

Transmitted by the expert from Japan

Further consideration on AEBS warning timing reflecting the discussion of 2nd TF meeting of AEBS/LDWS

[1] There was a discussion at last TF meeting in London concerning AEBS warning timing.
Japan has internally discussed further about it.
This is the summary of the results.

1. There are main different 2 proposals (A, B) at TF meeting.
2. Proposal C is added in this paper after the discussion in Japan.

***Proposal A:**

Provide warning at latest 2sec. before emergency braking.

[The definition of emergency braking]

“2.XX. “Emergency braking” means the maximum braking demand of the AEBS system in purpose of avoiding or mitigating an accident.”

***Proposal B (Option 1):**

Provide warning at latest 0.8sec. before activation of service brake system basically.

Warning brake is not included as activation of service brake system.

***Proposal C (Option 2):**

Provide warning at latest 1 sec. before deceleration reaches 4.0m/s^2 .

3. The conclusion of consideration in Japan is as follows.

*Proposal B (Option 1) is most favorable.

*Proposal C (Option 2) is recommended as a replacement of Proposal A, as a compromise when the majority of informal group member prefers Proposal A.

[2] The detailed evaluation of each Proposal is as follows:

1. Proposal A

Provide warning at latest 2 sec. before full braking.

Braking other than “emergency braking (full braking)” is recognized as “warning”.

And it requires providing warning at latest 2 sec. prior to this “emergency braking”.

(Concern)

1) It is unnatural to deem hard brake, which is close to full braking, as “warning”.

In a case where the full braking of a vehicle is 5.5m/s^2 , for example 4.4m/s^2 (80% of full braking) will be deemed as “warning”, not as the part of emergency braking.

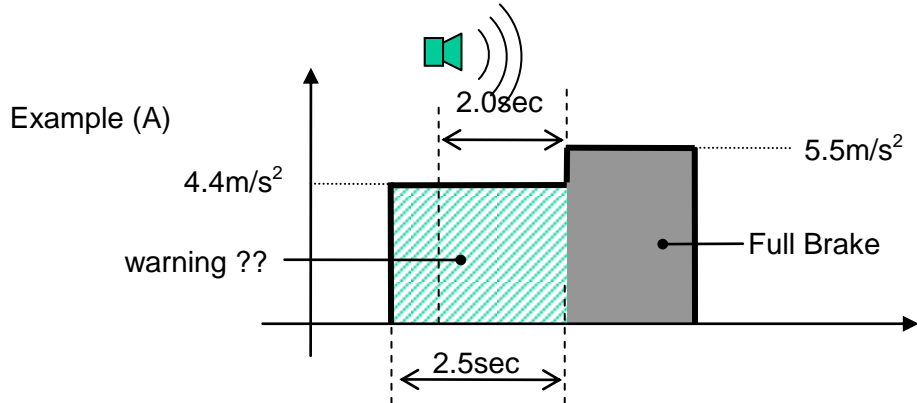
2) From an basic principal that if a vehicle operates any of its maneuver that is not intended by the

driver, some kind of warning shall be provided prior to this automatic operation.

However, this proposal A cannot exclude the possibility that automatic operation starts before warning.

This proposal permits applying hard brake for 0.5sec. without providing warning as shown in example (A) below.

Of course, there is little possibility that any car manufacturer designs such a system.



3) It is necessary to define the concrete threshold value which can be measured at Compliance Test.

But to measure and determine “the maximum braking demand of the AEBS system” is difficult in Type Approval Test sequence, even when demanding signal is surveyed through CAN. And there is a possibility that the vehicle is not equipped with CAN.

Further more it is completely difficult for Self Certification Approval to verify compliance, for example, in US.

2. Proposal B (Option 1)

Provide warning at latest 0.8 sec prior to the activation of service brake system.

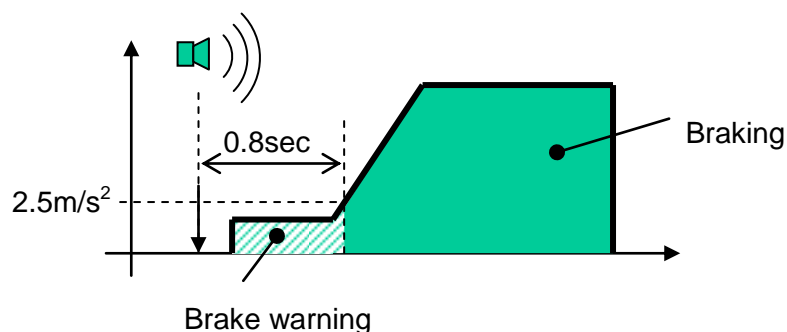
Brake warning is not included as activation of service brake system.

It is permitted to warn the driver simultaneously of service brake application when the emergency situation such as when the system detects the sudden cut-in of a vehicle.

This proposal can guarantee to warn the driver before automatic emergency braking basically.

[The definition of warning brake]:

The deceleration shall be equal or less than 2.5 m/s².



3. Proposal C (Option 2)

Provide warning at latest 1 sec prior to deceleration, which is automatically applied by AEBS, reaches 4.0m/s^2

The difference from Proposal (A) is as follows.

This proposal does not deem a hard brake as warning, which is defined as an emergency brake in ESS provisions in R13.

It is easy to measure and determine the starting point for calculation at Compliance Test, because the concrete deceleration value is defined.

