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1958 Agreement – Consideration of draft amendments to existing Regulations submitted by GRPE

Proposal for Supplement 7 to the 06 series of amendments to Regulation No. 83 (Emissions of M_1 and N_1 vehicles)

Submitted by the Working Party on Pollution and Energy*

The text reproduced below was adopted by the Working Party on Pollution and Energy (GRPE) at its seventy-second session (ECE/TRANS/WP.29/GRPE/72, paras. 12 and 13). It is based on ECE/TRANS/WP.29/GRPE/2016/4 as amended by para. 12 of the report. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee AC.1 for consideration at their June 2016 sessions.

* In accordance with the programme of work of the Inland Transport Committee for 2016–2017 (ECE/TRANS/254, para. 159 and ECE/TRANS/2016/28/Add.1, cluster 3.1), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

Supplement 7 to the 06 series of amendments to Regulation No. 83 (Emissions of M_1 and N_1 vehicles)

Annex 4a – Appendix 7,

Paragraphs 5.1.1.1. to 5.1.1.2.7., amend to read:

"5.1.1.1. Test equipment and error

Time shall be measured to an error lower than ±0.1 s.

Speed shall be measured to an error lower than ±2 per cent.

During the test, elapsed time and vehicle speed shall be measured and recorded at a minimum frequency of 1 Hz.

5.1.1.2. Test procedure

5.1.1.2.1. Accelerate the vehicle to a speed 10 km/h higher than the chosen test speed v.

5.1.1.2.2. Place the gearbox in "neutral" position.

5.1.1.2.3. For each reference speed point v_j, measure the time taken (ΔT_{aj}) for the vehicle to decelerate from speed

$v_2 = v_j + \Delta v$ km/h to $v_1 = v_j - \Delta v$ km/h

where:

Δv is equal to 5 km/h

v_j is each of the reference speed [km/h] points as indicated in the following table:

20	30	40	50	60	70	80	90	100	110	120

5.1.1.2.4. Perform the same test in the opposite direction: ΔT_{bj}

5.1.1.2.5. These measurements shall be carried out in opposite directions until, for each reference speed v_j, a minimum of three consecutive pairs of measurements have been obtained which satisfy the statistical accuracy p_j, in per cent, as defined below.

$$p_j = \frac{t \cdot s_j}{\sqrt{n}} \cdot \frac{100}{\Delta T_j} \leq 3 \text{ per cent}$$

where:

p_j is the statistical accuracy of the measurements performed at reference speed v_j;

n is the number of pairs of measurements;

ΔT_j is the mean coast down time at reference speed v_j in seconds, given by the equation:

$$\Delta T_j = \frac{1}{n} \sum_{i=1}^{n} \Delta T_{ji}$$

where ΔT_{ji} is the harmonic mean coast down time of the i^{th} pair of measurements at velocity v_j, seconds [s], given by the equation:

$$\Delta T_{ji} = \frac{2}{\left(\frac{1}{\Delta T_{aji}}\right)+\left(\frac{1}{\Delta T_{bji}}\right)}$$

where ΔT_{aji} and ΔT_{bji} are the coast down times of the i^{th} measurement at reference speed v_j, in seconds [s], in opposite directions a and b, respectively;

s_j is the standard deviation, in seconds [s], defined by:

$$s_j = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(\Delta T_{ji} - \Delta T_j)^2}$$

t is a coefficient given in the following table:

Coefficient t as function of n

n	*t*	$t/\sqrt{n}$	*n*	*t*	$t/\sqrt{n}$
3	4.3	2.48	10	2.2	0.73
4	3.2	1.60	11	2.2	0.66
5	2.8	1.25	12	2.2	0.64
6	2.6	1.06	13	2.2	0.61
7	2.5	0.94	14	2.2	0.59
8	2.4	0.85	15	2.2	0.57
9	2.3	0.77			

5.1.1.2.6. If during a measurement in one direction any external factor or driver action occurs which influences the road load test, that measurement and the corresponding measurement in the opposite direction shall be rejected.

5.1.1.2.7. The total resistances, F_{aj} and F_{bj}, at reference speed v_j in directions a and b, are determined by the equations:

$$F_{aj} = \frac{1}{3.6} \cdot M \cdot \frac{2 \cdot \Delta v}{\Delta T_{aj}}$$

and

$$F_{bj} = \frac{1}{3.6} \cdot M \cdot \frac{2 \cdot \Delta v}{\Delta T_{bj}}$$

where:

F_{aj} is the total resistance at reference speed, j, in direction a, [N];

F_{bj} is the total resistance at reference speed, j, in direction b, [N];

M is the reference mass, [kg];

Δv is the delta speed around v_j, taken according to 5.1.1.2.3.

ΔT_{aj} and ΔT_{bj} are the mean coast down times in directions a and b, respectively, corresponding to reference speed v_j, in seconds [s], given by the following equations:

$$\Delta T_{aj} = \frac{1}{n}\sum_{i=1}^{n} \Delta T_{aji}$$

and $$\Delta T_{bj} = \frac{1}{n}\sum_{i=1}^{n} \Delta T_{bji}$$

5.1.1.2.8. The following equation shall be used to compute the average total resistance:

$$F_j = \frac{(F_{aj} + F_{bj})}{2}$$

5.1.1.2.9. For each reference speed v_j calculate the power (P_j), [kW], by the formula:

$$P_j = (F_j \cdot v_j)/1{,}000$$

where:

F_j is the average resistance at reference speed, j, [N];

v_j is the reference speed, j, [m/s], defined in 5.1.1.2.3.

5.1.1.2.10. The complete power curve (P), [kW], as a function of speed, [km/h], shall be calculated with a least squares regression analysis."

Paragraph 5.1.1.2.8. (former), renumber as paragraph 5.1.1.2.11.

Paragraphs 5.1.2.2.5. to 5.1.2.2.7., amend to read:

"5.1.2.2.5. Carry out the operations specified in paragraph 5.1.1.2. of this appendix (with the exception of paragraph 5.1.1.2.4. of this appendix), replacing M by I in the formula set out in paragraph 5.1.1.2.7. of this appendix.

5.1.2.2.6. Adjust the brake to reproduce the corrected power (paragraph 5.1.1.2.11. of this appendix) and to take into account the difference between the vehicle mass (M) on the track and the equivalent inertia test mass (I) to be used. This may be done by calculating the mean corrected road coast down time from V_2 to V_1 and reproducing the same time on the dynamometer by the following relationship:

$$T_{corrected} = \frac{T_{measured}}{K} \cdot \frac{I}{M}$$

K = value specified in paragraph 5.1.1.2.11. above.

5.1.2.2.7. The power P_a to be absorbed by the dynamometer shall be determined in order to enable the same power (paragraph 5.1.1.2.11. of this appendix) to be reproduced for the same vehicle on different days."

Paragraph 5.2.1.2.7., amend to read:

"5.2.1.2.7. The average torque C_T determined on the track shall be corrected to the reference ambient conditions as follows:

$$C_{Tcorrected} = K \cdot C_{Tmeasured}$$

Where K has the value specified in paragraph 5.1.1.2.11. of this appendix."