

Proposal for clarification of Supplement 9 to Regulation No.13-H (Brakes of M<sub>1</sub> and N<sub>1</sub>  
vehicles)

A. PROPOSAL

Paragraphs 2.34.1. to 2.34.3., amend to read:

- “2.34.1. "Category A Brake Assist System" means a system which detects an emergency braking condition based, **primarily**, on the brake pedal force applied by the driver;
- 2.34.2. "Category B Brake Assist System" means a system which detects an emergency braking condition based, **primarily**, on the brake pedal speed applied by the driver;
- 2.34.3. "Category C Brake Assist System" means a system which ~~detects an emergency braking condition based on multiple criteria, one of which must be the rate at which the brake pedal is applied.~~ **cannot be classified as strictly Category A or strictly Category B because it may be a mixture of both categories. However, along with other criteria it has at least the criterion of brake pedal speed.**

Annex 9, Appendix 4, paragraph 1.3., amend to read:

- “1.3. The full deceleration must be reached within the timeframe of  $2.0 \pm 0.5$  s. The deceleration curve, recorded against time, must be within a corridor of  $\pm 0.5$  s around the centre line of the deceleration curve corridor. The example in Figure 3 has its origin at the time  $t_0$  crossing the  $a_{ABS}$  line at 2 seconds. Once full deceleration has been achieved, ~~the pedal travel  $S_p$  shall not be decreased for at least 1 s~~ **the brake pedal should be operated so that the ABS can continue fully cycling.** The time of full activation of the ABS system is defined as the time when pedal force  $F_{ABS}$  is achieved. The measurement shall be within the corridor for variation of increase in deceleration (see Figure 3).”

B. JUSTIFICATION

*B.1. BAS definitions*

BAS category definitions have been fundamentally based on its philosophy for emergency braking detection. This has meant that the pedal force or pedal speed has been selected as the principal criteria in the text. Category A is based on the pedal force criterion and Category B is based on the pedal speed criterion.

Category C, introduced at a later stage of drafting, had the aim of permitting future technologies or combinations of Category A and B, which may not be strictly classifiable as A or B. However there seems to be some confusion in the interpretation of category C between Technical Services.

The reason is the interpretation of the wording “multiple criteria” used in the current definition of Category C. For example, the system of pedal speed criteria which has a variable threshold value based on the vehicle speed has been classified as Category C by some Technical Service, simply because it has “multiple criteria”.

In this case, the variable pedal speed threshold, based on vehicle speed, is adjusted so as to avoid the unintentional activation of BAS rather than strictly the detection of the emergency braking situation, and the introduction of vehicle speed should be deemed as sub parameter tuning. Some Category B systems similarly use pedal force to avoid the unintentional activation. From a principle point of view these systems should still be classified as Category B because the additional criteria do not help detecting the emergency situation, rather help avoiding unintentional activation of BAS.

This amendment, it is believed, will clarify the category definition.

## *B.2. Procedure for obtaining F<sub>ABS</sub> and a<sub>ABS</sub>*

Annex 9 contains the provisions for ESC and BAS, Appendix 4 describes the procedure for obtaining F<sub>ABS</sub> and a<sub>ABS</sub> where:

- F<sub>ABS</sub> “is the minimum pedal force that has to be applied for a given vehicle in order to achieve maximum deceleration which indicates that ABS is fully cycling”, and
- a<sub>ABS</sub> is the deceleration for a given vehicle during ABS deceleration.

The aim of the original requirement “*Once full deceleration has been achieved ...*” is to maintain ABS at fully cycling for at least 1 second so as to obtain steady value of a<sub>ABS</sub>.

However, in actual tests, there are some cases where it is difficult to conduct the test according to this requirement because the brake pedal travel or force is momentarily decreased by the influence on the pedal operation of the test driver caused by the frequent change of brake line pressure while ABS is fully cycling.

Therefore, it is more realistic to prescribe directly “*the pedal should be operated so that ABS can continue fully cycling*” than indirectly “*the pedal travel should not be decreased*”. In this case, based on the time change of brake pedal stroke, force or vehicle deceleration as appropriate, it can be demonstrated that ABS continues fully cycling.

It is believed this amendment can lead to appropriate test result and expand the realistic choice of test method.

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