Submitted by the expert from Japan

Informal document **AEBS-13-XX**
12th AEBS IWG, 25-26 June 2020
Agenda item False reaction scenario

Proposal for amendments to false reaction avoidance of UN Regulation 152

I. Proposal

Remove existing scenarios of false reaction avoidance:

~~1. Vehicle Target~~

~~1.1. Two stationary vehicles. of Category M_1 AA saloon shall be positioned:~~

~~(a) So as to face in the same direction of travel as the subject vehicle;~~

~~(b) With a distance of 4.5m (with a tolerance of +0.2/-0.0 m) between them;~~

~~(c) With the rear of each vehicle aligned with the other.~~

~~1.2. The subject vehicle shall travel for a distance of at least 60 m. at a constant speed in the range of speeds listed in the Table of paragraph 5.2.1.4. of this Regulation to pass centrally between the two stationary vehicles.~~

~~During the test there shall be no adjustment of any subject vehicle control other than slight steering adjustments to counteract any drifting.~~

~~1.3. The AEBS shall not provide a collision warning and shall not initiate the emergency braking.~~

~~2. Pedestrian Target~~

~~2.1. A pedestrian target as prescribed in 6.3.2. shall be positioned:~~

~~(a) So as to face in the same direction of travel as the subject vehicle.~~

~~(b) With a distance of 1 m (with a tolerance of +0.2/-0.0 m) from the subject vehicle side closest to the target toward the side in the direction of traffic.~~

~~2.2. The subject vehicle shall travel in a straight line for a distance of at least 60 m. at a constant speed in the range of speeds listed in the Table of paragraph 5.2.2.4. to pass the stationary pedestrian target.~~

~~During the test there shall be no adjustment of any subject vehicle control other than slight steering adjustments to counteract any drifting.~~

~~2.3. The AEBS shall not provide a collision warning and shall not initiate the emergency braking.~~

~~3. Bicycle Target~~

~~3.1. A bicycle target as prescribed in 6.3.3. shall be positioned:~~

~~(a) So as to face in the same direction of travel as the subject vehicle.~~

~~(b) With a distance of 1 m (with a tolerance of +0.2/ 0.0 m) from the subject vehicle side closest to the target toward the side in the direction of traffic.~~

~~3.2. The subject vehicle shall travel in a straight line for a distance of at least 60 m. at a constant speed in the range of speeds listed in the Table of paragraph 5.2.3.4. to pass the stationary bicycle target.~~

~~During the test there shall be no adjustment of any subject vehicle control other than slight steering adjustments to counteract any drifting.~~

~~3.3. The AEBS shall not provide a collision warning and shall not initiate the emergency braking.~~

*Insert **new** scenarios of false reaction avoidance, to read:*

"**The following scenarios shall be used as a guidance to assess the system's strategies implemented in order to minimize the generation of false alarms. ~~the tool in order to share technical information which clarifies behaviour and the safety concept of the system between the Technical Service and the vehicle manufacturer.~~ For each type of scenario the vehicle manufacturer shall explain the principle strategies implemented to ensure safety. ~~In each scenario, the vehicle manufacturer shall show the Technical Service how the system behaves safely by demonstrating at least one of the scenarios, and also by providing the documentation of the remaining scenarios. So, these scenarios don't have specific pass / fail criteria.~~**

The manufacturer shall provide evidence (e.g. simulation results, real-world test data, track test data) of the system's behaviour in the described types of scenarios. The parameters described in subparagraph 2 of each scenario shall be used as guidance if the Technical Service deems a demonstration of the scenario necessary [due to a lack of other evidence].

Scenario 1: Left turn or Right turn at the intersection

1.1. In this scenario, the subject vehicle passes by a left turn or right turn in front of an oncoming vehicle that is stopped to make a left turn or right turn at an intersection.

1.2. An example of the detail scenario:

The subject vehicle drives at a speed of 30 km/h (with a tolerance of +0/-2 km/h) toward the intersection, and decelerates by braking to a speed of not less than 16 km/h at a point where the subject vehicle begins to steer left / right, and the TTC to the oncoming vehicle is not more than 2.8 seconds. When the subject vehicle turns left or right in the intersection, the speed is reduced to not less than 10 km/h, and then drives at a constant speed. The TTC to the oncoming vehicle is not

more than 1.7 seconds at when the wrap ratio between the subject vehicle and the oncoming vehicle becomes 0%.

Scenario 2: Right turn or Left turn of a forward vehicle

2.1. **In this scenario, the subject vehicle follows a forward vehicle. After that, the forward vehicle turns right or left at a corner, and the subject vehicle goes straight.**

2.2. **An example of the detail scenario:**

Both the forward vehicle and the subject vehicle drive at a speed of 40 km/h (with a tolerance of +0/-2 km/h) on the straight road. The forward vehicle decelerates by braking to a speed of 10 km/h (with a tolerance of +0/-2 km/h) in order to turn right or left at the corner, and the subject vehicle also decelerates by braking to keep appropriate distance with the forward vehicle. At when the forward vehicle begins to turn right or left, the speed of the subject vehicle is not less than 26 km/h and the TTC to the frontal vehicle is not more than 4.7 seconds. After that, the subject vehicle decelerates to a speed of not less than 20 km/h, and then drives at a constant speed. The TTC to the forward vehicle is not more than 2.5 seconds at when the wrap ratio between the subject vehicle and the oncoming vehicle becomes 0%.

Scenario 3: Curved road with guard pipes and a stationary object

3.1. **In this scenario, the subject vehicle drives a small radius curved road of which the guard pipes are constructed to the outer side, and a stationary vehicle (M1 category), a stationary pedestrian target or a stationary bicycle target is positioned just outside of the guard pipes and where on the extension of the centre of the lane.**

3.2. **An example of the detail scenario:**

The subject vehicle drives at a speed of 30 (with a tolerance of +0/-2 km/h) km/h toward the curve of which the radius is not more than 25 m at the outer side of the road, and decelerates by braking to a speed of not less than 22 km/h at a point where the subject vehicle enters the curve. The TTC to the stationary object is not more than 1.6 seconds at when the subject vehicle begins to turn in the curve. In the curve, the subject vehicle drives outer lane than the centre of the road. After that, the subject vehicle continue to turn in the curve at a constant speed of not less than 21 km/h. The TTC to the stationary object is not more than 1.1 second at when the wrap ratio between the subject vehicle and the stationary vehicle becomes 0%, or at when the offset ratio* between the subject vehicle and the centre of the stationary pedestrian target or the stationary bicycle target becomes -100%.

***offset ratio between the subject vehicle and the stationary object is calculated by the following formula.**

$$R_{offset} = L_{offset} / (0.5*W_{vehicle}) * 100$$

R_{offset} : Offset ratio [%]

L_{offset} : Amount of offset between the centre of the subject vehicle and the centre of the stationary object, and the direction of offset to the driver's seat side is defined as plus (+) [m]

$W_{vehicle}$: Width of the subject vehicle [m]

Scenario 4: Lane change due to road construction

4.1. **In this scenario, the subject vehicle changes the lane in front of the signboard which is positioned in the centre of the lane and notifies the driver that the lane is reduced.**

4.2. **An example of the detail scenario:**

The subject vehicle drives a straight road at a speed of 40 km/h (with a tolerance of +0/-2 km/h), and begins to steer in order to change the lane in front of the signboard which notifies reducing the lane. No other vehicles approach the subject vehicle. The TTC to the signboard is not more than 4.2 seconds at when the subject vehicle begins to steer. During changing the lane, the speed of the subject vehicle is constant, and the TTC to the signboard is not more than 3.3 seconds at when the offset ratio between the subject vehicle and the centre of the signboard becomes -100%.

II. Justification

1. The False Reaction scenarios in Annex 3-Appendix 2 were based on R131 (trucks in highways), and it was not verified sufficiently whether they are appropriate for passenger cars. Therefore, Japan proposes some additional or amendment scenarios in the Appendix.

2. The above scenarios are based on the traffic scenes where it is possible for passenger cars to encounter on public roads.

3. In the above scenarios, the subject vehicle speed and TTC to the related objects are based on the average values of the basic research which was carried out by Japan in order to measure data of driving behaviour of normal drivers.

4. The False Reaction scenarios shall be used as the tool in order to share technical information which clarifies behaviour and the safety concept of the system between the Technical Service and the manufacturer. The safety concept to the False Reaction is different in each vehicle manufacturer, therefore, simple and appropriate pass / fail criteria cannot be defined according to new technologies in the future.

5. The vehicle manufacturer shall demonstrate at least one of the above scenarios to the Technical Service, and the other scenarios which are not chosen for the demonstration shall be covered by the documentation.