

11 July 2016

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## 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\***

(Revision 2, including the amendments which entered into force on 16 October 1995)

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#### **Addendum 84 – Regulation No. 85**

#### **Revision 1 - Amendment 1**

Supplement 7 to the original version of the Regulation – Date of entry into force: 18 June 2016

#### **Uniform provisions concerning the approval of internal combustion engines or electric drive trains intended for the propulsion of motor vehicles of categories M and N with regard to the measurement of the net power and the maximum 30 minutes power of electric drive trains**

This document is meant purely as documentation tool. The authentic and legal binding text is: ECE/TRANS/WP.29/2015/102.



**UNITED NATIONS**

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\* Former title 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.

Annex 5,

Paragraph 2.3.2., Table 1, footnote 1b, amend to read:

"1b The complete exhaust system shall be fitted as provided for the intended application:  
...

The exit from the engine exhaust system is defined as a point 150 mm downstream from the termination of the part of the exhaust system mounted on the engine."

Paragraphs 5.4. to 5.4.3. (adding a new paragraph 5.4.3.), amend to read:

"5.4. Determination of correction factor  $\alpha_a$  and  $\alpha_d$  <sup>1</sup>

5.4.1. Naturally aspirated or pressure-charged positive-ignition engine factor  $\alpha_a$

The correction factor  $\alpha_a$  is obtained by applying the formula: <sup>2</sup>

$$\alpha_a = \left( \frac{99}{P_s} \right)^{1.2} \cdot \left( \frac{T}{298} \right)^{0.6}$$

Where

$P_s$  is the total dry atmospheric pressure in kilopascals (kPa); that is to say, the total barometric pressure minus water vapour pressure

$T$  is the absolute temperature in kelvins (K) of the air drawn in by the engine.

Conditions to be complied with in the laboratory

For a test to be valid, the correction factor  $\alpha_a$  must be such that  
 $0.93 \leq \alpha_a \leq 1.07$

If these limits are exceeded, the corrected value obtained shall be given and the test conditions (temperature and pressure) precisely stated in the test report.

5.4.2. Diesel engines - Factor  $\alpha_d$

The power correction factor ( $\alpha_d$ ) for diesel engines at constant fuel rate is obtained by applying the formula:

Where  $\alpha_d = (f_a) f_m$

$f_a$  is the atmospheric factor

$f_m$  is the characteristic parameter for each type of engine and adjustment

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<sup>1</sup> The tests may be carried out in air-conditioned test rooms where the atmospheric conditions may be controlled.

<sup>2</sup> In the case of engines fitted with automatic air temperature control, if the device is such that at full load at 25 °C no heated air is added, the test shall be carried out with the device fully closed. If the device is still operating at 25 °C then the test is made with the device operating normally and the exponent of the temperature term in the correction factor shall be taken as zero (no temperature correction).

5.4.2.1. Atmospheric factor  $f_a$

This factor indicates the effects of environmental conditions (pressure, temperature and humidity) on the air drawn in by the engine. The atmospheric factor formula differs according to the type of engine.

5.4.2.1.1. Naturally aspirated and mechanically supercharged engines

$$f_a = \left(\frac{99}{P_s}\right) \cdot \left(\frac{T}{298}\right)^{0.7}$$

5.4.2.1.2. Turbocharged engines with or without cooling of inlet air

$$f_a = \left(\frac{99}{P_s}\right)^{0.7} \cdot \left(\frac{T}{298}\right)^{1.5}$$

5.4.2.2. Engine factor  $f_m$

$f_m$  is a function of  $q_c$  (fuel flow corrected) as follows:

$$f_m = 0.036 q_c - 1.14$$

Where:  $q_c = q/r$

Where:

$q$  is the fuel flow in milligram per cycle per litre of total swept volume (mg/(l.cycle))

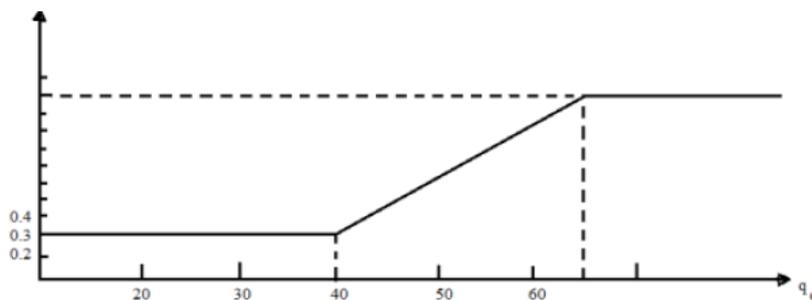
$r$  is the pressure ratio of compressor outlet and compressor inlet

( $r = 1$  for naturally aspirated engines)

This formula is valid for a value interval of  $q_c$  included between 40 mg/(l.cycle) and 65 mg/(l.cycle.)

For  $q_c$  values lower than 40 mg/(l.cycle), a constant value of  $f_m$  equal to 0.3 ( $f_m = 0.3$ ) will be taken.

For  $q_c$  values higher than 65 mg/(l.cycle), a constant value of  $f_m$  equal to 1.2 ( $f_m = 1.2$ ) will be taken (see figure):



5.4.2.3. Conditions to be complied with in the laboratory

For a test to be valid; the correction factor  $\alpha_d$  must be such that  $0.9 \leq \alpha_d \leq 1.1$ . If these limits are exceeded, the corrected value obtained shall be given and the test conditions (temperature and pressure) precisely stated in the test report.

5.4.3. When a turbocharged engine is fitted with a system which allows compensating the ambient conditions temperature and altitude, at the request of the manufacturer, the correction factor  $\alpha_a$  or  $\alpha_d$  shall be set to the value of 1."

*Appendix,*

*Item 4, amend to read:*

"4. ...

Engine speed, min <sup>-1</sup>		
...		
Net power, kW		
Net torque, Nm		
...		

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