TYRES

Regulation No. 117
**(UNIFORM PROVISIONS CONCERNING THE APPROVAL OF TYRES WITH REGARD TO ROLLING SOUND EMISSIONS AND TO ADHESION ON WET SURFACES
AND TO ROLLING RESISTANCE)**

Proposal for draft amendments to Regulation No. 117- Rev. 1

Submitted by the expert from ETRTO

The text reproduced below was prepared by the expert from ETRTO. Amendments to annex 8 are proposed. The modifications to the version of these chapters proposed as per informal document ECE/TRANS/WP.29/GRB/51-26 are **in bold** or as ~~strikethrough~~.

Proposal

The following text should replace the existing text in the annex 8 of the draft regulation R 117:

PROCEDURE FOR TECHNICAL SERVICES INTER-LABORATORY COMPARISON

1. General

This clause describes the procedure to be followed to perform inter-laboratory comparison in order to define a reference machine as composed by multiple laboratory machines for the purpose of implementing rolling resistance machine alignment procedure. It can be used for the determination of assigned values (see § 3) for a set of alignment tyres.

This machines alignment procedure requires at least five predetermined alignment tyres of the same sizes used by the candidate laboratory operating the machine. The set of tyres is used to align several machines by comparing the measured Cr results among each laboratory. An inter-laboratory alignment formula is then established and shall be used to translate the results obtained on different machines into aligned results in order to define a reference machine as constituted by a network of multiple machines. Each machine in the network can provide assigned Cr values to candidate machines when aligning with one candidate.

2. Conditions for machines part of the network.

Every machine participating to the inter-laboratory comparison must also be in accordance with defined requirements.

2.1 Monitoring of the reference machine laboratory control tyres shall be carried out for machines participating to the network at intervals no greater than one month. Monitoring shall include a minimum of three separate measurements taken during this one month period. The average of the three measurements taken during a given one-month period shall be evaluated for drift from one monthly evaluation to another.

2.2 Each laboratory in the network shall ensure that, based on a minimum of three measurements, the machine maintains a value of $\sigma_m \leq 0.05$ N/kN. This may be done using the laboratory control tyres (as specified in 2.1).

2.3 The assigned value for each alignment tyre is the general average of the results obtained by all laboratories in the network for that alignment tyre in this inter-laboratory comparison.

3. Alignment Tyre Requirements

a. The predetermined alignment tyres used to conduct the alignment procedure shall be identified to cover the needed usage range in terms of load index, Cr and Fr as follows:

- [Cr values shall have a minimum range [should cover the range of the market]
  - 3 N/kN for tyres with LI=121 and below
  - 2 N/kN for tyres with LI=122 and above.]
  Note: Tyre Industry assessment need to be completed.

- The alignment tyre section width should be:
  - ≤245 mm for machines for tyres with LI=121 and below
  - ≤345 mm for machines for tyres with LI=122 and above.

- The alignment tyre outer diameter should be
  - between 510 to 800 mm for Class C1 and C2 machines
  - between 771 to 1143 mm for Class C3 machines

- load index values shall adequately cover the range for the tyres to be tested, ensuring that the Fr values also cover the range for the tyres to be tested.

- the number of alignment tyres shall be equal to
  - at least five alignment tyres for Class C1 and C2 tyres, and
  - at least five alignment tyres for Class C3 tyres.

b. Each alignment tyre must be checked prior to use and replaced when:
   - it shows a condition which makes it unusable for further tests
   - there are deviations of Cr for alignment tyre measurement greater than 1.5% relative to earlier measurements after correction for any machine drift.

4. Alignment Procedure

a. Each time an alignment tyre is measured, the tyre/wheel assembly shall be removed from the machine and the entire test procedure specified in Annex 6 shall be followed again.

b. Each laboratory, shall measure each alignment tyre three times in accordance with Annex 6 and provide the mean value and standard deviation established from the 3 measurements for each tyre.

c. The measurement standard deviation σ_m calculated using at least five alignment tyres shall be ensured
   - not greater than 0.05 N/kN for tyres with LI=121 and below
   - not greater than 0.05 N/kN for tyres with LI=122 and above.

5. Comparison regression definition

N machines measure at least five alignment tyres of the same sizes of those used in paragraph 1. The average value of each tyre is taken as reference value.
Then, calling the average value of the j-th tyre RRCave $_j$

$$(1) \qquad RRCave_j = \frac{\sum\limits_{i=1}^{N} RRC_{ij}}{N}$$

where RRC_{ij} is the RRC value of the j-th tire measured by the i-th laboratory.
j is at least five. Each laboratory machine then correlates its measurements with the average values. The correlation shall be performed using a linear regression technique, A1 and B1, given in the equation:

$$Cr\_ass\_TS = A1 \times Cr\_TS_i + B1 \quad (2)$$

Where:
- Crr_ass_TS is the assigned value of the Rolling Resistance Coefficient to the laboratory machine including temperature and drum diameter influences.
- Cr_TS_i is the measured value of the rolling resistance coefficient by the laboratory machine including temperature and drum diameter influences.

- The aligned Cr value for the laboratory machine must take into account coefficients A1 and B1: when a candidate laboratory is requesting to perform the alignment to a laboratory within the inter-laboratory alignment network, the issued value by the contacted laboratory shall be corrected as above to represent the reference laboratory (being defined by all the laboratories in the network).

The measurement standard deviation estimate, σ_m, shall also be given.

6. Alignment process

The alignment process must be repeated at least every two years and after any significant machine change or any drift in candidate machine control tyre monitoring data, by each laboratory machine in the network.

Justification:

Tyre Industry is asking for the creation of a Technical Support Group dedicated to Rolling Resistance (RR) measurement machines alignment for the following reasons:

- A measurement machines alignment procedure is necessary in order to get comparative RR values and give an appropriate competitive playground for the declaration of RR labelling values according to European Regulation 1222/2009.

- As of today this procedure shall be built up, because it is only partially described both within ISO28580 and, with some differences, within draft UN/ECE Regulation R117.02 Annex 8 and 9 (which are not mandatory, but just "informative" Annexes, since this procedure was decided as not needed for Type Approval purpose).

- The procedure should be based upon the generation of Reference or "assigned" RR values through a Technical Services Inter-Laboratory comparison.

Tyre Industry is asking for the creation of a Working Group, composed of the Technical Services willing to participate to the inter-laboratory comparison.

A fast launch of this Working Group will allow Tyre Industry companies to quickly know the reference values in order to comply to the European Tyre Labelling Regulation where we need to start the tests of our tyre lines first quarter of 2011 at the latest.