Regulation (EC) No 1222/2009 of the European Parliament and of the Council of 25 November 2009 on the labelling of tyres with respect to fuel efficiency and other essential parameters (Text with EEA relevance)

[F1ANNEX IVa

Laboratory alignment procedure for the measurement of rolling resistance

Textual Amendments

F1 Inserted by Commission Regulation (EU) No 1235/2011 of 29 November 2011 amending Regulation (EC) No 1222/2009 of the European Parliament and of the Council with regard to the wet grip grading of tyres, the measurement of rolling resistance and the verification procedure (Text with EEA relevance).

1. DEFINITIONS

For the purpose of the laboratory alignment procedure, the following definitions apply:

(1) 'Reference laboratory' means a laboratory that is part of the network of laboratories the references of which have been published for the purpose of the alignment procedure in the *Official Journal of the European Union*, and is able to achieve the accuracy of test results determined in section 3;

(2) 'Candidate laboratory' means a laboratory participating in the alignment procedure that is not a reference laboratory;

(3) 'Alignment tyre' means a tyre that is tested for the purpose of performing the alignment procedure;

(4) 'Alignment tyres set' means a set of five or more alignment tyres;

(5) 'Assigned value' means a theoretical value of one alignment tyre as measured by a theoretical laboratory which is representative of the network of reference laboratories that is used for the alignment procedure.

2. GENERAL PROVISIONS

2.1. **Principle**

The measured Rolling Resistance Coefficient (RRC_m) in a reference laboratory (l) shall be aligned to the assigned values of the network of reference laboratories.

The RRC_m in a candidate laboratory (c) shall be aligned through one reference laboratory of the network of its choice.

2.2. **Tyre selection requirements**

A set of five or more alignment tyres shall be selected for the alignment procedure in compliance with the criteria below. One set shall be selected for C1 and C2 tyres together, and one set for C3 tyres.

(a) The set of alignment tyres shall be selected so as to cover the range of different *RRCs* of C1 and C2 tyres together, or of C3 tyres. In any event, the difference between the highest RRC_m of the tyre set, and the lowest RRC_m of the tyre set shall be at least equal to:

(i) 3 kg/t for C1 and C2 tyres; and

(ii) 2 kg/t for C3 tyres.

(b) The RRC_m in the candidate or reference laboratories (*c* or *l)* based on declared RRC values of each alignment tyre of the set shall be spaced out as follows and distributed uniformly:

(i) 1,0 +/– 0,5 kg/t for C1 and C2 tyres; and

(ii) 1,0 +/– 0,5 kg/t for C3 tyres.

(c) The selected tyre section width of each alignment tyre shall be:

(i) ≤ 245 mm for machines measuring C1 and C2 tyres; and

(ii) ≤ 385 mm for machines measuring C3 tyres.

(d) The selected tyre outer diameter of each alignment tyre shall be:

(i) between 510 to 800 mm for machines measuring C1 and C2 tyres; and

(ii) between 771 to 1 143 mm for machines measuring C3 tyres.

(e) Load index values shall adequately cover the range of the tyres to be tested, ensuring that the rolling resistance force (RRF) values also cover the range of the tyres to be tested.

Each alignment tyre shall be checked prior to use and replaced when:

(a) it shows a condition which makes it unusable for further tests; and/or

(b) there are deviations of RRC_m greater than 1,5 per cent relative to earlier measurements after correction for any machine drift.

2.3. **Measurement method**

The reference laboratory shall measure each alignment tyre four times and retain the three last results for further analysis, in accordance with paragraph 4 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments and applying the conditions set out in paragraph 3 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments.

The candidate laboratory shall measure each alignment tyre (n + 1) times with n being specified in section 5 and retain the n last results for further analysis, in accordance with paragraph 4 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments and applying the conditions set out in paragraph 3 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments.

Each time an alignment tyre is measured, the tyre/wheel assembly shall be removed from the machine and the entire test procedure specified in paragraph 4 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments shall be followed again from the start.

The candidate or reference laboratory shall calculate:

(a) the measured value of each alignment tyre for each measurement as specified in Annex 6, paragraphs 6.2 and 6.3, of UNECE Regulation No 117 and its subsequent amendments (i.e. corrected for a temperature of 25 °C and a drum diameter of 2 m);

(b) the mean value of the three (in the case of reference laboratories) or n (in the case of candidate laboratories) last measured values of each alignment tyre; and

(c) the standard deviation (σ_m) as follows:

$$\sigma_m = \sqrt{\frac{1}{p} \times \sum_{i=1}^{p} \sigma_2^{m,i}}$$

$$\sigma_{m,i} = \sqrt{\frac{1}{n-2} \times \sum_{j=2}^{n} \left(Cr_{i,j} - \frac{1}{n-1} \times \sum_{j=2}^{n} Cr_{i,j} \right)^2}$$

where:

i	is the counter from 1 to p for the number of alignment tyres
j	is the counter from 2 to n for the number of repetitions of each measurement for a given alignment tyre
n	is the number of repetitions of tyre measurements ($n \geq 4$)
p	is the number of alignment tyres ($p \geq 5$)

2.4. **Data formats to be used for the computations and results**

— The measured RRC values corrected from drum diameter and temperature shall be rounded to 2 decimal places.

— Then the computations shall be made with all digits: there shall be no further rounding except on the final alignment equations.

— All standard deviation values shall be displayed to 3 decimal places.

— All RRC values will be displayed to 2 decimal places.

— All alignment coefficients ($A1_l$, $B1_l$, $A2_c$ and $B2_c$) shall be rounded and displayed to 4 decimal places.

3. REQUIREMENTS APPLICABLE TO THE REFERENCE LABORATORIES AND DETERMINATION OF THE ASSIGNED VALUES

The assigned values of each alignment tyre shall be determined by a network of reference laboratories. After two years the network shall assess the stability and validity of the assigned values.

Each reference laboratory participating in the network shall comply with the specifications of Annex 6 of UNECE Regulation No 117 and its subsequent amendments and have a standard deviation (σ_m) as follows:

(i) not greater than 0,05 kg/t for class C1 and C2 tyres; and

(ii) not greater than 0,05 kg/t for class C3 tyres.

The sets of alignment tyres, conforming to the specification of section 2.2 shall be measured in accordance with section 2.3 by each reference laboratory of the network.

The assigned value of each alignment tyre is the average of the measured values given by the reference laboratories of the network for this alignment tyre.

4. PROCEDURE FOR THE ALIGNMENT OF A REFERENCE LABORATORY TO THE ASSIGNED VALUES

Each reference laboratory (*l*) shall align itself to the assigned values of the alignment tyre set using a linear regression technique, $A1_l$ and $B1_l$, calculated as follows:

$RRC = A1_l * RRC_{m,l} + B1_l$

where:

RRC is the assigned value of the rolling resistance coefficient;

$RRC_{m,}$ is the measured value of the rolling resistance coefficient by the reference laboratory '*l*' (including temperature and drum diameter corrections)

5. REQUIREMENTS APPLICABLE TO CANDIDATE LABORATORIES

Candidate laboratories shall repeat the alignment procedure at least once every two years and always after any significant machine change or any drift in machine control tyre monitoring data.

A common set of five different tyres, conforming to the specification of section 2.2 shall be measured in accordance with section 2.3 by the candidate laboratory and by one reference laboratory. More than five alignment tyres may be tested at the request of the candidate laboratory.

The alignment tyre set shall be provided by the candidate laboratory to the selected reference laboratory.

The candidate laboratory (*c*) shall comply with the specifications of Annex 6 of UNECE Regulation No 117 and its subsequent amendments and preferably have standard deviations (σ_m) as follows:

(i) not greater than 0,075 kg/t for C1 and C2 tyres; and

(ii) not greater than 0,06 kg/t for C3 tyres.

If the standard deviations (σ_m) of the candidate laboratory are higher than the above values with three measurements, then the number of measurement repetitions shall be increased as follows:

$n = (\sigma_m/\gamma)^2$, rounded up to the nearest higher integer value

where:

γ = 0,043 kg/t for Class C1 and C2 tyres

γ = 0,035 kg/t for Class C3 tyres

6. PROCEDURE FOR THE ALIGNMENT OF A CANDIDATE LABORATORY

One reference laboratory (*l*) of the network shall calculate the linear regression function of the candidate laboratory (*c*), $A2_c$ and $B2_c$, as follows:

$RRC_{m,l} = A2_c \times RRC_{m,c} + B2_c$

where:

$RRC_{m,l}$ is the measured value of the rolling resistance coefficient by the reference laboratory (*l*) (including temperature and drum diameter corrections)

$RRC_{m,c}$ is the measured value of the rolling resistance coefficient by the candidate laboratory (*c*) (including temperature and drum diameter corrections)

The aligned *RRC* of tyres tested by the candidate laboratory is calculated as follows:

$RRC = (A1_l \times A2_c) \times RRC_{m,c} + (A1_l \times B2_c + B1_l)$**]**

Status:
Point in time view as at 31/12/2020.

Changes to legislation:
There are outstanding changes not yet made to Regulation (EC) No 1222/2009 of the European Parliament and of the Council. Any changes that have already been made to the legislation appear in the content and are referenced with annotations.