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## Economic Commission for Europe

### Inland Transport Committee

### World Forum for Harmonization of Vehicle Regulations

#### 193rd session

Geneva, 25–28 June 2024

Item 4.7.10. of the provisional agenda

#### 1958 Agreement:

Consideration of draft amendments to existing

UN Regulations submitted by GRPE

## **Proposal for Supplement 1 to the 02 series of amendments to UN Regulation No. 120 (Uniform provisions concerning the approval of internal combustion engines to be installed in agricultural and forestry tractors and in non-road mobile machinery, with regard to the measurement of the net power, net torque and specific fuel consumption)**

### **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 ninetieth session (ECE/TRANS/WP.29/GRPE/90, para. 56). It is based on ECE/TRANS/WP.29/GRPE/2024/17 and GRPE-90-13 as amended by Annex XI of the session 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 2024 sessions.

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\* In accordance with the programme of work of the Inland Transport Committee for 2024 as outlined in proposed programme budget for 2024 (A/78/6 (Sect. 20), table 20.5), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

Paragraph 5.2.1., amend to read:

- "5.2.1. The net power test shall consist of either:
- (a) A run at full throttle for mechanically controlled positive ignition engines;
  - (b) A run at fixed full load fuel-injection-pump setting for mechanically controlled compression ignition engines; or
  - (c) A run at the required fuel system settings to produce the manufacturer specified power for electronically controlled engines.
- The engine shall be equipped as specified in Table 1 of Annex 4 to this Regulation."

Paragraph 5.2.3., amend to read:

- "5.2.3. The testing of an engine type or engine family shall be carried out by using the following reference fuels or fuel combinations described in Annex 7, as appropriate:
- (a) Diesel;
  - (b) Petrol;
  - (c) Petrol/oil mixture, for two stroke SI engines;
  - (d) Natural gas/bio methane;
  - (e) Liquid petroleum gas (LPG);
  - (f) Ethanol;
  - (g) Hydrogen.
- The engine type or engine family shall, in addition, meet the requirements set out in paragraph 5.1.1. in respect of any other specified fuels, fuel mixtures or fuel emulsions included by a manufacturer in an application for type- approval and described in Annex 1 to this Regulation."

Insert new Paragraph 5.4.2.1.3., to read:

- "5.4.2.1.3. 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."

Annex 1 - Appendix A1, paragraph 2.8.1., amend to read:

- "2.8.1. Fuel Type <sup>1</sup>: Diesel (non-road gas-oil)/Ethanol for dedicated compression ignition engines (ED95)/Petrol (E10)/ Ethanol (E85)/(Natural gas/Biomethane)/Liquid Petroleum Gas (LPG) / Hydrogen"

Annex 1 - Appendix A1, paragraph 3.14.1., amend to read:

"3.14.1.	Fuel: LPG /NG-H/NG-L /NG-HL/LNG/Fuel specific LNG/Hydrogen"					
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Annex 2, paragraph 2.8.1., amend to read:

- "2.8.1. Fuel Type(s): Diesel (non-road gas-oil)/Ethanol for dedicated compression ignition engines (ED95)/Petrol (E10)/ Ethanol (E85)/(Natural gas/Biomethane)/Liquid Petroleum Gas (LPG) <sup>2</sup> / Hydrogen"

Annex 2 - Appendix A.1 - Template for Test Report A.1.3, insert new paragraph to read:

- "4.5. Gaseous Fuel - Hydrogen
- 4.5.1. Make .....
- 4.5.2. Type .....

- 4.5.3. Grade.....
- 4.6. Dual-fuel engine (in addition to relevant sections above)
- 4.6.1. Gas energy ratio on test cycle: ....."

*Annex 4, paragraph 3.10., amend to read:*

"3.10. For C.I. engines, the fuel temperature shall be measured at the inlet of the fuel injection pump and maintained within 306 - 316 K (33-43 °C) for positive-ignition engines the fuel temperature shall be measured as near as possible to the inlet of the carburettor or assembly of fuel injectors and maintained within 293–303 K (20-30 °C)."

*Annex 5, paragraph 2.3.6., amend to read:*

- "2.3.6. Fuel type
- (a) Diesel (non-road gas-oil);
  - (b) Ethanol for dedicated compression ignition engines (ED95);
  - (c) Petrol (E10);
  - (d) Ethanol (E85);
  - (e) Natural gas/Biomethane:
    - (i) Universal fuel — high calorific fuel (H-gas) and low calorific fuel (L-gas);
    - (ii) Restricted fuel — high calorific fuel (H-gas);
    - (iii) Restricted fuel — low calorific fuel (L-gas);
    - (iv) Fuel specific (LNG);
  - (f) Liquid Petroleum Gas (LPG);
  - (g) Hydrogen"

*Annex 7, insert new paragraph 3.3., to read:*

3.3. Type: Hydrogen

<i>Parameter</i>	<i>Unit</i>	<i>Limits</i>		<i>Test method</i>
		<i>Minimum</i>	<i>Maximum</i>	
Hydrogen fuel index	%	99.97		1
Total non-hydrogen gases	µmol/mol		300	
Lists of non-hydrogen gases and the specification of each contaminant <sup>6</sup> :				
Water (H <sub>2</sub> O)	µmol/mol		5	5
Total hydrocarbons except methane (C1 equivalent) <sup>2</sup>	µmol/mol		2	5
Methane (CH <sub>4</sub> )	µmol/mol		100	5
Oxygen (O <sub>2</sub> )	µmol/mol		5	5
Helium (He)	µmol/mol		300	5
Nitrogen (N <sub>2</sub> )	µmol/mol		300	5

Argon (Ar)	µmol/mol		300	5
Carbon dioxide (CO <sub>2</sub> )	µmol/mol		2	5
Carbon monoxide (CO) <sup>3</sup>	µmol/mol		0.2	5
Total sulphur compounds (H <sub>2</sub> S basis) <sup>4</sup>	µmol/mol		0.004	5
Formaldehyde (HCHO)	µmol/mol		0.2	5
Formic acid (HCOOH)	µmol/mol		0.2	5
Ammonia (NH <sub>3</sub> )	µmol/mol		0.1	5
Total halogenated compounds (Halogenate ion basis)	µmol/mol		0.05	5

*Notes*

- <sup>1</sup> The hydrogen fuel index is determined by subtracting the "total non-hydrogen gases" in this table, expressed in mole per cent, from 100 mole per cent.
- <sup>2</sup> Total hydrocarbons except methane include oxygenated organic species.
- <sup>3</sup> The sum of measured CO, HCHO and HCOOH shall not exceed 0.2 µmol/mol
- <sup>4</sup> As a minimum, total sulphur compounds include H<sub>2</sub>S, COS, CS<sub>2</sub> and mercaptans, which are typically found in natural gas.
- <sup>5</sup> Test method shall be documented. Test methods defined in ISO21087 are preferable.
- <sup>6</sup> The analysis of specific contaminants depending on the production process shall be exempted. The manufacturer shall provide the approval authority reasons for exempting specific contaminants."