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1958 Agreement:

Consideration of draft amendments

to existing UN Regulations submitted by GRPE

Proposal for Supplement 9 to the 07 series of amendments to UN Regulation No. 83 (Emissions of M₁ and N₁ 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-eighth session (ECE/TRANS/WP.29/GRPE/78, para. 10). It is based on Annexes IV and VI to ECE/TRANS/WP.29/GRPE/78. 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 2019 sessions.

* In accordance with the programme of work of the Inland Transport Committee for 2018–2019 (ECE/TRANS/274, para. 123 and ECE/TRANS/2018/21, Cluster 3.1), 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.

Supplement 9 to the 07 series of amendments to UN Regulation No. 83 (Emissions of M₁ and N₁ vehicles)

Paragraph 5.2., Table A, footnote 7, amend to read:

"⁷ Upon the choice of the manufacturer vehicles with positive and compression ignition engines may be tested with either E5 or E10 and either B5 or B7 fuels, respectively. This decision shall be reflected where applicable in the approval character as described in Table A3/1"

Paragraph 5.2.1., amend to read:

"5.2.1. Positive ignition engine-powered vehicles and hybrid electric vehicles equipped with a positive ignition engine shall be subject to the following tests:

- Type I (verifying the average exhaust emissions after a cold start);
- Type II (carbon monoxide emission at idling speed);
- Type III (emission of crankcase gases);
- Type IV (evaporation emissions);
- Type V (durability of anti-pollution devices);
- Type VI (verifying the average low ambient temperature carbon monoxide and hydrocarbon exhaust emissions after a cold start;

OBD-test."

Paragraph 5.2.2., amend to read:

"5.2.2. Positive ignition engine-powered vehicle and hybrid electric vehicles equipped with positive ignition engine fuelled with LPG or NG/biomethane (mono or bi-fuel) shall be subjected to the following tests (according to Table A):

- Type I (verifying the average exhaust emissions after a cold start);
- Type II (carbon monoxide emissions at idling speed);
- Type III (emission of crankcase gases);
- Type IV (evaporative emissions), where applicable;
- Type V (durability of anti-pollution devices);
- Type VI (verifying the average low ambient temperature carbon monoxide and hydrocarbon exhaust emissions after a cold start), where applicable,

OBD test."

Paragraph 5.3.1.4., Table 1, footnote 2, amend to read:

"² A particulate number emission limit of 6.0×10^{12} #/km shall apply to PI direct injection vehicles upon the choice of the manufacturer. This decision shall be reflected where applicable in the approval character as described in Table A3/1"

Insert a new paragraph 12.2.5., to read:

"12.2.5. From the entry into force of this supplement [number to be inserted] the type approvals according to the characters ZD, ZE and ZF shall be considered to be the latest level for the purposes of mutual recognition for their respective vehicle categories. "

Paragraph 12.3.1., amend to read:

"12.3.1. Contracting Parties applying this Regulation may grant approvals to those vehicles which comply with any previous series of amendments, or to any level of this Regulation, provided that the vehicles are intended for sale or for export to countries that apply the relating requirements in their national legislations. 'Any level of this regulation' shall also be understood to mean any approval character in Table A3/1."

Paragraph 13., amend to read:

"13. The Contracting Parties to the 1958 Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Type Approval Authorities which grant approval and to which forms certifying approval or extension, or refusal or withdrawal of approval, issued in other countries, are to be sent.¹"

Appendix 3 Paragraph 6.1.1., amend to read:

"6.1.1. For tailpipe emissions more than one vehicle is found to be an outlying emitter that meets either of the following conditions:

(a) The conditions of paragraph 3.2.2. of Appendix 4 to this Regulation and where both the Type Approval Authority and the manufacturer agree that the excess emission is due to the same cause; or

(b) The conditions of paragraph 3.2.3. of Appendix 4 to this Regulation where the Type Approval Authority has determined that the excess emission is due to the same cause."

Appendix 5 Paragraph 2., amend to read:

"2. The manufacturer shall compile all the information needed to comply with the requirements of paragraph 9. and Appendices 3, 4 and 5 of this Regulation. The Type Approval Authority may also take information from surveillance programmes into consideration."

Appendix 6 Paragraph 9.4., amend to read:

"9.4. The instructions shall specify that use of, and refilling of, a required reagent of the correct specifications is mandatory for the vehicle to comply with its certificate of conformity."

Annex 1 Paragraph 3.2.12.2.6.2., amend to read:

"3.2.12.2.6.2. Type and design of particulate trap:"

Annex 3, footnote to Table A3/1, amend to read:

"Emissions standard key

- A Emission requirements according to the limits in Table 1 of paragraph 5.3.1.4. of this Regulation, but allowing complying with the preliminary values for particulate numbers for PI vehicles as detailed in footnote 2 to that table and using any applicable reference fuel;
- B Emission requirements according to the limits in Table 1 of paragraph 5.3.1.4. of this Regulation, including complying with the final particulate number

¹ This communication shall be done via the "343-app" that is available at: https://apps.unece.org/WP29_application

standards for PI vehicles in the table without reference to footnote 2 and use of E10 and B7 reference fuel (where applicable). "

Annex 5, Paragraph 3.1., amend to read:

- "3.1. The sampling probe shall be inserted into the exhaust pipe to a depth of at least 300 mm or into the pipe connecting the exhaust with the sampling bag and as close as possible to the exhaust."

Annex 7, paragraph 4.2.1., amend to read:

- "4.2.1. Variable-volume enclosure

The variable-volume enclosure expands and contracts in response to the temperature change of the air mass in the enclosure. Two potential means of accommodating the internal volume changes are movable panel(s), or a bellows design, in which an impermeable bag or bags inside the enclosure expand(s) and contract(s) in response to internal pressure changes by exchanging air from outside the enclosure. Any design for volume accommodation shall maintain the integrity of the enclosure as specified in Appendix 1 to this annex over the specified temperature range.

Any method of volume accommodation shall limit the differential between the enclosure internal pressure and the barometric pressure to a maximum value of ± 5 hPa.

The enclosure shall be capable of latching to a fixed volume. A variable volume enclosure shall be capable of accommodating a +7 per cent change from its "nominal volume" (see paragraph 2.1.1. of Appendix 1 to this annex.), taking into account temperature and barometric pressure variation during testing. "

Annex 7, paragraph 4.6.2., amend to read:

- "4.6.2. The accuracy of the pressure recording system shall be within ± 0.3 kPa and the pressure shall have resolution of 0.025 kPa. "

Delete Annex 7, paragraphs 4.9. and 4.9.1.

Annex 7, Paragraph 5.1.3.3., amend to read:

- "5.1.3.3. The canister is connected to a fuel tank, possibly an external one, filled with reference fuel, to 40 per cent capacity of the fuel tank(s)."

Annex 7, paragraph 6.1., amend to read:

- "6.1. Calculation of evaporative test results

- 6.1.1. The evaporative emission tests described in paragraph 5. of this annex allow the hydrocarbon emissions from the diurnal and hot soak phases to be calculated. Evaporative losses from each of these phases is calculated using the initial and final hydrocarbon concentrations, temperatures and pressures in the enclosure, together with the net enclosure volume. The formula below is used:

$$M_{HC} = k \cdot V \cdot 10^{-4} \left(\frac{C_{HC,f} \cdot P_f}{T_f} - \frac{C_{HC,i} \cdot P_i}{T_i} \right) + M_{HC,out} - M_{HC,i}$$

Where:

M_{HC} = hydrocarbon mass in grams,

$M_{HC,out}$	= mass of hydrocarbon exiting the enclosure, in the case of fixed volume enclosures for diurnal emission testing (grams),
$M_{HC,i}$	= mass of hydrocarbon entering the enclosure, in the case of fixed volume enclosures for diurnal emission testing (grams),
C_{HC}	= measured hydrocarbon concentration in the enclosure (ppm volume in C1 equivalent),
V	= net enclosure volume in cubic metres corrected for the volume of the vehicle, with the windows and the luggage compartment open. If the volume of the vehicle is not determined a volume of 1.42 m ³ is subtracted,
T	= ambient chamber temperature, in K,
P	= barometric pressure in kPa,
H/C	= hydrogen to carbon ratio,
k	= $1.2 \cdot (12 + H/C)$;

Where:

i	= is the initial reading,
f	= is the final reading,
H/C	= is taken to be 2.33 for diurnal test losses,
H/C	= is taken to be 2.20 for hot soak losses.

6.1.2. As an alternative to the equation in paragraph 6.1.1. of this Annex, for variable volume enclosures the following equation may be used at the choice of the manufacturer:

$$M_{HC} = k \times V \times \frac{P_i}{T_i} (C_{HCf} - C_{HCi})$$

Where:

M_{HC}	= hydrocarbon mass in grams,
C_{HC}	= measured hydrocarbon concentration in the enclosure (ppm volume in C ₁ equivalent),
V	= net enclosure volume in cubic metres corrected for the volume of the vehicle, with the windows and the luggage compartment open. If the volume of the vehicle is not determined a volume of 1.42 m ³ is subtracted;
T_i	= initial ambient chamber temperature, in K,
P_i	= initial barometric pressure in kPa,
H/C	= hydrogen to carbon ratio,
H/C	= is taken to be 2.33 for diurnal test losses;
H/C	= is taken to be 2.20 for hot soak losses;
k	= is $1.2 \times 10^{-4} \times (12 + H/C)$, in (g × K/(m ³ × kPa));"

Annex 7, Appendix 1, paragraph 2.4., amend to read:

"2.4. Calculations of evaporative test results

- 2.4.1. The calculation of net hydrocarbon mass change within the enclosure is used to determine the chamber's hydrocarbon background and leak rate. Initial and final readings of hydrocarbon concentration, temperature and barometric pressure are used in the following formula to calculate the mass change.

$$M_{HC} = k \cdot V \cdot 10^{-4} \left(\frac{C_{HC,f} \cdot P_f}{T_f} - \frac{C_{HC,i} \cdot P_i}{T_i} \right) + M_{HC,out} - M_{HC,i}$$

Where:

- M_{HC} = hydrocarbon mass in grams,
 $M_{HC,out}$ = mass of hydrocarbon exiting the enclosure, in the case of fixed volume enclosures for diurnal emission testing (grams),
 $M_{HC,i}$ = mass of hydrocarbon entering the enclosure when a fixed volume enclosure is used for diurnal emissions (grams),
 C_{HC} = hydrocarbon concentration in the enclosure (ppm carbon (Note : ppm carbon = ppm propane x 3)),
 V = enclosure volume in cubic metres,
 T = ambient temperature in the enclosure, (K),
 P = barometric pressure, (kPa),
 k = 17.6

Where:

- i = is the initial reading,
 f = is the final reading,

- 2.4.2. As an alternative to the equation in paragraph 2.4.1. of this Annex, for variable volume enclosures the following equation may be used at the choice of the manufacturer:

$$M_{HC} = k \times V \times \frac{P_i}{T_i} (C_{HCf} - C_{HCi})$$

Where:

- M_{HC} = hydrocarbon mass in grams,
 C_{HC} = measured hydrocarbon concentration in the enclosure (ppm volume in C_1 equivalent),
 V = net enclosure volume in cubic metres,
 T_i = initial ambient chamber temperature, in K,
 P_i = initial barometric pressure in kPa,
 k = is 17.6"

Annex 10a Paragraph 1.3. Footnote 3, amend to read:

"³ The hydrogen shall not contain dust, sand, dirt, gums, oils, or other substances in an amount sufficient to damage the fuelling station equipment **or** the vehicle (engine) being fuelled."

Annex 11, Paragraph 2.2., amend to read:

- "2.2. "Vehicle type" means a category of power-driven vehicles which do not differ in essential engine and OBD system characteristics."

Annex 11 Appendix 1, Paragraph 6.5.3.4., amend to read:

"6.5.3.4. Basic diagnostic data, (as specified in paragraph 6.5.1.) and bi-directional control information shall be provided using the format and units described in the standard listed in paragraph 6.5.3.2.(a) of this appendix and must be available using a diagnostic tool meeting the requirements of the standard listed in paragraph 6.5.3.2.(b) of this appendix.

The vehicle manufacturer shall provide to a national standardisation body the details of any emission-related diagnostic data, e.g. PID's, OBD monitor Id's, Test ID's not specified in the standard listed in paragraph 6.5.3.2.(a) of this appendix but related to this Regulation."

Annex 11 Appendix 1, Paragraph 6.5.3.6., amend to read:

"6.5.3.6. The connection interface between the vehicle and the diagnostic tester shall be standardised and shall meet all the requirements of the standard listed in paragraph 6.5.3.2.(c) of this appendix. The installation position shall be subject to agreement of the Type Approval Authority such that it is readily accessible by service personnel but protected from tampering by non-qualified personnel."
