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Working Party on Brakes and Running Gear (GRRF)
(Fifty-seventh session, 31 January-4 February 2005,
agenda item 1.1.)

AMENDMENT PROPOSAL TO REGULATION No. 13

(Braking)

Transmitted by the expert from the European Association of Automotive Suppliers (CLEPA)

Note: The text reproduced below was prepared by the expert from CLEPA according to the request of GRRF (TRANS/WP.29/GRRF/56, para. 13). It is a revised version of informal document No. GRRF-56-7, taking into consideration comments made on it during the fifty-sixth session of GRRF.

Note: This document is distributed to the Experts on Brakes and Running Gear only.

A. PROPOSAL

Annex 19

Title, amend to read: "PERFORMANCE TESTING OF TRAILER BRAKING COMPONENTS"

Paragraph 2.1.1., amend to read:

"2.1.1. … brakes with mechanical actuation.
For the purpose of this verification procedure the service brake section of a combined spring brake actuator is considered to be a diaphragm brake chamber."

Paragraphs 2.3.1. and. 2.3.2., amend to read:

"2.3.1. With reference to appendix 1 of this Annex, paragraphs 3.1., 3.2., 3.3. and 3.4., a minimum of 6 samples are to be tested, with a verification report being issued providing that the requirements of paragraphs 2.3.2., 2.3.3. and 2.3.4. below are satisfied.

2.3.2. With respect to the verification of average thrust (Th_A) - f(p), a graph defining the acceptable performance variation shall be constructed following the model shown in Diagram 1, which is based on the manufacturers declared thrust to pressure relationship. The manufacturer shall also define the category of trailer for which the brake chamber may be used and the corresponding tolerance band applied."

Insert new paragraphs 2.3.3. to 2.3.4., to read:

"2.3.3 It shall be verified that the pressure (p_{15}) required to produce a pushrod stroke of 15 mm from the zero datum position with a tolerance of ± 0.1 bar by following one of the following test procedures:

2.3.3.1 Utilizing the declared function of thrust (Th_A) - f(p) the brake chamber threshold pressure (p_{15}) shall be calculated when $Th_A = 0$. It shall then be verified that when this threshold pressure is applied a pushrod stroke as defined in 2.3.3. above is produced.

2.3.3.2 The manufacturer shall declare the brake chamber threshold pressure (p_{15}) and it shall be verified that when this pressure is applied the pushrod stroke defined in 2.3.3. above is produced.

2.3.4 With respect to the verification of effective stroke (sp) - f(p), the measured value must not be less than – 4% of the s_p characteristics at the manufacturer's declared pressure range. This value shall be recorded and specified in paragraph 3.3.1. of Appendix 1 to this Annex. Outside of this pressure range the tolerance may exceed –4 per cent."

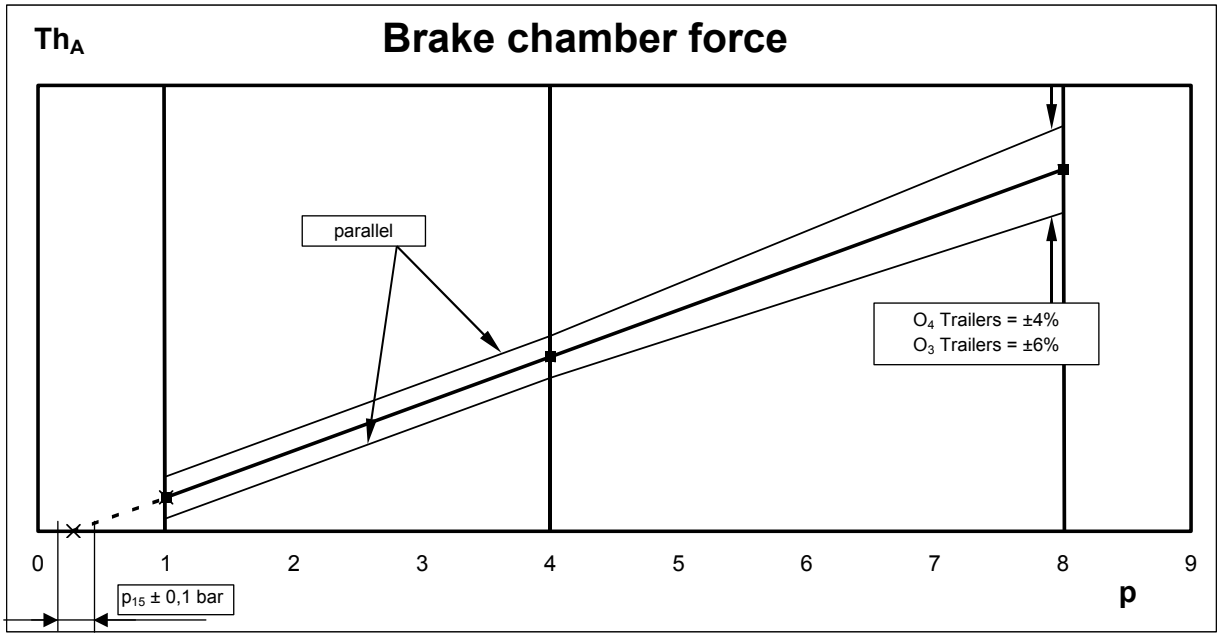

Diagram 1"

Insert a new paragraph 2.3.5., to read:

"2.3.5. The test results recorded shall be reported on a form, a model of which is shown in Appendix 2 to this Annex and shall be included with the verification report, detailed in paragraph 2.4."

Paragraph 3.1.1.,amend to read:

"3.1.1. … brakes with mechanical actuation.
For the purpose of this verification procedure the spring brake section of a combined spring brake actuator is considered to be a spring brake."

Paragraph 4.4.1.1., amend to read:

"4.4.1.1. … following the model shown in Diagram 2, using the …"

Renumber existing Diagram 1 as Diagram 2

Appendix 1,

Paragraph 3.3.1., amend to read:

" 3.3.1. Pressure range over which the above effective stroke is valid: (see paragraph 2.3.4. of Annex 19)."

Insert new paragraphs 3.4. and 4., to read:

" 3.4. Pressure required to produce a push rod stroke of 15 mm (p_{15}) based on $Th_A - f(p)$ or declared value. 2/, 3/, 4/

4. Scope of application
The brake chamber may be used on trailers of category O_3 and O_4 …….. yes/no
The brake chamber may be used on trailers of category O_3 only …….. yes/no"

Existing paragraphs 4. to 8., renumber as paragraphs 5. to 9.

Footnote 4/, amend to read.

"4/ For the purposes of the application of the characteristics defined in this report with respect to Annex 10 it shall be assumed that the relationship from p_{15} to the declared $Th_A - f(p)$ at a pressure of 1.0 bar is linear."

Appendix 7, add a new symbol and definition to read:

" p_{15}	The pressure in the brake chamber required to produce a pushrod stroke of 15mm from the zero datum position."

* * *

B JUSTIFICATION

At the fifty-first session of GRRF, when the test procedures in Annex 19 to Regulation No.13 were adopted, GRRF agreed that the defined procedures were only applicable to trailers and not to motor vehicles or parts of them. To prevent any misinterpretation of the application, it is proposed to precise in the title of Annex 19 that it refers to performance testing of trailer braking components.

Regardless of the size of the service brake diaphragm, e.g. from type 9 to type 30, the construction of the diaphragms remains basically unchanged, the reinforcement material, rubber specification and thickness are similar to ensure a high level of durability during operation on the vehicle. As the pushrod of the brake chamber extends, the diaphragm will "roll" where the force required for this rolling action is independent of pressure. When pressure is applied to actuate the brakes, the force is generated to cause the diaphragm to "roll". Therefore, when pressure is exhausted to release the brakes, a force is required to return the diaphragm to its zero stroke position. This is realized by an internal spring, which must be capable of returning the diaphragm to the zero stroke position over the operating temperature range of the brake chamber. The force to achieve this operation is relatively constant irrespective of brake chamber size. However, when applying the brakes the pressure required to generate the force to overcome the rolling action of the diaphragm and internal return spring is a variable, dependent on the size of the brake chamber. In

consequence it is not possible to achieve the currently prescribed tolerance of +/- 4 per cent in the low pressure range.

To overcome this problem, it is proposed that the tolerance band applied to the manufacturers declared performance is constructed in a way that at pressures $\geq$ 4.0 bar the current +/- 4 per cent tolerance remains unchanged. The tolerance band from 4.0 bar to 1 bar would then be parallel based on the force difference determined at 4.0 bar. This tolerance band would be applied to brake chambers that may be installed on trailers of category O_4, which generally utilize the larger size of brake chamber. In the case of O_3 trailers, where the use of smaller brake chambers is common, a larger tolerance is required. In this case, it is proposed that the above defined tolerance band has a tolerance of +/- 6 per cent.

The 10 series of amendments to Regulation No.13 will introduce changes to the compatibility requirements of towing vehicles and trailers, one of which is a check that when a coupling head pressure of between 0.2 and 1.0 bar is generated, at the coupling head at least one brake must start to generate a braking force. To fulfil this requirement on a trailer equipped with a conventional pneumatic braking system (REV + LSV + ABS), there must be some control over the thresholds of the components within the braking system, which includes the brake chamber. As a result, a new requirement has been added where it will be required to validate that the pressure required to produce a pushrod stroke of 15 mm (typical value required to generate a braking force) is within the defined limits. As with the validation of the Th_A characteristics, different tolerances are necessary and again it is proposed to differentiate between O_3 and O_4 trailer applications.

The final proposed change relates to the application of the +/- 4 per cent tolerance on the effective stroke (**sp**). Having a positive (**sp**), tolerance offers no advantage as this will always result in a greater margin of safety when applied to the hot brake performance calculation. Therefore, it is proposed to only define a lower limit of –4 per cent for the verification requirement.

At the fifty-sixth session of GRRF, the expert from Germany suggested additional wording to remove possible interpretation problems of the characteristics between the point p_{15} and the force developed at a pressure of 1 bar. As a result, footnote 4/ has been added to paragraph 3.4. of Appendix 1 to Annex 19.

Further consideration by industry has been given to the terms of diaphragm brake chamber and spring brake and again to remove any possible misinterpretation problems and ensure that a unit which incorporates both the service brake chamber and spring brake can be assessed according to the procedure in Annex 19, paragraphs 2.1.1. and 3.1.1. which have been extended to make reference to this specific design.