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Item 3(c) of the provisional agenda

#### Light vehicles:

**Worldwide harmonized Real Driving Emissions test procedure  
and UN Regulations No. 168 (Global Real Driving Emissions (Global RDE))**

## **Proposal for a new Series of Amendments to UN Regulation No. 168 on uniform provisions concerning the approval of light duty passenger and commercial vehicles with regards to real driving emissions (RDE)**

**Submitted by the experts of the European Commission, The United  
Kingdom of Great Britain and the International Organization of Motor  
Vehicle Manufacturers.**

The text reproduced below was prepared by the representative of the European Commission, The United Kingdom of Great Britain and the experts from the International Organization of Motor Vehicle Manufacturers (OICA). This document aims to propose a new [01] Series of Amendments to UN Regulation No. 168 to incorporate changes introduced within the European Union by “Euro 7”. In addition, a levels concept similar to the levels concept found in UN Regulation No. 154 is introduced.

The modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters.

## I. Proposal

*Paragraph 1., amend to read (Option 1):*

"1. Scope and application

This Regulation aims at providing a worldwide harmonized method to determine the levels of Real Driving Emissions (RDE) of gaseous compounds and particles from light-duty vehicles.

**[This Regulation provides requirements for three levels of approval. The first level requires testing and evaluation based on a 4-phase WLTC (low, medium, high and extra-high) – this is called Level 1A. The second level requires testing and evaluation based on a 3-phase WLTC cycle (low, medium and high) – this is called Level 1B. The third level requires testing and evaluation based on both a 4-phase WLTC and a 3-phase WLTC cycle – this is called Level 2.**

**Level 2 shall be considered to be the “highest level of stringency” in the context of paragraph 2 of Article 1 of the 1958 Agreement.**

**Where the requirements in this Regulation apply to either Level 1A, Level 1B or Level 2 only, the Regulatory text refers to the relevant level to denote the start of the level specific requirements.]**

~~This Regulation applies to the type approval of vehicles of categories M<sub>1</sub> with a reference mass not exceeding 2,610 kg and vehicles of categories M<sub>2</sub> and N<sub>1</sub> with a reference mass not exceeding 2,610 kg and a technical permissible maximum laden mass not exceeding 3,500 kg with regard to their Real Driving Emissions.~~

**At the request of the manufacturer, for vehicles of category N<sub>2</sub> between 3.5 and 5 tonnes maximum mass originating from a type of vehicle of category N<sub>1</sub>, the approval authority may grant an emission type-approval if the vehicle meets the requirements for a type of vehicle of category N<sub>1</sub>.**

~~At the manufacturer's request, type approval granted under this Regulation may be extended from vehicles mentioned above to vehicles of categories M<sub>1</sub> with a reference mass not exceeding 2,840 kg and vehicles of categories M<sub>2</sub> and N<sub>1</sub> with a reference mass not exceeding 2,840 kg and a technical permissible maximum laden mass not exceeding 3,500 kg and which meet the conditions laid down in this Regulation.~~

Pure Electric Vehicles and Fuel Cell Vehicles are out of the scope of this Regulation."

*Paragraph 1., amend to read (Option 2):*

"1. Scope and application

This Regulation aims at providing a worldwide harmonized method to determine the levels of Real Driving Emissions (RDE) of gaseous compounds and particles from light-duty vehicles.

**[This Regulation provides requirements for three levels of approval. The first level requires testing and evaluation based on a 4-phase WLTC (low, medium, high and extra-high) – this is called Level 1A. The second level requires testing and evaluation based on a 3-phase WLTC cycle (low, medium and high) – this is called Level 1B. The third level requires testing and evaluation based on both a 4-phase WLTC and a 3-phase WLTC cycle – this is called Level 2.**

**Level 2 shall be considered to be the “highest level of stringency” in the context of paragraph 2 of Article 1 of the 1958 Agreement.**

Where the requirements in this Regulation apply to either Level 1A, Level 1B or Level 2 only, the Regulatory text refers to the relevant level to denote the start of the level specific requirements.

~~This Regulation applies to the type approval of vehicles of categories M<sub>1</sub> with a reference mass not exceeding 2,610 kg and vehicles of categories M<sub>2</sub> and N<sub>1</sub> with a reference mass not exceeding 2,610 kg and a technical permissible maximum laden mass not exceeding 3,500 kg with regard to their Real Driving Emissions.~~

~~At the manufacturer's request, type approval granted under this Regulation may be extended from vehicles mentioned above to vehicles of categories M<sub>1</sub> with a reference mass not exceeding 2,840 kg and vehicles of categories M<sub>2</sub> and N<sub>1</sub> with a reference mass not exceeding 2,840 kg and a technical permissible maximum laden mass not exceeding 3,500 kg and which meet the conditions laid down in this Regulation.~~

**1.1. Scope for Level 1A;**

**This Regulation applies to the type approval of vehicles of categories M<sub>1</sub> and N<sub>1</sub> with regard to their Real Driving Emissions.**

**At the request of the manufacturer, for vehicles of category N<sub>2</sub> between 3.5 and 5 tonnes maximum mass originating from a type of vehicle of category N<sub>1</sub>, the approval authority may grant an emission type-approval if the vehicle meets the requirements for a type of vehicle of category N<sub>1</sub>.**

**Pure Electric Vehicles and Fuel Cell Vehicles are out of the scope of this Regulation.**

**1.2. Scope for Level 1B;**

**This Regulation applies to the type approval of vehicles of categories M<sub>2</sub> and N<sub>1</sub> with a technical permissible maximum laden mass not exceeding 3,500 kg and to all vehicles of category M<sub>1</sub> with regard to their Real Driving Emissions.**

**Pure Electric Vehicles and Fuel Cell Vehicles are out of the scope of this Regulation.**

**1.3. Scope for Level 2;**

**This Regulation applies to the type approval of vehicles of categories M<sub>1</sub> and N<sub>1</sub> with regard to their Real Driving Emissions.**

**At the request of the manufacturer, for vehicles of category N<sub>2</sub> between 3.5 and 5 tonnes maximum mass originating from a type of vehicle of category N<sub>1</sub>, the approval authority may grant an emission type-approval if the vehicle meets the requirements for a type of vehicle of category N<sub>1</sub>.**

**Pure Electric Vehicles and Fuel Cell Vehicles are out of the scope of this Regulation.]"**

*Paragraph 3.1., amend to read:*

"3.1. ~~"Vehicle type with regard to Real Driving Emissions" means a group of vehicles which do not differ with respect to the criteria constituting a "PEMS test family" as defined in paragraph 6.3.1. Administrative"~~

*Insert new paragraphs 3.1.1. to 3.1.3., to read:*

"3.1.1. **"Vehicle type with regard to Real Driving Emissions" means a group of vehicles which do not differ with respect to the criteria constituting a "PEMS test family" as defined in paragraph 6.3.1. or, if applicable, paragraph 6.3.2.**

3.1.2. **"Declared Maximum RDE" means the emission values, which shall necessarily be lower than the applicable emission limits, declared**

optionally by the manufacturer and used for checking compliance against lower emission limits.

- 3.1.3. "Third party" means a party with legitimate interest and the resources to testing facilities with accreditation in accordance with EN ISO/IEC 17020 and EN ISO/IEC 17025."**

*Paragraph 3.3.5., amend to read:*

- "3.3.5. ~~"Odometer" means an instrument indicating to the driver the total distance driven by the vehicle since its production.~~ Reserved"**

*Paragraph 5.2.1., amend to read:*

- "5.2.1. The type approval number shall consist of four sections. Each section shall be separated by the '\*' character.**

**Section 1: The capital letter 'E' followed by the distinguishing number of the Contracting Party which has granted the type approval.**

**Section 2: The number of this UN Regulation, followed by the letter 'R', successively followed by:**

**(a) Two digits (with leading zeros as applicable) indicating the series of amendments incorporating the technical provisions of the UN Regulation applied to the approval (00 for the UN Regulation in its original form);**

**(b) A slash (/) and two digits (with leading zeros as applicable) indicating the number of supplements to the series of amendments applied to the approval (00 for the series of amendments in its original form);**

**[(c) A slash (/) and two character(s) indicating the implementing stage/level (e.g. 1A, 1B or 02).]**

**Section 3: A four-digit sequential number (with leading zeros as applicable). The sequence shall start from 0001.**

**Section 4: A two-digit sequential number (with leading zeros if applicable) to denote the extension. The sequence shall start from 00.**

**All digits shall be Arabic digits."**

*Paragraph 5.2.2., amend to read:*

- "5.2.2. Example of an Approval Number to this Regulation:**

**E11\*168R01/02/1A\*0123\*01**

**The first extension of the Approval numbered 0123, issued by the United Kingdom to Supplement 2 to Series of Amendments 01[, which is a Level 1A Approval]."**

*[Insert a new paragraph 5.4.3., to read:*

- "5.4.3. The approval mark shall contain an additional code after the type approval number, the purpose of which is to distinguish the level (Level 1A, 1B or 2) for which the approval has been granted. This code should be chosen according to the Table A3/1 of Annex A3 to this Regulation."]**

*Paragraph 6.1., amend to read:*

- "6.1. Compliance requirements**

**[For vehicle types approved according to Level 1A of this Regulation, the final emissions at any possible RDE test performed in accordance with the requirements of this Regulation, shall be calculated for evaluation with a 4-phase WLTC.**

**For vehicle types approved according to Level 1B of this Regulation, the final emissions at any possible RDE test performed for vehicles with a**

**diesel engine in accordance with the requirements of this Regulation, shall be calculated for evaluation with a 3-phase WLTC.]**

For vehicle types approved according to [Level 2 of] this Regulation, the final emissions at any possible RDE test performed in accordance with the requirements of this Regulation, shall be calculated for evaluation with a 4-phase WLTC and for vehicles with a diesel engine additionally with a 3-phase WLTC.

<i>Requirements for evaluation with 4 Phase WLTC</i>	<i>Requirements for evaluation with 3 Phase WLTC</i>
The final emissions for the 4-phase analysis shall not be higher than any of the limits for the relevant criteria emissions (i.e. NO <sub>x</sub> and PN) found in Table 1A of paragraph 6.3.10. of the <b>04</b> series of Amendments to UN Regulation No. 154 on WLTP.	The final emissions for the 3-phase analysis shall not be higher than the NO <sub>x</sub> limits found in Table 1B of paragraph 6.3.10. of the <b>04</b> series of Amendments to UN Regulation No. 154 on WLTP.

The requirements of emission limits shall be fulfilled for the urban operation and the complete PEMS trip.

**The manufacturer may declare compliance with lower emission limits by declaring lower values called ‘Declared Maximum RDE’, either for NO<sub>x</sub> or PN or both, in the Manufacturer’s RDE certificate of compliance found in Annex 12 of this Regulation. These Declared Maximum RDE values shall be used for checking the compliance of cars when applicable.**

The RDE tests required by this Regulation provide a presumption of conformity. The presumed conformity may be reassessed by additional RDE tests.

The manufacturer shall ensure that all vehicles within the PEMS test family are compliant with UN Regulation No. 154 on WLTP, including conformity of production requirements.

The RDE performance shall be demonstrated by performing the necessary tests in the PEMS test family on the road, operated over their normal driving patterns, conditions and payloads. The necessary tests shall be representative for vehicles operated on their real driving routes, with their normal load."

*Paragraph 8.3.1., amend to read:*

"8.3.1. Vehicle condition

The vehicle, including the emission related components, shall be in good mechanical condition and shall have been run in and driven at least 3,000 km before the test. The mileage and the age of the vehicle used for RDE testing shall be recorded.

All vehicles, and in particular OVC-HEVs ~~vehicles~~ may be tested in any selectable mode, including battery charge mode. On the basis of technical evidence provided by the manufacturer and with the agreement of the responsible authority, the dedicated driver-selectable modes for very special limited purposes shall not be considered (e.g. maintenance mode, race driving, crawler mode). All remaining modes used for forward and for rearwards driving where road and traffic conditions demand this may be considered and the criteria emissions limits shall be fulfilled in all these modes.

Modifications that affect the vehicle aerodynamics are not permitted, with the exception of the PEMS installation. The tyre types and pressure shall be according to the vehicle's manufacturer recommendations. The tyre pressure shall be checked prior to the pre-conditioning and adjusted to the

recommended values if needed. Driving the vehicle with snow chains is not permitted.

Vehicles should not be tested with an empty starter battery. In case the vehicle has problems starting, the battery shall be replaced following the recommendations of the vehicle's manufacturer.

The vehicle's test mass comprises of the driver, a witness of the test (if applicable), the test equipment, including the mounting and the power supply devices and any artificial payload. It shall be between the actual mass of the vehicle and the maximum permissible test mass of the vehicle at the beginning of the test and shall not increase during the test.

The test vehicles shall not be driven with the intention to generate a passed or failed test due to extreme driving that do not represent normal conditions of use. If necessary, verification of normal driving may be based on expert judgement made by or on behalf of the granting type approval authority through cross-correlation on several signals, which may include exhaust flow rate, exhaust temperature, CO<sub>2</sub>, O<sub>2</sub> etc. in combination with vehicle speed, acceleration and GNSS data and potentially further vehicle data parameters like engine speed, gear, accelerator pedal position etc."

*Paragraph 9.3., amend to read:*

"9.3. RDE test to be performed

The RDE performance shall be demonstrated by testing vehicles on the road, operated over their normal driving patterns, conditions and payloads. RDE tests shall be conducted on paved roads (e.g. off-road operation is not permitted). Either a single RDE trip or two dedicated RDE trips shall be driven in order to prove compliance with the **[associated]** emission requirements ~~against both 3-Phase WLTC and 4-Phase WLTC~~ **[, i.e.:**

- (a) For Level 1A Approvals against a 4-Phase WLTC**
- (b) For Level 1B Approvals against a 3-Phase WLTC**
- (c) For Level 2 Approvals against both 3-Phase WLTC and 4-Phase WLTC]"**

*Paragraph 10.7., amend to read:*

"10.7. Where applicable, separate data-sets shall be created for 3-phase and 4-phase evaluation. **[For Level 2 Approvals tF]**he data collected during the entire trip shall be the basis of the 4-phase RDE emission results, while the data with the exclusion of any data point with speed above 100 km/h shall be the basis of the 3-phase RDE trip validity and emission results calculations according to paragraphs 8 and 9 and Annexes 8, 9 and 11. For data analysis continuity Annex 10 will begin with the entire data set for both analyses."

*Paragraph 10.7.1., amend to read:*

"10.7.1. For vehicles with a diesel engine, in the case that a single RDE trip **[for a Level 2 Approval]** is not capable of complying with all validity requirements described in paragraphs 9.1.1., 9.2. and 9.3., paragraphs 4.5.1. and 4.5.2. of Annex 8 and paragraph 4. of Annex 9 simultaneously, then a second RDE trip shall be done. The second trip shall be designed to meet either the 3-phase or 4-phase WLTC trip requirements not yet satisfied, as well as all other relevant trip validity requirements, but it is not necessary to satisfy again the 4-phase or 3-phase WLTC trip requirements previously met by the first trip."

*Paragraph 10.8., amend to read:*

"10.8. 10.8. Data Reporting: All data of a single RDE test shall be recorded according to the data **exchange and data** reporting files found in the same weblink as this Regulation<sup>3</sup>.

A test report shall be prepared by the Technical Service in accordance with the Data Reporting File and shall be made available to the Contracting Party."

*Insert new paragraphs 10.9. to 10.9.2.2., to read:*

- "10.9. Reporting and dissemination of RDE type-approval test information**
- 10.9.1. A technical report prepared by the manufacturer shall be made available to the approval authority. The technical report is composed of 4 items:**
- (i) the Data Exchange file**
  - (ii) the Reporting file**
  - (iii) the Vehicle and engine description as described in Annex 2 of this Regulation;**
  - (iv) visual supporting material (photographs and/or videos) of the PEMS installation in the tested vehicle of adequate quality and quantity to identify the vehicle and to assess if the installation of the PEMS main unit, the EFM, the GNSS antenna, and the weather station follow the instrument manufacturers recommendations and the general good practices of PEMS testing.**
- 10.9.2. The manufacturer shall ensure that the information listed in paragraph 10.9.2.1. is made available on a publicly accessible website without costs and without the need for the user to reveal his identity or sign up. The manufacturer shall keep the granting Type Approval Authority and upon request Contracting Parties informed on the location of the website.**
- 10.9.2.1. The website shall allow a wildcard search of the underlying database based on one or more of the following (as applicable):**
- Make, Type, Variant, Version, Commercial name, or Type Approval Number.**
- The information described below shall be made available for each vehicle in a search:**
- The PEMS family ID to which that vehicle belongs, in accordance with the Transparency List 2 of [Appendix 5 of Annex 4 to UN Regulation No. 83];**
  - If applicable, the Declared Maximum RDE Values in accordance with this UN Regulation.**
- 10.9.2.2. Upon request, without costs and within 10 days, the manufacturer shall make available the technical report referred to in paragraph 10.9.1. to any Contracting Party or recognised third party. The manufacturer shall also make available the technical report referred to in paragraph 10.9.1. upon request and with a reasonable and proportionate fee to others, which does not discourage an inquirer with a justified interest from requesting the respective information or exceed the internal costs of the manufacturer for making the requested information available.**
- Upon request, the type-approval authority shall make available the information listed under paragraphs 10.9.1. and 10.9.2. without costs and within 10 days of receiving the request to any Contracting Party or recognised third party. The type-approval authority shall also make available to others upon request the information listed under paragraphs 10.9.1. and 10.9.2. with a reasonable and proportionate fee, which does not discourage an inquirer with a justified interest from requesting the respective information or exceed the internal costs of the authority for making the requested information available."**

Annex 1, text of Part 1, amend to read:

"Part 1 In the case that all vehicles included in the approval to this Regulation are also approved to UN Regulation No. 154:

	Approval number(s) to UN Regulation No. 154 [or <b>Interpolation family identifier(s)</b> ]: .....
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Annex 1, Item 0.2.2.1. of Part 1 and Part 2, amend to read:

"0.2.2.1. Allowed Parameter Values for multistage type approval (if applicable) to use the base vehicle emission values (insert range if applicable):

Final Vehicle ~~mass in running order~~ **actual mass** (in kg):

**Final Vehicle technically permissible maximum laden mass (in kg):**

Frontal area for final vehicle (in cm<sup>2</sup>):

Rolling resistance (kg/t):

Cross-sectional area of air entrance of the front grille (in cm<sup>2</sup>):"

Annex 2, amend to read:

"...

of a vehicle type with regard to **Real Driving Emissions** ~~the emission of gaseous pollutants by the engine~~ pursuant to UN Regulation No. 168

..."

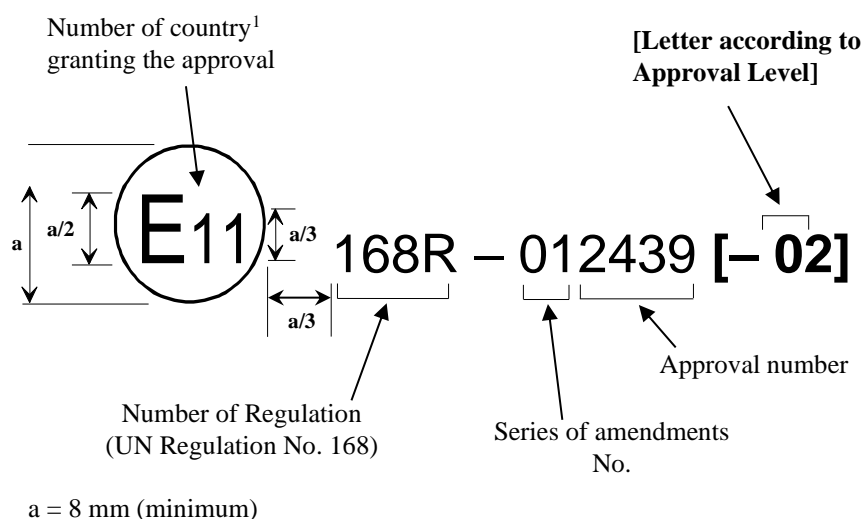
Annex 3, amend to read:

## " Arrangement of the approval mark

In the approval mark issued and affixed to a vehicle in conformity with paragraph 5. of this Regulation, the type approval number shall be accompanied by an alphanumeric character reflecting the level that the approval is limited to.

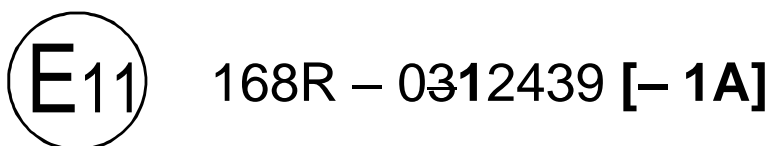
This annex outlines the appearance of this mark and gives an example how it shall be composed.

The following schematic graphic presents the general lay-out, proportions and contents of the marking. The meaning of numbers and alphabetical character are identified, and sources to determine the corresponding alternatives for each approval case are also referred.





The following graphic is a practical example of how the marking should be composed.



The preceding approval mark affixed to a vehicle in conformity with paragraph 5. of this Regulation shows that the vehicle type concerned has been approved in the United Kingdom (E 11), pursuant to UN Regulation No. 168 under approval number 2439, as defined in Section 3 of paragraph 5.2.1. This mark indicates that the approval was given in accordance with the requirements of this Regulation with the 031 series of amendments incorporated. **[Furthermore, the accompanying code (1A) denotes that the vehicle is approved to Level 1A (Europe).**

**Table A3/1**

**Characters with reference to approval level**

<i>Code</i>	<i>Contracting Party on which the requirements are based</i>
<b>1A</b>	<b>European Union</b>
<b>1B</b>	<b>Japan</b>
<b>02</b>	<b>Harmonized</b>

]"

*Annex 5, paragraph 6.1., amend to read:*

"6.1. General

The PN analyser shall consist of a pre-conditioning unit and a particle detector that counts with **minimum** 50 per cent efficiency from approximately ~~23~~ **10** nm. It is permissible that the particle detector also pre-conditions the aerosol. The sensitivity of the analysers to shocks, vibration, aging, variability in temperature and air pressure as well as electromagnetic interferences and other impacts related to vehicle and analyser operation shall be limited as far as possible and shall be clearly stated by the equipment manufacturer in its support material. The PN analyser shall only be used within its manufacturer's declared parameters of operation. An example of a PN analyser setup is provided in Figure A5/1.

The PN analyser shall be connected to the sampling point via a sampling probe which extracts a sample from the centreline of the tailpipe tube. As specified in paragraph 3.5. of Annex 4, if particles are not diluted at the tailpipe, the sampling line shall be heated to a minimum temperature of 373 K (100 °C) until the point of first dilution of the PN analyser or the particle detector of the analyser. The residence time in the sampling line shall be less than 3 s.

All parts in contact with the sampled exhaust gas shall be always kept at a temperature that avoids condensation of any compound in the device. This can be achieved for example by heating at a higher temperature and diluting the sample or oxidizing the (semi)volatile species.

The PN analyser shall include a **catalytically active** heated section at wall temperature  $\geq 573$  K. The unit shall control the heated stages to constant nominal operating temperatures, within a tolerance of  $\pm 10$  K, and provide an indication of whether or not heated stages are at their correct operating temperatures. Lower temperatures are acceptable as long as the volatile particle removal efficiency fulfils the specifications of paragraph 6.4.

Pressure, temperature and other sensors shall monitor the proper operation of the instrument during operation and trigger a warning or message in case of malfunction.

The delay time of the PN analyser shall be  $\leq 5$  s.

The PN analyser (and/or particle detector) shall have a rise time of  $\leq 3.5$  s.

Particle concentration measurements shall be reported normalised to 273 K and 101.3 kPa. If necessary, the pressure and/or temperature at the inlet of the detector shall be measured and reported for the purposes of normalizing the particle concentration.

PN systems that comply with the calibration requirements of UN Regulation Nos 83 or 49 or UN Regulation No. 154 on WLTP automatically comply with the calibration requirements of this annex."

*Annex 5, heading of figure A5/1, amend to read:*

"Example of a PN analyser setup: Dotted lines depict optional parts. **The heated section shall be catalytically active.** EFM = Exhaust mass Flow Meter, d = inner diameter, PND = Particle Number Diluter."

*Annex 5, Table A5/3a, is replaced with the following:*

"Table A5/3a

**PN analyser (including the sampling line) system efficiency requirements**

$d_p$ [nm]	10	15	30	50	70	100	200
E( $d_p$ ) PN analyser	0.1 – 0.5	0.3 – 0.7	0.75 – 1.05	0.85 – 1.15	0.85 – 1.15	0.8 – 1.2	0.8 – 2.0

"

*Annex 5, paragraph 6.2., amend to read:*

"6.2. Efficiency requirements

The complete PN analyser system including the sampling line shall fulfil the efficiency requirements of Table A5/3a.

Efficiency E( $d_p$ ) is defined as the ratio in the readings of the PN analyser system to a reference Condensation Particle Counter (CPC)'s ( ~~$d_{50\%} = 10$  nm or lower, checked for linearity and calibrated with an electrometer~~) **(with counting efficiency above 90 per cent for 10 nm equivalent electrical mobility diameter, checked for linearity and calibrated with an electrometer)** or an Electrometer's number concentration measuring in parallel monodisperse aerosol of mobility diameter  $d_p$  and normalized at the same temperature and pressure conditions.

The material should be thermally stable soot-like (e.g. spark discharged graphite or diffusion flame soot with thermal pre-treatment). If the efficiency curve is measured with a different aerosol (e.g. NaCl), the correlation to the soot-like curve must be provided as a chart which compares the efficiencies obtained using both test aerosols. The differences in the counting efficiencies shall be taken into account by adjusting the measured efficiencies based on the provided chart to give soot-like aerosol efficiencies. The correction for multiply charged particles shall be applied and documented but shall not exceed 10 per cent. These efficiencies refer to the PN analysers with the sampling line. The PN analyser can also be calibrated in parts (i.e. the pre-conditioning unit separately from the particle detector) as long as it is proven that the PN analyser and the sampling line together fulfil the requirements of Table A5/3a. The measured signal from the detector shall be  $> 2$  times the limit of detection (here defined as the zero level plus 3 standard deviations)."

*Annex 5, paragraph 6.3., amend to read:*

"6.3. Linearity requirements

The PN analyser including the sampling line shall fulfil the linearity requirements of paragraph 3.2. of Annex 5 using monodisperse or polydisperse soot-like particles. The particle size (mobility diameter or count median diameter) shall be larger than 45 nm. **The reference instrument shall be an Electrometer or a Condensation Particle Counter (CPC) with counting efficiency above 90 per cent for 10 nm equivalent electrical mobility diameter, verified for linearity.** ~~The reference instrument shall be an Electrometer or a Condensation Particle Counter (CPC) with  $d_{50} = 10$  nm or lower, verified for linearity.~~ Alternatively, a particle number system compliant with UN Regulation No. 154 on WLTP **with a counting efficiency above 90 per cent for 10 nm equivalent electrical mobility diameter can be used as reference instrument for the linearity check of the complete system.**

In addition, the differences of the PN analyser from the reference instrument at all points checked (except the zero point) shall be within 15 per cent of their mean value. At least 5 points equally distributed (plus the zero) shall be checked. The maximum checked concentration shall be > 90 per cent of the PN analyser nominal measurement range.

If the PN analyser is calibrated in parts, then the linearity can be checked only for the PN detector, but the efficiencies of the rest parts and the sampling line shall be considered in the slope calculation."

*Annex 5, paragraph 6.4., amend to read:*

"6.4. Volatile removal efficiency

The system shall achieve > 99.9 per cent removal of  $\geq 30$  nm tetracontane ( $\text{CH}_3(\text{CH}_2)_{38}\text{CH}_3$ ) particles with an inlet concentration of  $\geq 10,000$  particles per cubic-centimetre at the minimum dilution.

The system shall also achieve a > 99.9 per cent removal efficiency of tetracontane with count median diameter > 50 nm and mass > 1 mg/m<sup>3</sup>.

The volatile removal efficiency with tetracontane shall be proven only once for the instrument family. The instrument manufacturer though shall provide the maintenance or replacement interval that ensures that the removal efficiency does not drop below the technical requirements. If such information is not provided, the volatile removal efficiency shall be checked yearly for each instrument."

*Annex 8, paragraph 4.4.1.2., amend to read:*

"4.4.1.2. Medium speed windows

Medium speed windows are characterized by average vehicle ground speeds  $\bar{v}_j$  greater than or equal to 45 km/h and lower than 80 km/h.

**For those vehicles that are equipped with a device limiting vehicle speed to 90 km/h, medium-speed windows are characterized by average vehicle speeds  $\bar{v}_j$  lower than 70 km/h."**

*Annex 8, paragraph 4.4.1.3., amend to read:*

"4.4.1.3. High speed windows

High speed windows are characterized by average vehicle ground speeds  $\bar{v}_j$  greater than or equal to 80 km/h and lower than 145 km/h

**For those vehicles that are equipped with a device limiting vehicle speed to 90 km/h, high-speed windows are characterized by average vehicle speeds  $\bar{v}_j$  greater than or equal to 70 km/h and lower than 90 km/h."**

[Annex 8, title of Figure A8/5, amend to read:

"Vehicle CO<sub>2</sub> characteristic curve: low, medium and high speed definitions (Illustrated for ICE and NOVC-HEV) **except those vehicles that are equipped with a device limiting vehicle speed to 90 km/h**"

[Annex 8, title of Figure A8/6, amend to read:

"Vehicle CO<sub>2</sub> characteristic curve: low, medium and high speed definitions (Illustrated for OVC-HEV) **except those vehicles that are equipped with a device limiting vehicle speed to 90 km/h**"

[Annex 9, paragraph 3.1.3.1., amend to read:

"3.1.3.1. Binning of the results (for analysis with 4-phase WLTP)

After the calculation of  $a_i$  and  $(v \times a)_i$ , the values  $v_i$ ,  $d_i$ ,  $a_i$  and  $(v \times a)_i$  shall be ranked in ascending order of the vehicle speed.

All datasets with  $(v \leq 60 \text{ km/h})$  belong to the 'urban' speed bin, all datasets with  $(60 \text{ km/h} < v_i \leq 90 \text{ km/h})$  belong to the 'rural' speed bin and all datasets with  $(v_i > 90 \text{ km/h})$  belong to the 'motorway' speed bin.

**[For those vehicles that are equipped with a device limiting vehicle speed to 90 km/h, all datasets with  $v_i \leq 60 \text{ km/h}$  belong to the "urban" speed bin, all datasets with  $60 \text{ km/h} < v_i \leq 80 \text{ km/h}$  belong to the "rural" speed bin and all datasets with  $v_i > 80 \text{ km/h}$  belong to the "motorway" speed bin.]**

The number of datasets with acceleration values  $a_i > 0.1 \text{ m/s}^2$  shall be greater than or equal to 100 in each speed bin.

..."]

Annex 12, insert of a second bullet point to read:

"...

Annex:

— List of vehicle types to which this certificate applies

— **List of the Declared Maximum RDE values for each vehicle type expressed as mg/km or particle numbers/km as appropriate."**

## II. Justification

1. Addition of a levels concept within UN Regulation No. 168 similar to the level concept found in UN Regulation No. 154.
2. Amendment of the scope to UN Regulation No. 168 to reflect the light-duty vehicle scope introduced by Regulation (EU) 2024/1257. The final decision regarding the two options for the scope amendments will be taken until GRPE. Option 1 provides a single scope without differentiation using the levels concept, whereas option 2 provides a differentiation for Level 1A, Level 1B and Level 2.
3. Restructuring of definition 3.1. to incorporate the new definitions of "Declared Maximum RDE" and "Third party" as used by Regulation (EU) 2024/1257. The definition of "Vehicle type with regard to Real Driving Emissions" is updated to also cover the alternative PEMS family building concept which is part of 6.3.2.
4. The definition of "odometer" is not used anywhere in the regulation and therefore deleted.
5. Addition of the concept for "Declared Maximum RDE" within paragraph 6.1.
6. Deletion of "vehicles" in paragraph 8.3.1., as the abbreviation OVC-HEV already contains the word vehicle.
7. Change to paragraph 10.8. and addition of paragraphs 10.9. to 10.9.2.2. to include the changes introduced by Regulation (EU) 2024/1257.

8. Harmonization of requirements between UN Regulation No. 168's information document and Regulation (EU) 2017/1151.
  9. Amending the wording on the type-approval certificate to better reflect the regulated contents of UN Regulation No. 168.
  10. Amendments in Annex 5 to account for 10nm particle measurement equipment as introduced by Regulation (EU) 2024/1257.
  11. Harmonization of requirements between Annex 8 of UN Regulation No. 168's and Regulation (EU) 2017/1151 on the medium and high-speed windows.
  12. Addition of missing specifications in Annex 9 of UN Regulation No. 168 for speed-limited vehicles.
  13. Addition of the concept for "*Declared Maximum RDE*" within Annex 12.
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