	C	D	E	F	G	H	Row
	Stationary target			Moving target				
	Timing of warning modes		Speed reduction	Timing of warning modes		Speed reduction	Target speed	
	At least 1	At least 2		At least 1	At least 2			
$M_3^1$ $N_2^2 > 8\text{ t}$ and $N_3$	Not later than 1.4 s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	Not less than 20 km/h	Not later than 1.4 s. before the start of emergency braking phase	Not later than 0.8 s. before the start of emergency braking phase	No impact	$12 \pm 2\text{ km/h}$	1
$N_2 \leq 8\text{ t}^2$ , and $M_2^{2,4}$	Not later than 0.8 s before the start of the emergency braking phase	Before the start of the emergency braking phase <sup>3</sup>	Not less than 10 km/h	Not later than 0.8 s before the start of the emergency braking phase	Before the start of the emergency braking phase <sup>5</sup>	No impact	$67 \pm 2\text{ km/h}^5$	2

- 1 Vehicles of category M3 with hydraulic braking system are subject to the requirements of row 2.**
- 2 Vehicles with pneumatic braking systems are subject to the requirements of row 1.**
- 3 Values shall be specified by the vehicle manufacturer at the time of Type Approval (Annex 1, paragraph 15.).**
- 4 Manufacturers of vehicles covered by row 2 may elect to gain vehicle Type Approval to the values specified in row 1; in this instance compliance shall be demonstrated with all the values contained in row 1.**
- 5 The values for the target speed in cell H2 shall be reviewed before 1st November 2021.**



#### 5.2.3.

The system **shall be active at least within the vehicle speed range of 15 km/h up to the maximum design speed** of the vehicle, and **at all vehicle load conditions**, unless manually deactivated as per paragraph 5.4. below.

#### 5.4.

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.

Thank you!