AEBS-11 – Industry Input

AEBS-11 – Car 2 Bicycle provisions

Industry proposal for bicyclist decelaration to be taken into account for AEB C2B performance:

State of the art:

<u>Maximum</u> deceleration of bicycle brake systems ranges from 2,5m/s² to 7,9m/s²

Brake System	Maximum deceleration in m/s²
back pedal brake / coaster brake (rear wheel, 300N applied)	1,8…2,5
side pull brake / L shaped brake (race bike)	3,9…4,0
V brake	3,9…4,2
hydraulic calliper brake	3,9…7,0
mechanical disc brake	4,0…7,9

from about 5m/s² risk of flip-over

<u>Minimum</u> required brake performance on test bench based on DIN/EN ranges from 3,4m/s² to 4,2m/s²

Bicycle type	Minimum deceleration in m/s² (front wheel, dry)
City Bike, Trekking Bike (DIN EN 14764)	3,4
Race Bike (DIN EN 14781)	4,2
Mountain Bike (DIN 14766)	4,2

Source: „Tabellenbuch Fahrradtechnik“, 3. Edition 2014

Industry proposes to use 5m/s² as reference for a typical value of a bicycle braking deceleration

Deceleration of the AEBS vehicle for speed reduction computation in Car2Bicycle scenarios

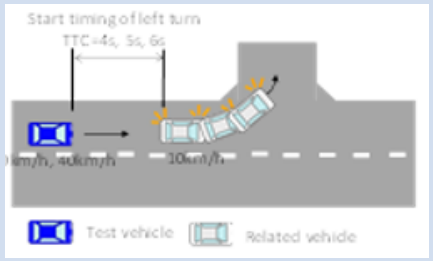
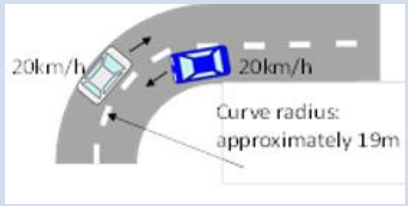
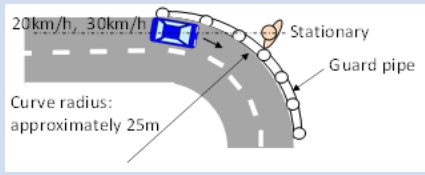
- Scope of this Regulation is M1 and N1 vehicles
- Especially, but not only, not all N1 vehicles will be able to achieve a deceleration of 9m/s^2, even more so when the vehicle is at its maximum load
- For the Car2Bicycle scenario, compensation of a lower deceleration might not be possible, e.g. like braking earlier, because this would likely increase false positives.

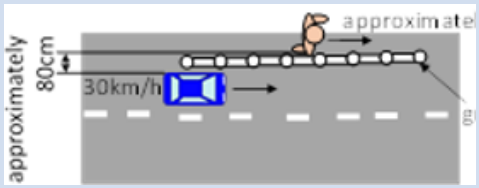
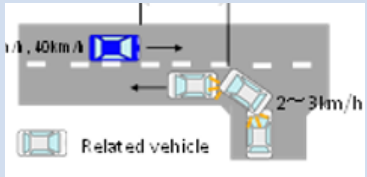
AEBS-11 – False Reaction Avoidance

Priciples to be reflected when discussing false reaction avoidance

- There is a natural trade off between false reaction avoidance and collision avoidance performance
- We must differentiate between scenarios where there is absolutely no risk of an imminent collision and those, where a collision could be imminent if the situation changed slightly. (sensor based vs. situation based)
- We must be aware, that environmental perception and situation awareness is different for a real human driver and a sensor system.
- With regard to Regulation, only false braking should be of relevance, not false warnings, because whether a warning is justified or not is very subjective.
- For clear pass fail criteria the situation needs to be described in very much detail (see following slide)

Relevant parameters to assess a situation

Scenario	1	2	3	4
				
Relevant parameters	• Trajectory of VUT? • Lane width? • Position of the VUT before and after turning ➔ lat. position from VUT and Target? • Position of the stationary target (in the intersection), angle of the stationary vehicle? • v_constant?	• Position of the VUT in the lane? • Lane width? • Trajectory of the GVT • v_VUT and v_GVT constant? • Initial condition?	• Position of the vehciles (Targets and objects)? • Inner and outer radius? • Trajectory of the vehicle? • Meeting point of GVT and target?	• Position of the vehicle (Targets and objects)? • Detailed description of „guard pipe“? • Adult dummy (ISO19206-2)? • Position of the stationary (+ viewing direction)?

Scenario	5	6	7
			
Relevant parameters	• Description of the guard pipe • Adult dummy (19206-2)? • Position of the guard pipe to the vehicle or to the pedestrian • Tolerances (only positive ones)?	• Material of the signs? • Dimension of the material/signs? • Position of the material? • Trajectory of the VUT (v_lat, radius,…) • Position of the VUT in the lane • Lane width • Use of Indicator? • Physical limitation (steering at 0,8s)?	Trajectory of the target? • Lat. distance of VUT and GVT? • Position of the VUT in the lane? • Final position of the GVT in the lane?

AEBS-11 – Other items

Clarification regarding unsuitable vehicle configuration (e.g. ESP deactivated) as automatic deactivation:

Current wording:

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.

Industry position:

- **Automatic deactivation of the AEBS** may be the result of an **unsuitable vehicle configuration or operating condition**.
- This configuration can be caused by **external influences or certain driver actions**.
- As long as the **intention of the driver action was not to deactivate the AEBS**, but this **deactivation comes as a side effect due to safety constraints**, this should be considered an **automatic deactivation because the system automatically responds to the given situation**.

Example:

Action by the Driver: Driver deactivates the Electronic Stability Control

Effect on the vehicle: If the vehicle was in a mu-split braking situation, the vehicle might become unstable.

Consequence for the AEBS: The AEBS will deactivate automatically as long as this condition exists and indicate the unavailability to the driver. because the risk of an intervention could be greater than the potential safety benefit.

If this understanding is acceptable, it should be clarified and added as an example in par. 5.4.2. in order to give guidance to the Technical Secvices.