

# AEBS-HDV-07 industry prep

AEBS-HDV-07

October 26-28, 2021

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- Tests
- Transitional provisions

# Requirements

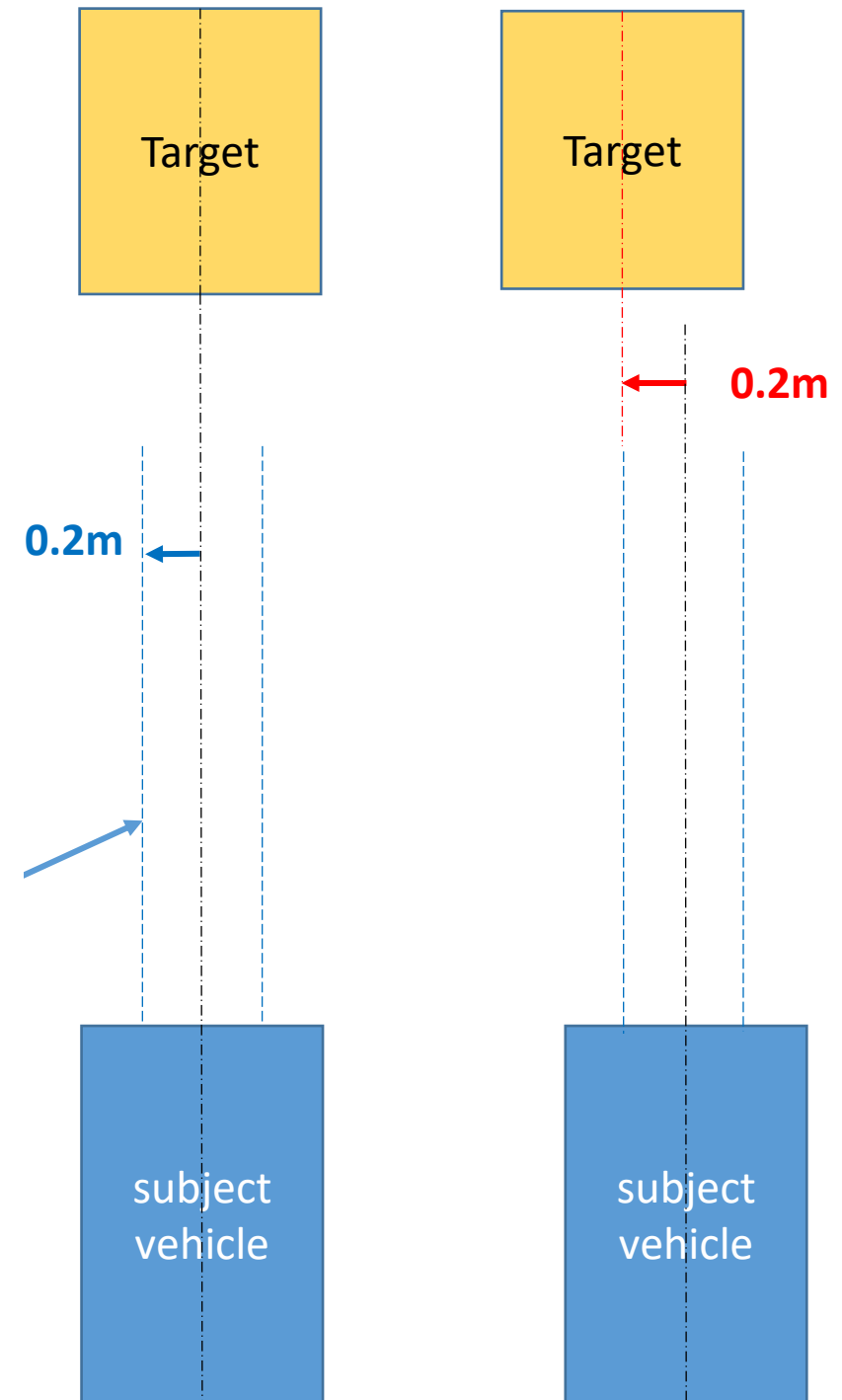
# Vehicle longitudinal centre planes (offset) Interpretation

## Requirement section:

- (d) In situations where ~~the vehicle longitudinal centre planes are the anticipated impact point~~ is displaced by **not more than 0.2 m** compared to the vehicle longitudinal centre plane;

## Test section:

- 6.5 The subject vehicle and the moving target shall travel in a straight line, in the same direction, for at least two seconds prior to the functional part of the test. with a subject vehicle to target centreline offset of **not more than 0.2m**.



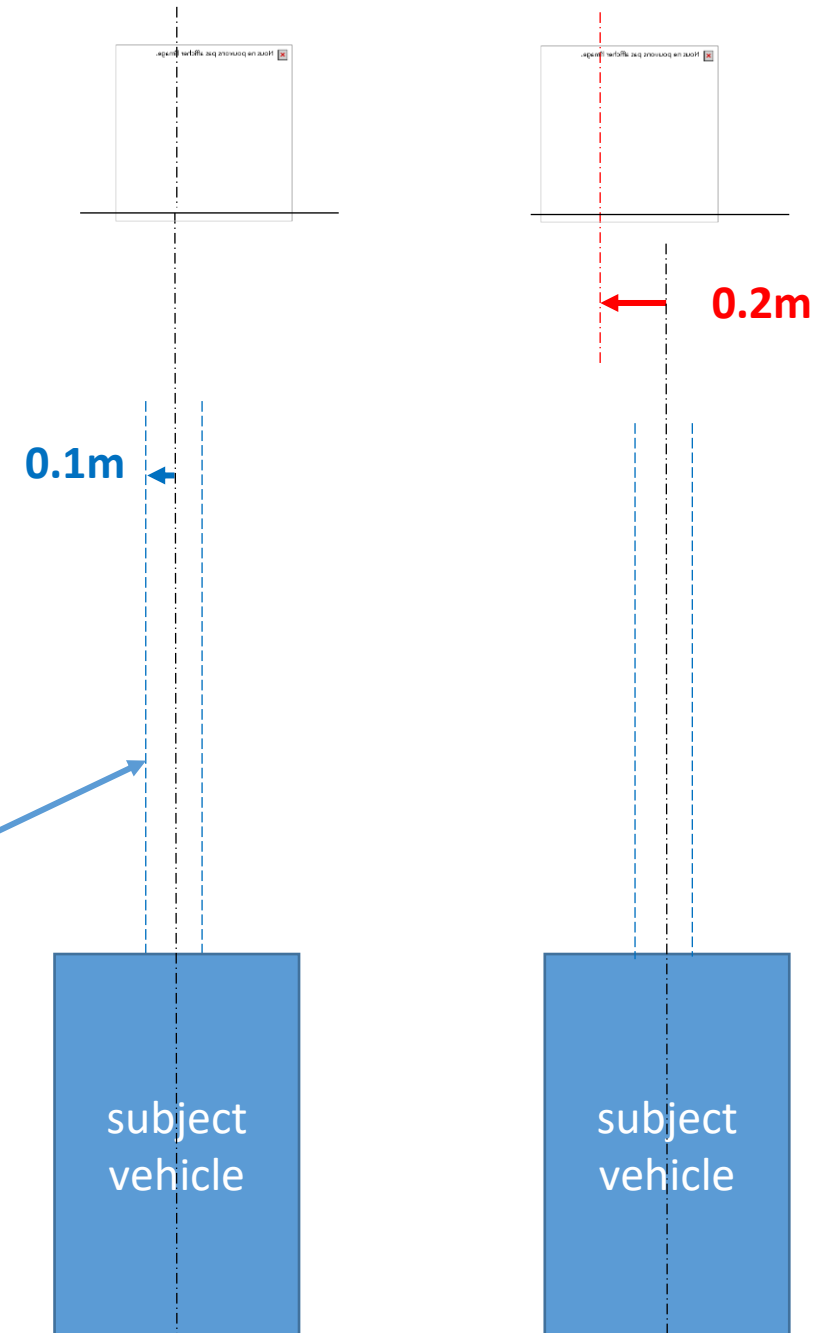
# Vehicle longitudinal centre planes (offset) Interpretation

## Requirement section:

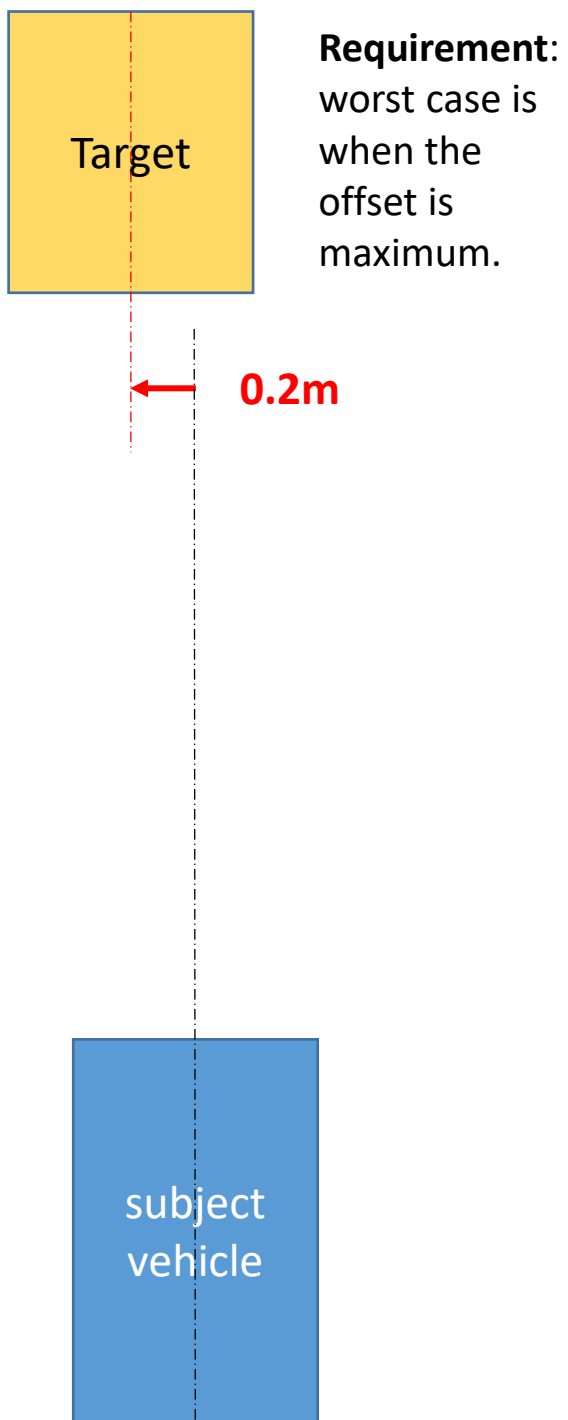
- (e) In situations where the anticipated impact point is displaced by **not more than 0.2 m** compared to the vehicle longitudinal centre plane;

## Test section:

- 6.6.1. The subject vehicle shall approach the impact point with the pedestrian target in a straight line for at least two seconds prior to the functional part of the test with an anticipated subject vehicle to impact point centreline offset of **not more than 0.1 m**.



*During the test,  
the vehicle shall  
stay within a  $\pm$   
0.1m corridor*

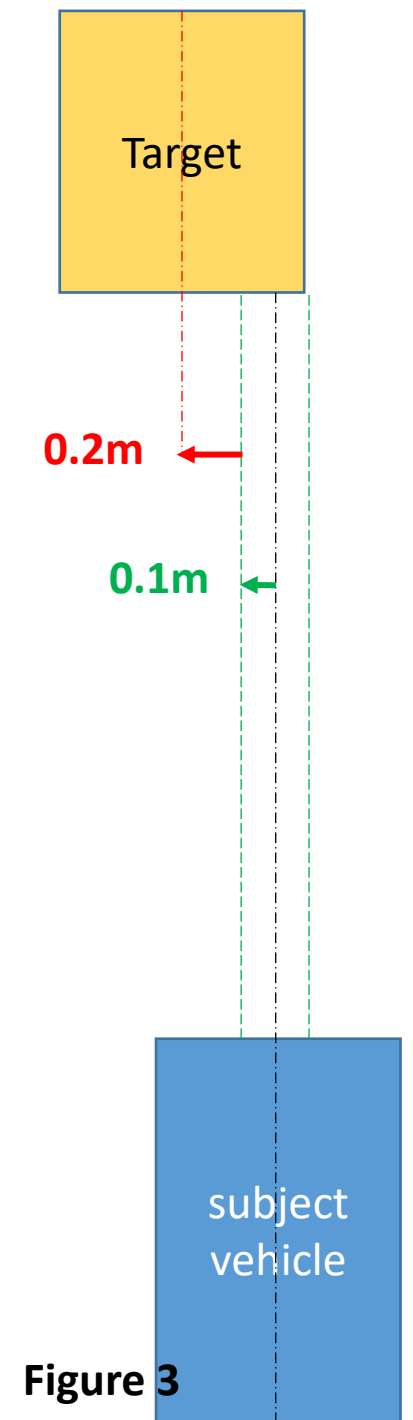
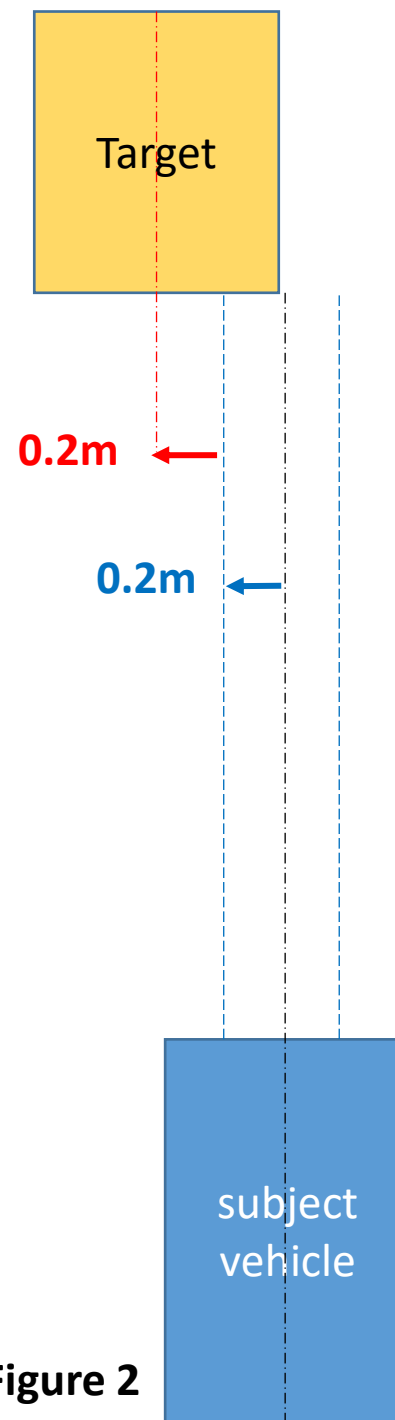
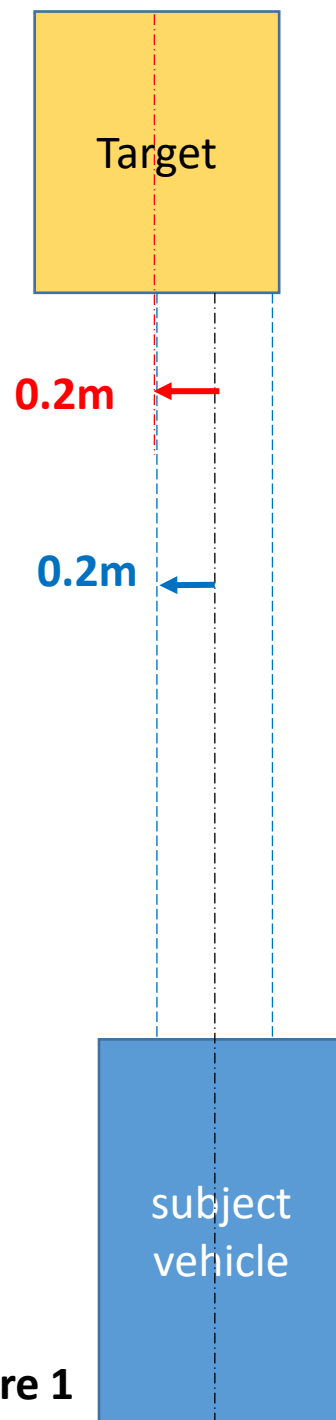


**Test:**  
during the test, the vehicle has to remain in a +/- 0.2m corridor.

**Question 1:**  
Should the corridor be placed like on figure 1 or 2 ?

With figure 2, the actual requirement is increased by the test tolerances...

**Question 2:**  
If the actual tolerance of the test equipment is 0.1m (and not 0.2m), would figure 3 then be the right way?



# AEBS deactivation

## Proposal:

[5.4.1.4. It shall not be possible to manually deactivate the AEBS at a speed above 10 km/h. However this requirement does not apply when the AEBS is automatically reinstated after a cumulated time of 10 minutes above 70km/h.]

## Justification:

- There are situations where the driver must be able to deactivate the AEBS while driving, e.g. a coach driving uphill in serpentines (to a ski resort or so), construction areas on highways (narrow lanes, cross opened guardrails to drive on the other side of the motorway).
- Deleting this possibility may “invite” drivers to deactivate the function earlier than really needed (which may then be counter-productive about safety).
- The proposal here is an attempt to find a compromise, by adding an alternative.



### First alternative (original):

- No possible deactivation above 10km/h.
- Permanent deactivation until next power-on.



### Second alternative (new):

- Possible deactivation at any speed, provided:
- The deactivation lasts not more than 10 minutes above 70kph. This addresses the risk of driving on the motorway w/o AEBS activated.

Tests



# V2C - M2 M3 N2 N3 - Pneumatic Braking



Avoid too high speed for the target

Collision speed

| Target | 0  | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|--------|----|----|----|----|----|----|----|----|----|----|-----|
| 10     | 0  |    |    |    |    |    |    |    |    |    |     |
| 20     | 0  | 0  |    |    |    |    |    |    |    |    |     |
| 30     | 0  | 0  | 0  |    |    |    |    |    |    |    |     |
| 40     | 0  | 0  | 0  | 0  |    |    |    |    |    |    |     |
| 50     | 0  | 0  | 0  | 0  | 0  |    |    |    |    |    |     |
| 60     | 0  | 0  | 0  | 0  | 0  | 0  |    |    |    |    |     |
| 70     | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |    |     |
| 80     | 28 | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |    |     |
| 90     | 42 | 28 | 0  | 0  | 0  | 0  | 0  | 0  | 0  |    |     |
| 100    | 54 | 42 | 28 | 0  | 0  | 0  | 0  | 0  | 0  | 0  |     |

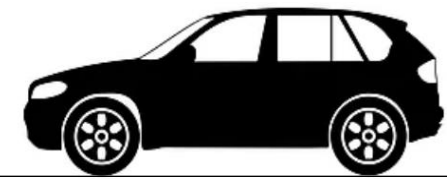
Green = collision avoidance  
Yellow = collision mitigation

2 tests at intermediate speed for checking "robustness"

2 tests at the highest avoidance speed (stationary and moving targets)

**N**  
**M**

Avoid tests with collision or with highest speeds (risks for the test drivers and for the equipment, issue with availability of tracks with appropriate length)



# V2C - M2 M3≤8t N2 ≤8t - Hydraulic braking (vehicles derived from M1 N1)

Avoid too high speed for the target

Collision speed

| Target<br>Subject | 0  | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|-------------------|----|----|----|----|----|----|----|----|----|----|-----|
| 10                | 0  |    |    |    |    |    |    |    |    |    |     |
| 20                | 0  | 0  |    |    |    |    |    |    |    |    |     |
| 30                | 0  | 0  | 0  |    |    |    |    |    |    |    |     |
| 40                | 0  | 0  | 0  | 0  |    |    |    |    |    |    |     |
| 50                | 0  | 0  | 0  | 0  | 0  |    |    |    |    |    |     |
| 60                | 25 | 0  | 0  | 0  | 0  | 0  |    |    |    |    |     |
| 70                | 37 | 25 | 0  | 0  | 0  | 0  | 0  |    |    |    |     |
| 80                | 49 | 37 | 25 | 0  | 0  | 0  | 0  | 0  |    |    |     |
| 90                | 60 | 49 | 37 | 25 | 0  | 0  | 0  | 0  | 0  |    |     |
| 100               | 71 | 60 | 49 | 37 | 25 | 0  | 0  | 0  | 0  | 0  |     |

Green = collision avoidance  
Yellow = collision mitigation

Avoid tests with collision or with highest speeds (risks for the test drivers and for the equipment, issue with availability of tracks with appropriate length)

# V2C - M2 M3 ≤ 8t N2 ≤ 8t - Hydraulic braking (vehicles not derived from M1 N1)



Avoid too high speed for the target

Collision speed

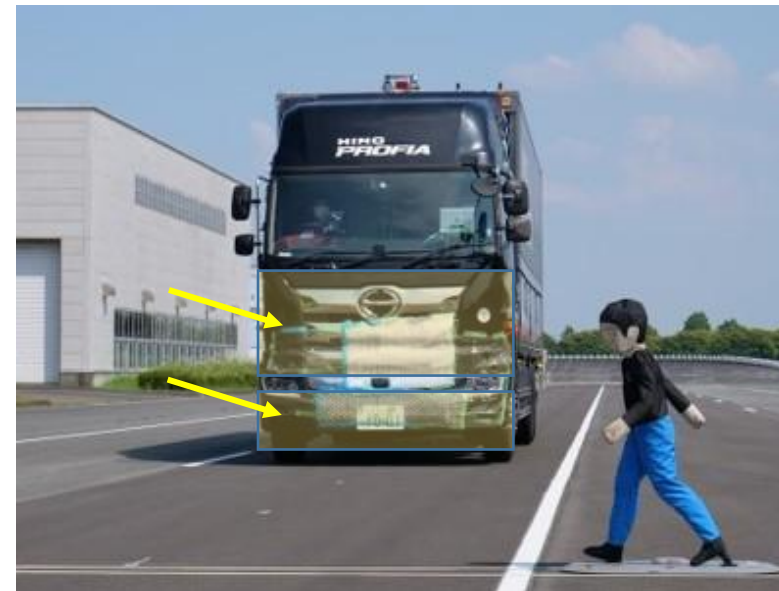
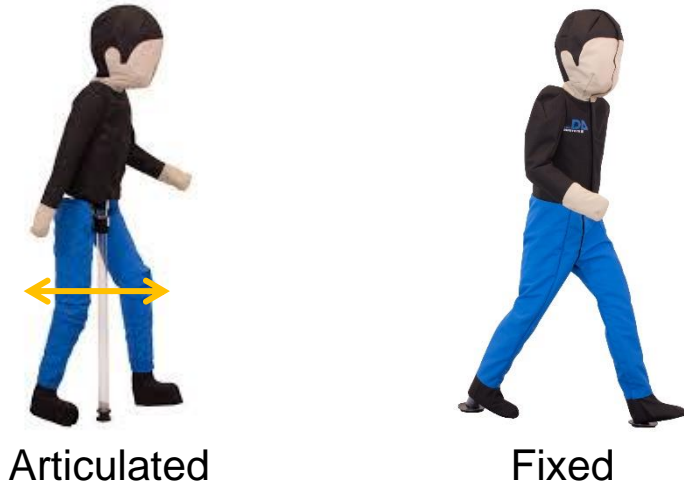
| Target<br>Subject | 0  | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|-------------------|----|----|----|----|----|----|----|----|----|----|-----|
| 10                | 0  |    |    |    |    |    |    |    |    |    |     |
| 20                | 0  | 0  |    |    |    |    |    |    |    |    |     |
| 30                | 0  | 0  | 0  |    |    |    |    |    |    |    |     |
| 35                | 0  | 0  | 0  | 0  |    |    |    |    |    |    |     |
| 40                | 15 | 0  | 0  | 0  | 0  |    |    |    |    |    |     |
| 50                | 28 | 15 | 0  | 0  | 0  | 0  |    |    |    |    |     |
| 60                | 40 | 28 | 15 | 0  | 0  | 0  | 0  |    |    |    |     |
| 70                | 50 | 40 | 28 | 15 | 0  | 0  | 0  | 0  |    |    |     |
| 80                | 61 | 50 | 40 | 28 | 15 | 0  | 0  | 0  | 0  |    |     |
| 90                | 71 | 61 | 50 | 40 | 28 | 15 | 0  | 0  | 0  | 0  |     |
| 100               | 82 | 71 | 61 | 50 | 40 | 28 | 15 | 0  | 0  | 0  | 0   |

Green = collision avoidance  
Yellow = collision mitigation

Avoid tests with collision or with highest speeds (risks for the test drivers and for the equipment, issue with availability of tracks with appropriate length)

# V2P

- **Rationale:** non destructive tests are a must, given the number of approvals needed to cover a HDV range (see slides 5 to 10 of document AEBS-HDV-SP-02-04), and the very high cost of an articulated dummy. Collisions should be avoided during the test procedure.
- **Proposals**
  1. The performance requirement is specified with an articulated dummy. This should not be changed. However, the manufacturer should be allowed to use a fixed dummy instead of an articulated one, to limit damaging risks. Using a fixed dummy is acceptable since it is a worse case than testing with an articulated one.
  2. The add-on of a protection in front of the vehicle should be allowed to protect the target in case of a collision.
  3. Avoid testing at speed above the required avoidance speed. See next slide. Unlike with passenger cars, the dummy will be overran by trucks/buses, thus more likely to be destroyed.



# V2P

| Relative Speed (km/h) | $M_2N_2, M_3 < 8t$ with hydraulic brake |  |  | $M_3N_3$ (without $M_3 < 8$ ton with hydraulic brake) |
|-----------------------|---|--|--|---|
|                       | Vehicle derived from $M1/N1$            | Vehicle derived from $M3/N3$ & pneumatic brake | Vehicle derived from $M3/N^{**}3$ & hydraulic brake, $M_3$ & hydraulic brake |   |
| 20                    | <b>0</b>                                | <b>0</b>                                       | <b>0</b>   | <b>0</b>  |
| 26                    | <b>0</b>                                | <b>13</b>                                      | <b>13</b>  | <b>13</b>   |
| 30                    | <b>11</b>                               | <b>18</b>                                      | <b>18</b>  | <b>18</b>   |
| 40                    | <b>24</b>                               | <b>29</b>                                      | <b>29</b>  | <b>29</b>   |
| 50                    | <b>35</b>                               | <b>39</b>                                      | <b>39</b>  | <b>39</b>   |
| 60                    | <b>46</b>                               | <b>49</b>                                      | <b>49</b>  | <b>49</b>   |

Test equipment should be protected from collisions by limiting the tests to speed where the collision is avoided.

# False reaction tests

## Rationale

- The false reaction scenarios and the specific parameter values (speed, TTC...) associated to each scenario have been defined for passenger cars.
- Such scenario and values are not available for HDVs. Defining them would require a huge test campaign which may delay the delivery of the final text, knowing HDVs experience and availability of city-AEB is 'rather poor'.
- Industry does not believe that a unique value can fit to all HDVs, from N2 4t to 40 or 76t heavy combination, which is adding complexity.
- A trimming of robustness should not lead to a degradation of the intended function. Robustness against unintended system reaction has to be realized by each manufacturer but not by regulation if no imminent danger for traffic participants is expected.

## Proposal:

- Delete scenarios coming from R152 and install instead the false reaction test as per current R131.

### **Current R131**

#### **6.8. False reaction test**

- 6.8.1. Two stationary vehicles of category M1 ~~AA-saloon~~ or alternatively a "soft target" representative of a passenger vehicle according to ISO 19206-3:2021, shall be positioned:
- (a) So as to face in the same direction of travel as the subject vehicle,
  - (b) With a distance of 4.5 m between them ,
  - (c) With the rear of each vehicle aligned with the other.
- 6.8.2. The subject vehicle shall travel for a distance of at least 60 m, at a constant speed of  $50 \pm 2$  km/h 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.
- 6.8.3. The AEBS shall not provide a collision warning and shall not initiate the emergency braking phase.

# Transitional provisions

# Transitional provisions

- Industry is not able today to provide transition provisions firm dates, given all discussions around the requirements and tests are not yet completed.
- However, we can provide preliminary input to the IWG.



# Transitional provisions

Comparison of the situations on Passenger cars vs HDVs

- On passenger cars, first **City-AEB** appeared on the market around 2010, while a majority of car models does have today pedestrian (TBC) collision avoidance available.
- The situation is quite different on HDVs: around 2010, first **highway-AEB** appeared on the market, while only very few vehicles are currently available with pedestrian collision avoidance. Due to this lack of experience, implementing city-AEB and pedestrian collision is a bigger technical challenge for HDVs.
- The challenge is also increased by some specificities to HDVs:
  - Higher complexity of HDV vehicle ranges (see see slides 5 to 10 of document AEBS-HDV-SP-02-04), i.e. more installation, integration, V&V tests, approvals...
  - Sensor sets / EE platform being currently fully re-developed to fulfil for example new UN measures for VRUs (BSIS and MOIS regulations); industry cannot modify again Sensor sets / EE platform within a short period after start of production
  - Direct vision new requirements are also addressing VRUs protection and may impact the installation of sensors in cab, thus some new developments and approvals/extensions if the different application dates are not synchronized in a proper way
  - Some technical challenges like e.g. relative chassis-cab movement.

**Implementing city-AEB and pedestrian collision is a bigger technical challenge for HDVs, thus industry expects similar / longer TPs than those defined in M1 N1.**

# Transitional provisions

- Reminder of R152 transitional provisions :

- **Series 00**

- No TPs defined.
- Application dates of the different CPs mandating AEBS M1N1 could be a source for discussion.

- **Series 01**

- Entry into force                      1 September 2020
- New types                                      1 May 2024                      (~4 years)
- New Registration                      1 May 2026                      (~6 years)

**Implementing city-AEB and pedestrian collision is a bigger technical challenge for HDVs, thus industry expects similar / longer TPs than those defined for M1 N1.**