

2 February 2021

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## **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\***

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

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#### **Addendum 82 – UN Regulation No. 83**

#### **Revision 4 - Amendment 14**

Supplement 14 to the 06 series of amendments – Date of entry into force: 3 January 2021

#### **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.29/2020/62.



**UNITED NATIONS**

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\* 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).

*Paragraph 5.3.1.2.1.2., amend to read:*

"5.3.1.2.1.2. Notwithstanding the requirement of paragraph 5.3.1.2.1.1., mono-fuel gas vehicles will be regarded for the Type I test as vehicles that can only run on a gaseous fuel."

*Paragraph 5.3.2.1.2., amend to read:*

"5.3.2.1.2. Notwithstanding the requirement of paragraph 5.3.2.1.1., mono-fuel gas vehicles will be regarded for the Type II test as vehicles that can only run on a gaseous fuel."

*Paragraph 5.3.3.1.2., amend to read:*

"5.3.3.1.2. Notwithstanding the requirement of paragraph 5.3.3.1.1., mono-fuel gas vehicles will be regarded for the Type III test as vehicles that can only run on a gaseous fuel."

*Add a new paragraph 5.3.9. to read:*

"5.3.9. Vehicles that use a reagent for the exhaust after-treatment system shall meet the requirements described in Appendix 6 to this Regulation."

#### *Appendix 6*

*Paragraph 1. amend to read:*

"1. Introduction

This appendix sets out the requirements for vehicles that rely on the use of a reagent for the after-treatment system in order to reduce emissions. Every reference in this appendix to 'reagent tank' shall be understood as also applying to other containers in which a reagent is stored

..."

#### *Annex 1*

*Paragraph 3. footnote \*\*, amend to read:*

"\*\* Mono-fuel gas vehicles will be regarded for the test as vehicles which can only run a gaseous fuel."

*Paragraph 3.2.12.2.5.5., amend to read:*

"3.2.12.2.5.5. Schematic drawing of the fuel tank with indication of nominal capacity and material: ....."

#### *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"

*Rename Appendix 7 to Appendix 7a.*

*Insert a new Appendix 7b, to read:*

## "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,<sup>1</sup> fitted with its standard equipment<sup>1</sup>
- (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 3.2.3.2.2.3. of UN GTR No. 15 Annex 4.
- (c) The aerodynamic drag of the vehicle fitted with its standard equipment<sup>1</sup>

##### 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,

$P_{max}$ , is the average of the maximum tyre pressures of the selected tyres for the two axles;

$P_{min}$ , 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:

$$TTD = \left( 2 \cdot \frac{0.1 \cdot RM_n^{9.81}}{1000} \right)$$

<sup>1</sup> As defined in UN GTR No. 15

Where,  $RM_n$  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  $F_{0n}$  expressed in Newton (N) for vehicle shall be determined as follows:

(i) Effect of different inertia:

$$F_{0n}^1 = F_{0w} \cdot \left( \frac{RM_n}{TM_w} \right)$$

Where:

$RM_n$  is the Reference Mass of the vehicle according to this Regulation

$F_{0w}$  is the road load coefficient  $F_0$  determined for the WLTP test of the vehicle;

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

(ii) Effect of different tyre pressure:

$$F_{0n}^2 = F_{0n}^1 \cdot TP$$

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

(iii) Effect of the inertia of rotating parts:

$$F_{0n}^3 = F_{0n}^2 \cdot \left( \frac{1}{1.03} \right)$$

(iv) Effect of different tyre tread depth:

$$F_{0n} = F_{0n}^3 \cdot TTD$$

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

(b) The road load coefficient  $F_{1n}$  for the vehicle shall be determined as follows:

$$F_{1n} = F_{1w} \cdot \left( \frac{1}{1.03} \right)$$

(c) The road load coefficient  $F_{2n}$  for the vehicle shall be determined as follows:

$$F_{2n} = F_{2w} \cdot \left( \frac{1}{1.03} \right)$$

Where the factor  $F_{2w}$  is the WLTP road load coefficient  $F_2$  determined of the vehicle fitted with its standard equipment."

Annex 7

Paragraph 4.7.2., amend to read:

"4.7.2. The chamber shall have one or more fans or blowers of like capacity 0.1 to 0.5 m<sup>3</sup>/sec with which to thoroughly mix the atmosphere in the enclosure. It shall be possible to attain an even temperature and hydrocarbon concentration in the chamber during measurements. The vehicle in the enclosure shall not be subjected to a direct stream of air from the fans or blowers"

*Annex 11*

*Paragraph 2.14.*, amend to read:

- "2.14. "Permanent emission default mode" refers to a case where the engine management controller permanently switches to a setting that does not require an input from a failed component or system where such a failed component or system would result in an increase in emissions from the vehicle to a level above the limits given in paragraph 3.3.2. of this annex.
- 2.14.1. Permanent in this context means that the default mode is not recoverable, i.e. the diagnostic or control strategy that caused the emission default mode cannot run in the next driving cycle and cannot confirm that the conditions that caused the emission default mode is not present anymore. All other emission default modes are considered not to be permanent."

*Add a new paragraph 2.21.*, to read:

- "2.21. "Limp-home routines" means any default mode other than emission default mode."

*Paragraph 3.1.1.*, amend to read:

- "3.1.1. Access to the OBD system required for the inspection, diagnosis, servicing or repair of the vehicle shall be unrestricted and standardised. All emission-related fault codes shall be consistent with paragraph 6.5.3.5. of Appendix 1 to this annex."

*Paragraph 3.5.1.*, amend to read:

- "3.5.1. The OBD system shall incorporate a malfunction indicator readily perceivable to the vehicle operator. The MI shall not be used for any other purpose except to indicate emergency start-up, emission default modes or limp-home routines which effect the emission system to the driver. The MI shall be visible in all reasonable lighting conditions. When activated, it shall display a symbol in conformity with ISO 2575. A vehicle shall not be equipped with more than one general purpose MI for emission-related problems. Separate specific purpose tell tales (e. g. brake system, fasten seat belt, oil pressure, etc.) are permitted. The use of red colour for an MI is prohibited."

*Paragraph 3.8.1.*, amend to read:

- "3.8.1. The OBD system may erase a fault code and the distance travelled and freeze-frame information if the same fault is not re-registered in at least 40 engine warm-up cycles or 40 driving cycles with vehicle operation in which the following criteria (a) to (c) are satisfied:
- (a) Cumulative time since engine start is greater than or equal to 600 seconds;
  - (b) Cumulative vehicle operation at or above 40 km/h occurs for greater than or equal to 300 seconds;
  - (c) Continuous vehicle operation at idle (i.e. accelerator pedal released by driver and vehicle speed less than or equal to 1.6 km/h) for greater than or equal to 30 seconds."

*Paragraph 7.3.2.*, amend to read:

- "7.3.2. In addition to the requirements of paragraph 7.3.1. of this appendix:
- (a) Secondary air system monitor denominator(s) shall be incremented if the commanded "on" operation of the secondary air system occurs for a time greater than or equal to 10 seconds. For purposes of determining this commanded "on" time, the OBD system may not include time during intrusive operation of the secondary air system solely for the purposes of monitoring.

- (b) Denominators of monitors of systems only active during cold start shall be incremented if the component or strategy is commanded "on" for a time greater than or equal to 10 seconds.
- (c) The denominator(s) for monitors of Variable Valve Timing (VVT) and/or control systems shall be incremented if the component is commanded to function (e.g., commanded "on", "open", "closed", "locked", etc.) on two or more occasions during the driving cycle or for a time greater than or equal to 10 seconds, whichever occurs first.
- (d) For the following monitors, the denominator(s) shall be incremented by one if, in addition to meeting the requirements of this paragraph on at least one driving cycle, at least 800 cumulative kilometres of vehicle operation have been experienced since the last time the denominator was incremented:
  - (i) Diesel oxidation catalyst;
  - (ii) Diesel particulate filter.
- (e) Without prejudice to requirements for the increment of denominators of other monitors the denominators of monitors of the following components shall be incremented if and only if the driving cycle started with a cold start:
  - (i) Liquid (oil, engine coolant, fuel, SCR reagent) temperature sensors;
  - (ii) Clean air (ambient air, intake air, charge air, inlet manifold) temperature sensors;
  - (iii) Exhaust (EGR recirculation/cooling, exhaust gas turbo-charging, catalyst) temperature sensors;
- (f) The denominators of monitors of the boost pressure control system shall be incremented if all of the following conditions are met:
  - (i) The general denominator conditions are fulfilled;
  - (ii) The boost pressure control system is active for a time greater than or equal to 15 seconds.
- (g) Manufacturers may request to use special denominator conditions for certain components or systems, and this request can be approved only if it can be demonstrated to the Type Approval Authority by submitting data and/or an engineering evaluation that other conditions are necessary to allow for reliable detection of malfunctions."

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