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Light vehicles:
UN Regulations Nos. 68 (Measurement of the maximum speed, including electric vehicles), 83 (Emissions of M_1 and N_1 vehicles), 101 (CO2 emissions/fuel consumption), 103 (Replacement pollution control devices) and 154 (Worldwide harmonized Light vehicles Test Procedures (WLTP))

Proposal for a new Supplement to the 06 and 07 Series of Amendments to UN Regulation No. 83 (Emissions of M_1 and N_1 vehicles)

Submitted by the experts from the International Organization of Motor Vehicle Manufacturers*

This document proposes to amend the scope of UN Regulation No. 83 to allow type approval of vehicles that previously where only within the scope as an extension based on their reference mass. The contents of this document are based on informal document GRPE-91-12-Rev1 from the 91st GRPE. The modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2025 as outlined in proposed programme budget for 2025 (A/79/6 (Sect. 20), table 20.6), 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.

I. Proposal

In the 06 and 07 Series of Amendments,

Paragraph 1.1., amend to read:

"1.1. This Regulation shall apply to vehicles of categories M_1, M_2, N_1 and N_2 with a reference mass not exceeding 2,610 kg.[1)]

At the manufacturer's request, type approval ~~granted~~ under this Regulation may be **granted** ~~extended from vehicles mentioned above~~ to M_1, M_2, N_1 and N_2 vehicles with a reference mass not exceeding 2,840 kg and which meet the conditions laid down in this Regulation.

At the manufacturer's request, type approval granted under this Regulation may be extended from vehicles mentioned above to special purpose vehicles of categories M_1, M_2, N_1 and N_2 regardless of their reference mass. The manufacturer shall demonstrate to the Type Approval Authority which granted the type approval that the vehicle in question is a special purpose vehicle.[1)] "

Annex 4A - Paragraph 3.2.2., amend to read:

"3.2.2. The exhaust device shall not exhibit any leak likely to reduce the quantity of gas collected, which quantity shall be that emerging from the engine. **If applicable, openings in the exhaust system designed to remove condensate shall be sealed prior to the test.**

Openings in the exhaust system designed to remove condensate shall fulfil the following requirements:

(a) The openings shall be located downstream of the last component reducing tailpipe emissions (e.g. catalytic converter, particulate trap) of the exhaust after-treatment system.

(b) The openings shall be documented within the information document set out in Annex 1 to this Regulation. "

Annex 7 - Paragraph 5.1.1., amend to read:

"5.1.1. The vehicle is mechanically prepared before the test as follows:

(a) The exhaust system of the vehicle shall not exhibit any leaks. **Openings in the exhaust system designed to remove condensate as described in paragraph 3.2.2. of Annex 4a shall be sealed prior to the test**;

(b) The vehicle may be steam-cleaned before the test;

(c) In the case of use of the gasoline canister load option (paragraph 5.1.5. of this annex) the fuel tank of the vehicle shall be equipped with a temperature sensor to enable the temperature to be measured at the mid-point of the fuel in the fuel tank when filled to 40 per cent of its capacity;

(d) Additional fittings, adapters of devices may be fitted to the fuel system in order to allow a complete draining of the fuel tank. For this purpose it is not necessary to modify the shell of the tank;

(e) The manufacturer may propose a test method in order to take into account the loss of hydrocarbons by evaporation coming only from the fuel system of the vehicle. "

In the 06 Series of Amendments,

Annex 4A - Appendix 2, Paragraph 1.3.2., amend to read:

"1.3.2. Dilution Air Conditioning The dilution air used for the primary dilution of the exhaust in the CVS tunnel shall be passed through a medium capable of reducing particles in the most penetrating particle size of the filter material by ≥ 99.95 per cent, or through a filter of at least class H13 of EN 1822:~~1998~~**2019**.

This represents the specification of High Efficiency Particulate Air (HEPA) filters. The dilution air may optionally be charcoal scrubbed before being passed to the HEPA filter. It is recommended that an additional coarse particle filter is situated before the HEPA filter and after the charcoal scrubber, if used. At the vehicle manufacturer's request, the dilution air may be sampled according to good engineering practice to determine the tunnel contribution to background particulate mass levels, which can then be subtracted from the values measured in the diluted exhaust."

Annex 4A - Appendix 5, Paragraph 2.1.3., amend to read:

"2.1.3. Calibration shall be traceable to a standard calibration method:

(a) By comparison of the response of the PNC under calibration with that of a calibrated aerosol electrometer when simultaneously sampling electrostatically classified calibration particles; or

(b) By comparison of the response of the PNC under calibration with that of a second PNC which has been directly calibrated by the above method.

In the electrometer case, calibration shall be undertaken using at least six standard concentrations spaced as uniformly as possible across the PNC's measurement range. These points will include a nominal zero concentration point produced by attaching HEPA filters of at least class H13 of EN 1822:~~2008~~**2019**, or equivalent performance, to the inlet of each instrument. With no calibration factor applied to the PNC under calibration, measured concentrations shall be within ±10 per cent of the standard concentration for each concentration used, with the exception of the zero point, otherwise the PNC under calibration shall be rejected. The gradient from a linear regression of the two data sets shall be calculated and recorded. A calibration factor equal to the reciprocal of the gradient shall be applied to the PNC under calibration. Linearity of response is calculated as the square of the Pearson product moment correlation coefficient (R^2) of the two data sets and shall be equal to or greater than 0.97. In calculating both the gradient and R^2 the linear regression shall be forced through the origin (zero concentration on both instruments).

In the reference PNC case, calibration shall be undertaken using at least six standard concentrations across the PNC's measurement range. At least three points shall be at concentrations below 1,000 cm^{-3}, the remaining concentrations shall be linearly spaced between 1,000 cm^{-3} and the maximum of the PNC's range in single particle count mode. These points will include a nominal zero concentration point produced by attaching HEPA filters of at least class H13 of EN 1822:~~2008~~**2019**, or equivalent performance, to the inlet of each instrument. With no calibration factor applied to the PNC under calibration, measured concentrations shall be within ±10 per cent of the standard concentration for each concentration, with the exception of the zero point, otherwise the PNC under calibration shall be rejected. The gradient from a linear regression of the two data sets shall be calculated and recorded. A calibration factor equal to the reciprocal of the gradient shall be applied to the PNC under calibration. Linearity of response is calculated as the square of the Pearson product moment correlation coefficient (R^2) of the two data sets and shall be equal to or greater than 0.97. In calculating both the gradient and R^2 the linear regression shall be forced through the origin (zero concentration on both instruments)."

Annex 4A - Appendix 5, Paragraph 2.3.1., amend to read:

"2.3.1. Prior to each test, the particle counter shall report a measured concentration of less than 0.5 particles cm^{-3} when a HEPA filter of at least class H13 of EN 1822:~~2008~~**2019**, or equivalent performance, is attached to the inlet of the entire particle sampling system (VPR and PNC)."

Annex 4A - Appendix 5, Paragraph 2.3.3., amend to read:

"2.3.3. Each day, following the application of a HEPA filter of at least class H13 of EN 1822:~~2008~~**2019**, or equivalent performance, to the inlet of the particle counter, the particle counter shall report a concentration of ≤ 0.2 cm^{-3}. Upon removal of this filter, the particle counter shall show an increase in measured concentration to at least 100 particles cm^{-3} when challenged with ambient air and a return to ≤ 0.2 cm^{-3} on replacement of the HEPA filter."

In the 07 Series of Amendments,

Annex 4A - Appendix 2, Paragraph 1.3.2., amend to read:

"1.3.2. Dilution air conditioning

The dilution air used for the primary dilution of the exhaust in the Constant Volume Sampling (CVS) tunnel shall be passed through a medium capable of reducing particulates in the most penetrating particulate size of the filter material by ≥ 99.95 per cent, or through a filter of at least class H13 of EN 1822:~~1998~~**2019**. This represents the specification of High Efficiency Particulate Air (HEPA) filters. The dilution air may optionally be charcoal scrubbed before being passed to the HEPA filter. It is recommended that an additional coarse particulate filter is situated before the HEPA filter and after the charcoal scrubber, if used.

At the vehicle manufacturer's request, the dilution air may be sampled according to good engineering practice to determine the tunnel contribution to background particulate mass levels, which can then be subtracted from the values measured in the diluted exhaust."

Annex 4A - Appendix 5, Paragraph 2.1.3., amend to read:

"2.1.3. Calibration shall be traceable to a standard calibration method:

(a) By comparison of the response of the PNC under calibration with that of a calibrated aerosol electrometer when simultaneously sampling electrostatically classified calibration particulates; or

(b) By comparison of the response of the PNC under calibration with that of a second PNC which has been directly calibrated by the above method.

In the electrometer case, calibration shall be undertaken using at least six standard concentrations spaced as uniformly as possible across the PNC's measurement range. These points will include a nominal zero concentration point produced by attaching HEPA filters of at least class H13 of EN 1822:~~1998~~**2019**, or equivalent performance, to the inlet of each instrument. With no calibration factor applied to the PNC under calibration, measured concentrations shall be within ± 10 per cent of the standard concentration for each concentration used, with the exception of the zero point, otherwise the PNC under calibration shall be rejected. The gradient from a linear regression of the two data sets shall be calculated and recorded. A calibration factor equal to the reciprocal of the gradient shall be applied to the PNC under calibration. Linearity of response is calculated as the square of the Pearson product moment correlation coefficient (R^2) of the two data sets and shall be equal to or greater than 0.97. In calculating both the gradient and R^2 the linear regression shall be forced through the origin (zero concentration on both instruments).

In the reference PNC case, calibration shall be undertaken using at least six standard concentrations across the PNC's measurement range. At least three points shall be at concentrations below 1,000 cm^{-3}, the remaining concentrations shall be linearly spaced between 1,000 cm^{-3} and the maximum of the PNC's range in single particulate count mode. These points will include a nominal zero concentration point produced by attaching HEPA filters of at least class H13 of EN 1822:~~1998~~**2019**, or equivalent performance, to the inlet of each instrument. With no calibration factor applied to the PNC under

calibration, measured concentrations shall be within ± 10 per cent of the standard concentration for each concentration, with the exception of the zero point, otherwise the PNC under calibration shall be rejected. The gradient from a linear regression of the two data sets shall be calculated and recorded. A calibration factor equal to the reciprocal of the gradient shall be applied to the PNC under calibration. Linearity of response is calculated as the square of the Pearson product moment correlation coefficient (R^2) of the two data sets and shall be equal to or greater than 0.97. In calculating both the gradient and R^2 the linear regression shall be forced through the origin (zero concentration on both instruments)."

Annex 4A - Appendix 5, Paragraph 2.3.1., amend to read:

"2.3.1. Prior to each test, the particulate counter shall report a measured concentration of less than 0.5 particulates cm^{-3} when a HEPA filter of at least class H13 of EN 1822:~~2008~~**2019**, or equivalent performance, is attached to the inlet of the entire particulate sampling system (VPR and PNC)."

Annex 4A - Appendix 5, Paragraph 2.3.3., amend to read:

"2.3.3. Each day, following the application of a HEPA filter of at least class H13 of EN 1822:~~2008~~**2019**, or equivalent performance, to the inlet of the particulate counter, the particulate counter shall report a concentration of ≤ 0.2 cm^{-3}. Upon removal of this filter, the particulate counter shall show an increase in measured concentration to at least 100 particulates cm^{-3} when challenged with ambient air and a return to ≤ 0.2 cm^{-3} on replacement of the HEPA filter."

II. Justification

1. On occasion the wording of this scope has caused concerns for some manufacturers as it permits approval of vehicles with reference masses between 2610 kg and 2840 kg if there are approved configurations of that vehicle type below 2610 kg but does not permit approval if such configurations do not exist due to the requirement being restricted to extensions of an existing approval.

2. This restriction can be seen as a market distortion as it affects different manufacturers differently depending on their product specifications.

3. This concern is becoming more relevant with the expansion of electrification of the fleet due to a) electrified vehicles being tendentially heavier and b) electrified vehicles requiring a different vehicle type designation in the context of emissions-based regulations.

4. OICA members believe that this amendment does not require a new series of amendments as it does not change the technical specification of vehicles included in the scope due to its affect being based on the approval of other vehicles and not those in question.

5. Water is one product of the combustion process of internal combustion engines which may condensate and remain in the exhaust system. As modern vehicles rely heavily on sensors within the exhaust system to control the engine or exhaust-aftertreatment system, high sensor data availability and quality is crucial. Both, data availability and quality, can be negatively impacted by condensate in the exhaust system. This proposal seeks to clarify the existing requirements of 3.2.2. and 5.1.1. in conjunction with solutions to remove condensate from the exhaust system.

6. Adaption of the referenced EN 1822 standard to the newest version from 2019.