Submitted by the expert from The Netherlands.

Informal document **GRRF-76-19**
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agenda item 5(a))

Comments from The Netherlands on the document ECE/TRANS/WP.29/GRRF/2014/6 concerning the proposal for amendments to Regulation No. 78 (Uniform provisions concerning the approval of vehicles of categories L1, L2, L3, L4 and L5 with regard to braking)

Note:
The same comments apply mutatis mutandis to document ECE/TRANS/WP.29/GRRF/2014/3 with regard to the Global Technical Regulation No. 3 (Motorcycle brake systems)

I. Comments to the proposed "note 1" to par. 1.1.3. of Annex 3

Document .../GRRF/2014/6; proposal IMMA for Annex 3 par. 1.1.3. and notes 1 and 2

1.1.3. Measurement of PBC

The PBC is measured ~~as determined by the approval authority~~ using either:

(a) ~~the American Society for Testing and Materials~~ **An ASTM International** (ASTM) E1136-**93 (Re-approved 2003)** standard reference test tyre, in accordance with ASTM Method E1337-90 **(Re-approved 2008)**, at a speed of 40 mph ~~without water delivery~~; or

(b) the method specified in the Appendix 1 to this **Annex**:

Note 1: A representative vehicle may be acceptable for PBC measurement by method (b) if that vehicle has shown the same nominal PBC on both high µ and low µ as previously determined by method (a).

Note 2: PBC measurement of the surface shall be carried out at least once a year. PBC measurement shall be completed prior to testing if any major maintenance or alterations that may significantly modify the PBC have occurred since the last measurement.

Comments by The Netherlands on "note 1":

(i) Both methods (a) and (b) mentioned in par. 1.1.3. have their own advantages and disadvantages;

- The advantage of method (a) is that the ASTM E1337 is a standardized measurement procedure independent of the tester and the used tyre is a standard reference test tyre, specified in ASTM E1136. That is a special tyre, especially manufactured to have properties which are constant. This SRTT is an inseparable part of the measuring method. The accuracy and the reproducibility of the pbc measurement is high.
The disadvantage is that the real friction between the tyres of the motorcycle to be tested with regard to the utilized adhesion by the ABS (Annex 3 par. 9.4) is different from that assessed by the ASTM-method (a) because the tyres are different. So the test result, the braking distance with fully cycling ABS depends on the

tyres installed on the vehicle which is tested. However the result of the measurement it self is accurate and reproducible and independent of the tester.

- The advantage of method (b) is that the friction between the tyres of the motorcycle and the test track is established with the motorcycle (the same as the test-motorcycle) according the method described in Annex 3 appendix 1. The established pbc is the same as the real friction between the tyre of the test-motorcycle with ABS and the test track.
The disadvantage however is that the result of the measurement of the PBC depends on the skill of the tester and the reproducibility of the results is not good also because the assessment is not easy to be done with a motorcycle.

(ii) In document ECE/TRANS/WP.29/GRRF/2014/6 it is proposed to introduce an alternative for the measurement of method (a) according ASTM E1337 using the SRTT according ASTM1136. That alternative is a measurement according method (b) using a "representative vehicle" which has shown the "same nominal PBC" as previously determined by method (a).
By doing so the disadvantages of method (a) (*i.e. the friction of the tyres used to assess the pbc are different from the ones on the test vehicle*) and the method (b) (*i.e. inaccuracy and bad reproducibility*) are combined.

In this way the utilization of the adhesion by the ABS is determined by comparing the results of the braking distance of the test-vehicle to the doubtful determined friction (pbc) of another vehicle with other (non SRTT) tyres.

Above that the "representative vehicle" mentioned in the IMMA-proposal has ordinary tyres from the market. Those tyres are not produced for measurements or research and their properties are not constant and guaranteed. When e.g. after a certain time the tyre is replaced the properties of the new tyre (although same make, type, etc.) will be different. The "standard reference test tyre" according ASTM E1136 has guaranteed constant properties and is especially produced for measurements and research. Therefore an ordinary tyre is in this application not equivalent to the SRTT according ASTM.

A result from the alternative method proposed by IMMA could show the "same nominal PBC" on both high mu and low mu as previously determined by the method (a) according ASTM however such a result is in principle an "once only" result. Moreover the concept of "same nominal PBC" is rather vague and the differences can be big and the "resemblance" has only to be shown once.

Conclusion: We cannot see the measurements according to the alternative proposed by IMMA in "note 1" as having the same level of reliability and accuracy as the measurement according to ASTM E1337 as currently prescribed in the regulation. We are of the opinion that the in "note 1" proposed alternative should not be accepted.

Comments by The Netherlands to B. justification 2

Document .../WP.29/GRRF/2014/6; Justification 2 (b) by IMMA for note 1 to Annex 3 par. 1.1.3.

> Annex 3. Test conditions, procedures and performance requirements
>
> Paragraph 1.1.3 Measurement of PBC
>
> (a) …
>
> (b) In some instances just before the wheel-locking condition for all-wheels during the PBC test, the following may happen to the vehicle for type approval:
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> "(a) rear wheel lift due to maximum braking may cause difficulties in undertaking the PBC test.

(b) vehicle not getting into the wheel lock, because of reduction in brake performance (brake lever stroke reaches full stroke before wheel locking).

(c) For 3-wheeled motorcycles (L_2, L_4, L_5), the PBC test is not described and it may understood that the PBC test is not possible for these vehicle types for type approvals"

Comments by The Netherlands on justification 2 (b):

- The above mentioned arguments (a) and (b) show that it is not easy to establish the pbc according the method (b) as specified in the appendix 1 to Annex 3 of the regulation. The reproducibility is poor and there is a large variation between the results of the measurements. This is also shown in document …/WP.29/GRRF/2014/6 justification 2 (c) and (d).
A measurement according method (a) as specified in ASTM E1137 on the other hand is accurate and there is not much variation between the results.

- In argument (c) it is assumed that a PBC test is not possible for 3-wheeled motorcycles. However that is an unjustified assumption. There is no reason why it is not possible to do a PBC-test with a 3-wheeled motorcycle. The test can e.g. also be done by cars with 4 wheels. The regulation just has not specified requirements for 3-wheeled motorcycles up till now.

Document .../WP.29/GRRF/2014/6; Justification 2 (e) by IMMA for note 1 to Annex 3 par. 1.1.3.

(e) In UN Regulation No. 13-H, paragraph 2.2. of the Annex 6, Appendix 4 "METHOD OF SELECTION OF THE LOW ADHESION SURFACE", the calibration of the surface has to be carried out at least once a year with a representative vehicle to verify the stability of R.

A representative vehicle can be used in UN Regulation No. 13-H.

Comments by The Netherlands on justification 2 (c):

- In regulation R13-H Annex 6 appendix 4 paragraph 2.2 is described how a low adhesion surface has to be selected to do the energy consumption test (R13-H Annex 6 par. 5.1.1.2). After that specific test a sufficient amount of energy shall still be available to brake the vehicle. The ratio k-peak to k-lock, ratio R, has an influence on the energy consumption by the ABS. Therefore the low adhesion surface used for that test shall have a certain property to give results which are comparable with tests on other low adhesion surfaces.
In regulation R78 there is no requirement with regard to the energy consumption of the ABS. The assessment of the adhesion utilization of the ABS (as in effect the test according R78 Annex 3 par. 9.4 is) is different from an energy consumption test. Therefore the justification (e) is not relevant.

Note:
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