|  |  |
| --- | --- |
|  | E/ECE/324/Rev.1/Add.82/Rev.3/Amend.9−E/ECE/TRANS/505/Rev.1/Add.82/Rev.3/Amend.9 |
|  |  | 21 March 2022 |

 Agreement

 Concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Regulations[[1]](#footnote-2)\*

(Revision 3, including the amendments which entered into force on 14 September 2017)

\_\_\_\_\_\_\_\_\_

 Addendum 82 – UN Regulation No. 83

 Revision 3 - Amendment 9

Supplement 14 to the 05 series of amendments – Date of entry into force: 7 January 2022

 Uniform provisions concerning the approval of vehicles with regard to the emission of pollutants according to engine fuel requirements

This document is meant purely as documentation tool. The authentic and legal binding text is: ECE/TRANS/WP.29/2021/68

**\_\_\_\_\_\_\_\_\_**

**UNITED NATIONS**

*Annex 4a, paragraph 5.1,* amend to read:

"5.1. Test procedure

The procedure for measuring the vehicle road load is described in Appendix 7a to this annex.

In the case where the vehicle road load has already been determined according to WLTP procedures as defined in UN GTR No. 15, the methodology, described in Appendix 7b may alternatively be used.

These procedures are not required if the chassis dynamometer load is to be set according to the reference mass of the vehicle."

*Annex 4a,* rename Appendix 7 to Appendix 7a.

*Annex 4a,* insert a new Appendix 7b:

**"Annex 4a - Appendix 7b**

 **Alternative procedure for determination of the total road load power of a vehicle**

1. Introduction

The purpose of this appendix is to provide the road load power calculation method that may be used, at the choice of manufacturer, when the vehicle road load has been determined according to WLTP procedures as defined in UN GTR No. 15.

2. Method

2.1. WLTP Road Load calculation of the vehicle

The WLTP Road Load of the vehicle shall be determined according to UN GTR No. 15 Annex 4 or in case the vehicle is part of an interpolation family, according to Annex 7 point 3.2.3.2.2. “Road Load calculation for an individual vehicle” considering as input parameters of the individual vehicle:

(a) The Test Mass of the vehicle[[2]](#footnote-3), fitted with its standard equipment;

(b) The RRC value of the applicable tyre energy class according to Table A4/2 of UN GTR No. 15 Annex 4 or, if the tyres on the front and rear axles belong to different energy efficiency classes, the weighted mean using the equation in paragraph 3.2.3.2.2.2.3. of UN GTR No. 15 Annex 7;

(c) The aerodynamic drag of the vehicle fitted with its standard equipment.

2.2. Calculation of the applicable (NEDC) road load of the vehicle

2.2.1. Effect of different tyre pressure prescriptions

The tyre pressure to be taken into account for the purpose of calculating the NEDC road load shall be the average between the two axles of the average between the minimum and maximum tyre pressure permitted for the selected tyres on each axle for the NEDC reference mass of the vehicle. The calculation shall be carried out with the following formula:

$$P\_{avg}=\left(\frac{P\_{max}+P\_{min}}{2}\right)$$

Where,

Pmax, is the average of the maximum tyre pressures of the selected tyres for the two axles;

Pmin, is the average of the minimum tyre pressures of the selected tyres for the two axles.

The corresponding effect in terms of resistance applied to the vehicle shall be calculated using the following formula:

$$TP=\left(\frac{P\_{avg}}{P\_{min}}\right)^{-0.4}$$

2.2.2. Effect of tyre tread depth

The effect in terms of the resistance applied to the vehicle shall be determined in accordance with the following formula:

 $TTD=\left(2∙\frac{0.1∙RM\_{n}∙9.81}{1000}\right)$

Where, RMn is the reference mass of the vehicle according to this Regulation

2.2.3. Effect of different consideration of rotating parts

During the WLTP coastdown setting, coastdown times are to be transferred to forces and vice versa by taking into account the applicable test mass plus the effect of rotational mass (3 % of the sum of the MRO and 25 kg). For the NEDC coastdown setting, coastdown times are to be transferred to forces and vice versa by neglecting the effect of rotational mass.

2.2.4. Determination of the NEDC road load coefficients

(a) The road load coefficient F0,n expressed in Newton (N) for vehicle shall be determined as follows:

(i) Effect of different inertia:

$$F\_{0n}^{1}=F\_{0w}∙\left(\frac{RM\_{n}}{TM\_{w}}\right)$$

Where:

RMn is the Reference Mass of the vehicle according to this Regulation

*F*0*w* is the road load coefficient F0 determined for the WLTP test of the vehicle;

TMw is the WLTP test mass of the vehicle fitted with its standard equipment.

(ii) Effect of different tyre pressure:

$$F\_{0n}^{2}=F\_{0n}^{1}∙TP$$

Where the factors $TP$ in the formula are as defined in point 2.2.1.

(iii) Effect of the inertia of rotating parts:

$$F\_{0n}^{3}=F\_{0n}^{2}∙\left(\frac{1}{1.03}\right)$$

(iv) Effect of different tyre tread depth:

$$F\_{0n}=F\_{0n}^{3}-TTD$$

Where the factors $TTD$ in the formula are as defined in point 2.2.2.

(b) The road load coefficient F1n for the vehicle shall be determined as follows:

$$F\_{1n}=F\_{1w}∙\left(\frac{1}{1.03}\right)$$

(c) The road load coefficient F2n for the vehicle shall be determined as follows:

$$F\_{2n}=F\_{2w}∙\left(\frac{1}{1.03}\right)$$

Where the factor $F\_{2w}$ is the WLTP road load coefficient F2 determined of the vehicle fitted with its standard equipment."

1. \* Former titles of the Agreement:

 Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958 (original version);

 Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, done at Geneva on 5 October 1995 (Revision 2). [↑](#footnote-ref-2)
2. As defined in UN GTR No.15 [↑](#footnote-ref-3)