

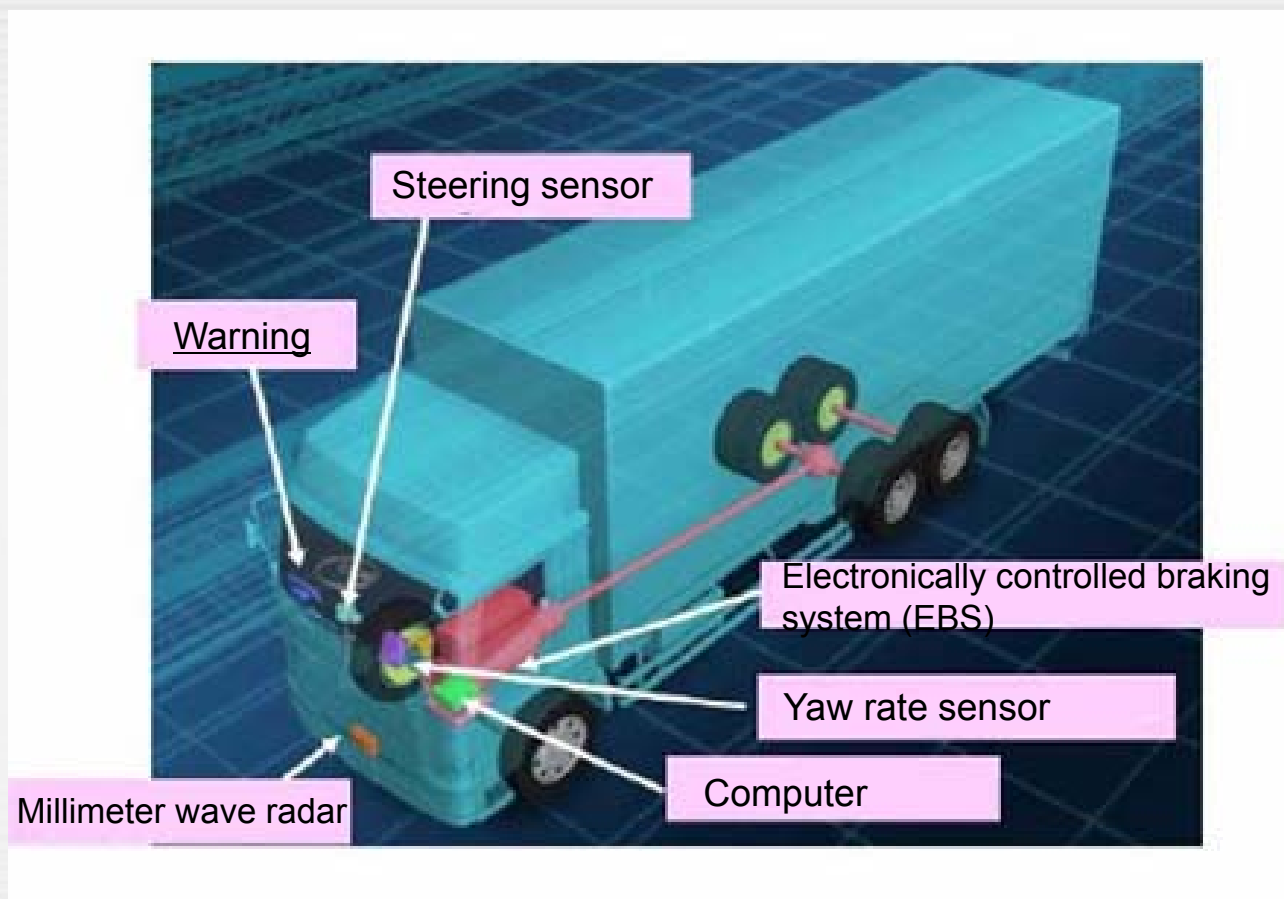
Test Procedure of UN-R131 Advanced Emergency Braking System (AEBS)

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Outline of Advanced Emergency Braking System (AEBS)



The risk of a collision is detected in advance by sensors such as millimeter wave radar.



As the risk of collision increases, the system issues a warning, activates the emergency brake, and slows down the vehicle.

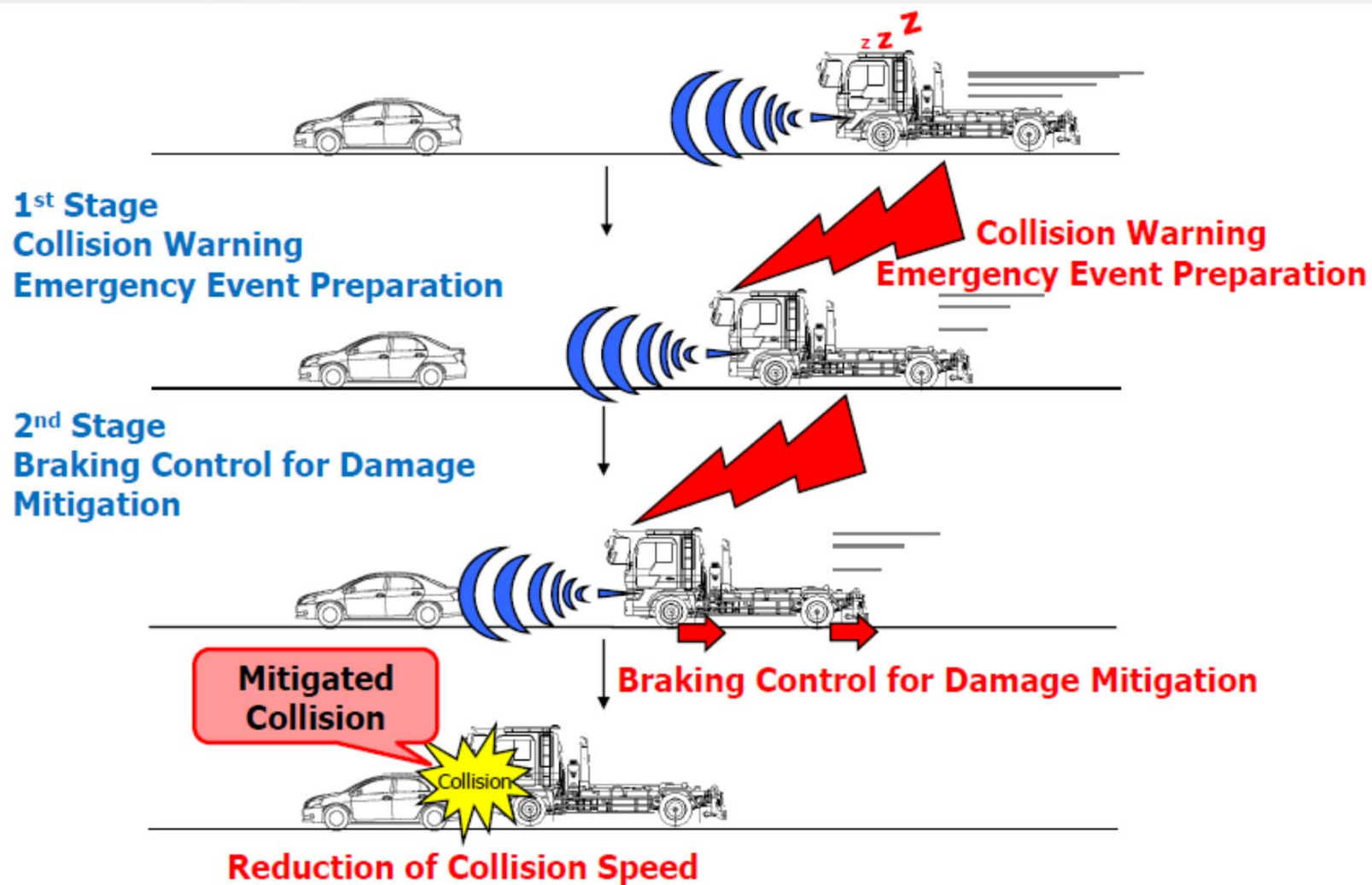


Avoid the collision or reduce damage.

Scope of application: **Vehicles of N2 or M2, N3 or M3 categories**

Operating vehicle speed: 15 km/h to the maximum design speed (which is, in Japan, 80 km/h, the speed limit under the Road Traffic Act for vehicles of Category N3 (over 12t))

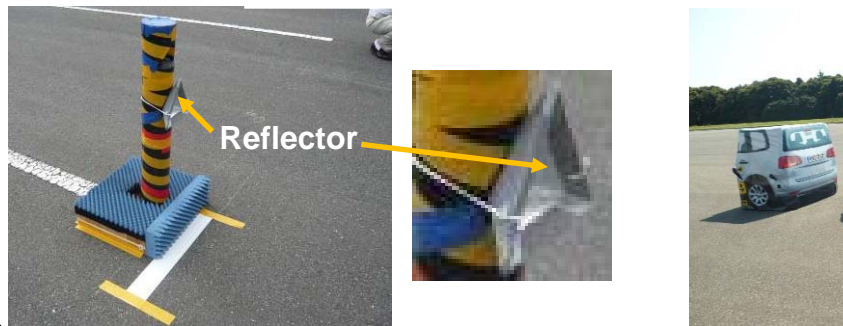
AEBS actuation sequence



Targets Used in AEBS Tests

The target used for the tests shall be a regular high volume series production passenger car of category M1 AA saloon, or alternatively a "soft target" representative of such a vehicle in terms of its identification characteristics applicable to the sensor system of the AEBS under test

Stationary target

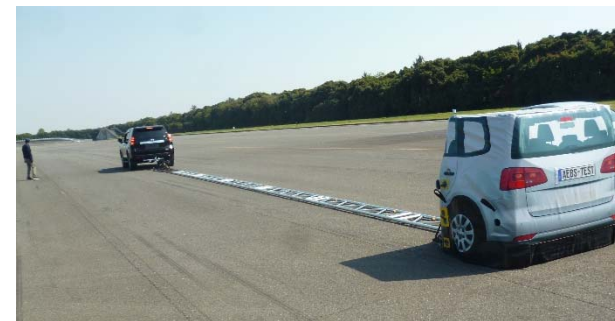


Reflector type

Radio wave reflection characteristics, size, number, etc.

The identification characteristics of the soft target shall be agreed upon between the Technical Service and the vehicle manufacturer as being equivalent to a passenger car of category M1 AA saloon

Moving target



Balloon type

Size, radio wave reflection characteristics, imaging characteristics, etc.

ADAC target is commonly used for NCAP in Japan, Europe, etc.

(New Car Assessment Programme)

Targets and measurement equipment



GPS / Inter-vehicle communication measurement equipment



GPS / Inter-vehicle communication measurement equipment

Vehicle speed (forward and lateral)
Relative distance(forward and lateral)
Time to Collision
=> calculated from speed and distance
Deceleration(Forward and lateral)

Test vehicle
Oxts RT3002
Oxts RT-Range S

Towing vehicle Moving target
Oxts RT2002
Oxts RT-Range S



Base Transceiver Station



Antenna for GPS/ / Inter-vehicle communication

Braking demand signal

Only vehicle manufacturer can prepare for output of this signal



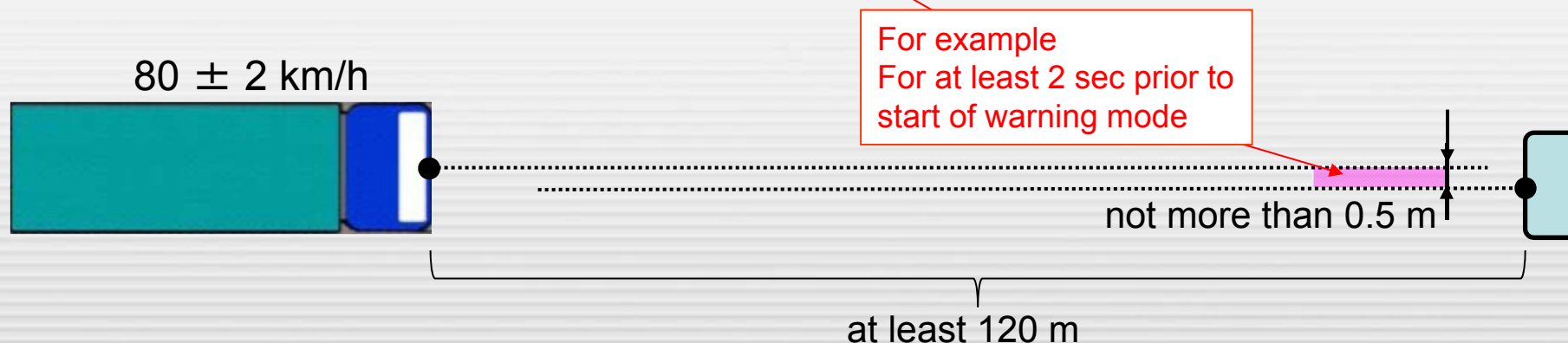
Data Record

Warning and Activation Test requirements

Requirements for stationary target

	Timing of warning modes		Speed reduction
	At least 1	At least 2	
M3, N2 > 8t and N3 Vehicles with pneumatic braking systems	Not later than 1.4s before the start of emergency braking phase <i>haptic or acoustic</i>	Not later than 0.8 s. before the start of emergency braking phase <i>haptic, acoustic or optical</i>	No impact
N2 < 8t and M2 M3 with hydraulic braking system	Not later than 0.8 s before the start of the emergency braking phase <i>haptic, acoustic or optical</i>	Before the start of the emergency braking phase <i>haptic, acoustic or optical</i>	No impact

The subject vehicle shall approach the stationary target in a straight line for at least two seconds prior to the functional part of the test with a subject vehicle to target centerline offset of not more than 0.5 m.

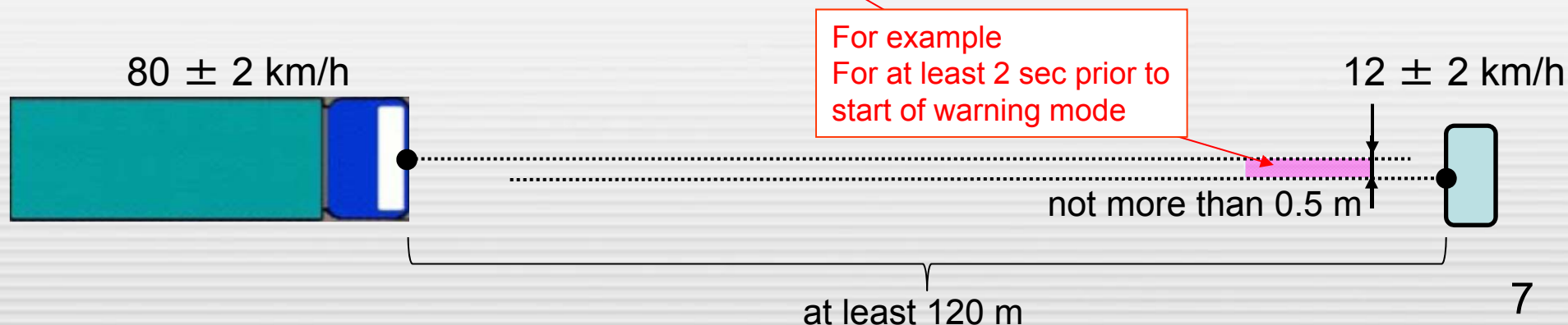


Warning and Activation Test requirements

Requirements for moving target

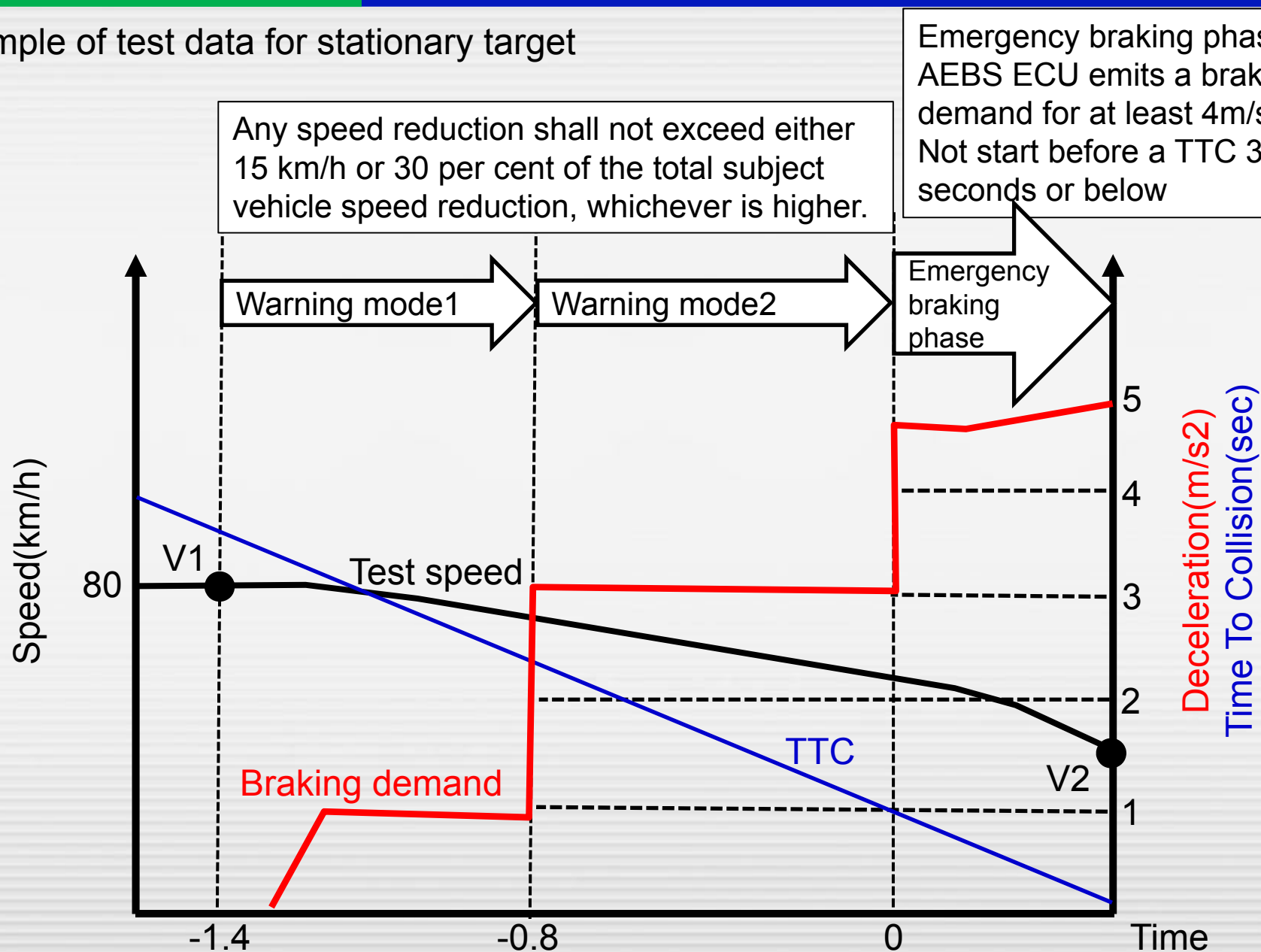
	Timing of warning modes		Speed reduction	Target speed
	At least 1	At least 2		
M3, N2 > 8 t and N3 Vehicles with pneumatic braking systems	Not later than 1.4s before the start of emergency braking phase <i>haptic or acoustic</i>	Not later than 0.8s before the start of emergency braking phase <i>haptic, acoustic or optical</i>	No impact	12 ± 2 km/h
N2 < 8 t and M2 M3 with hydraulic braking system	Not later than 0.8s before the start of the emergency braking phase <i>haptic or acoustic</i>	Before the start of the emergency braking phase <i>haptic, acoustic or optical</i>	No impact	67 ± 2 km/h

The subject vehicle shall approach the stationary target in a straight line for at least two seconds prior to the functional part of the test with a subject vehicle to target centerline offset of not more than 0.5 m.



Warning and Activation Test requirements

Example of test data for stationary target



Failure detection Test

- Type of warning

Optical warning (display) with a yellow telltale

1) Failure detection test

Simulate an electrical failure

(Disconnect a connector of the power supply or input or output port of the control unit)



Forward obstacle sensor



AEBS control unit

Requirements:

The failure warning signal (constant yellow optical warning signal) shall be activated.

It shall remain activated not later than 10 seconds after the vehicle has been driven at a speed greater than 15 km/h

It shall be reactivated immediately after a subsequent ignition "off" ignition "on" cycle with the vehicle stationary as long as the simulated failure exists.

2) Deactivation test

Activate the AEBS OFF switch (if equipped with)

Requirements:

- **The yellow telltale must turn on when the AEBS is switched off.**
- **The yellow telltale must not turn on again after an ignition OFF/ON cycle (Confirmation of automatic restoration).**

False detection Tests

3) False detection test

The subject vehicle shall travel for a distance of at least 60 m, at a constant speed of 50 ± 2 km/h to pass centrally between the two stationary vehicles.

Requirements:

- Shall not provide a collision warning.
- Shall not initiate the emergency braking phase.

