

**Proposal for amendments to  
ECE/TRANS/WP.29/GRPE/2023/03  
UN Regulation No. [XXX] on uniform provisions  
concerning the approval of light duty passenger and  
commercial vehicles with regards to real driving  
emissions (RDE)**

This document proposes some amendments to the above paper which OICA members request to be integrated at first adoption of the new Regulation. The modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters.

## I. Proposal

*Paragraph 3.3.7.*, amend to read:

"3.3.7. ~~"Power to test mass ratio~~**Power-to-test-mass-ratio**" corresponds to the ratio of the rated engine power of the internal combustion engine over the test mass **of the tested vehicle as described in paragraph 8.3.1.** ~~(i.e. the actual mass of the vehicle plus the mass of the measurement equipment and the mass of additional passengers or payload, if any)."~~

*Paragraph 6.4.3.2.*, amend to read:

"6.4.3.2. The manufacturer shall specify a value PMRH (= highest ~~power to mass ratio~~ **power-to-mass-ratio** of all vehicles in the PEMS test family) and a value PMRL (= lowest ~~power to mass ratio~~ **power-to-mass-ratio** of all vehicles in the PEMS test family). At least one vehicle configuration representative for the specified PMRH and one vehicle configuration representative for the specified PMRL of a PEMS test family shall be selected for testing. The ~~power-to-mass-ratio~~ **power-to-mass-ratio** of a vehicle shall not deviate by more than 5 per cent from the specified value for PMRH, or PMRL for the vehicle to be considered as representative for this value."

*Paragraph 6.5.3.*, amend to read:

"6.5.3. The **granting** approval authority and the vehicle manufacturer shall maintain a list of vehicle emission types being part of a given PEMS test family on the basis of emission type approval numbers."

*Paragraph 6.5.4.*, amend to read:

"6.5.4. The **granting** approval authority and the vehicle manufacturer shall maintain a list of vehicle emission types selected for PEMS testing in order to validate a PEMS test family in accordance with paragraph 6.4., which also provides the necessary information on how the selection criteria of paragraph 6.4.3 are covered. This list shall also indicate whether the provisions of paragraph 6.4.1.3. were applied for a particular PEMS test."

*Paragraph 7., amend to read:*

**"7. Performance requirements for instrumentation**

The instrumentation used for RDE tests shall comply with the requirements as defined in Annex 5 **and the measurement accuracies assumed in Table A11/2**. If requested by the authorities, the tester shall provide proof that the instrumentation used complies with the requirements in Annex 5 **and the measurement accuracies assumed in Table A11/2**."

*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 driving and for rearward driving where road and or 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 8.3.2., amend to read:

"8.3.2. Vehicle conditioning for cold start PEMS trip

Before RDE testing, the vehicle shall be preconditioned in the following way:

The vehicle shall be driven, preferably on the same route as the planned RDE testing, or for at least 10 min per type of operation (e.g. urban, rural, motorway) or 30 minutes with a minimum average ~~velocity~~ **speed** of 30 km/h. ~~The~~ **Alternatively the** validation test in the laboratory, as in paragraph 8.4., may also counts as preconditioning. **However, in the case that the anticipated ambient temperature for the RDE test is below 0°C, the validation test shall be followed by a preconditioning on the road as described in this paragraph.** The vehicle shall subsequently be parked with doors and bonnet closed and kept in engine-off status within moderate or extended altitude and temperatures, in accordance with paragraph 8.1., for between 6 and 72 hours. Exposure to extreme atmospheric conditions (such as heavy snowfall, storm, hail) and excessive amounts of dust or smoke should be avoided.

Before the test start, the vehicle and equipment shall be checked for damages and the presence of warning signals that may suggest malfunctioning. In the case of a malfunction the source of the malfunctioning shall be identified and corrected or the vehicle shall be rejected."

Paragraph 9.1.1., amend to read:

"9.1.1. Other requirements

The average speed (including stops) of the urban speed bin shall be between 15 and 40 km/h.

The speed range of the motorway driving shall properly cover a range between 90 and at least 110 km/h. The vehicle's ~~velocity~~ **speed** shall be above 100 km/h for at least 5 minutes.

For M2 category vehicles that are equipped with a device permanently limiting vehicle speed to 100 km/h, the speed range of the motorway speed bin shall properly cover a range between 90 and 100 km/h. The vehicle's ~~velocity~~ **speed** shall be above 90 km/h for at least 5 minutes.

For those vehicles that are equipped with a device limiting vehicle speed to 90 km/h, the speed range of the motorway speed bin ~~of~~ shall properly cover a range between 80 and 90 km/h. The vehicle's ~~velocity~~ **speed** shall be above 80 km/h for at least 5 minutes.

In the case that the local speed limits for the specific vehicle being tested prevent compliance with the requirements of this paragraph, the requirements of the following paragraph shall apply:

The speed range of the motorway driving shall properly cover a range between X – 10 and X km/h. The vehicle's ~~velocity~~ **speed** shall be above X - 10 km/h for at least 5 minutes. Where X = the local speed limit for the tested vehicle."

Paragraph 9.2., amend to read:

"9.2. Required distance shares of trip speed bins

The following is the distribution of the speed bins in an RDE trip that are required for respecting the needs of evaluation for both the 4-phase WLTC and 3-phase WLTC:

<i>Requirements for evaluation with 4-Phase WLTC</i>	<i>Requirements for evaluation with 3-Phase WLTC</i>
The trip shall consist of approximately 34 per cent urban, 33 per cent rural and 33 per cent motorway speed bins. 'Approximately' shall mean the interval of $\pm 10$ per cent points around the stated percentages. The urban speed bin shall however never be less than 29 per cent of the total trip distance.	The trip shall consist of approximately 55 per cent urban and 45 per cent expressway speed bins. 'Approximately' shall mean the interval of $\pm 10$ per cent points around the stated percentages. The urban speed bin however can be lower than 45 per cent but never be less than 40 per cent of the total trip distance.

The shares of urban, rural and motorway speed bins shall be expressed as a percentage of the total trip distance for analysis with 4-Phase WLTC.

The shares of urban and expressway speed bins shall be expressed as a percentage of the trip distance with ~~velocity~~ **speed** not exceeding 100km/h for analysis with 3-Phase WLTC.

The minimum distance of each, urban, rural and motorway or expressway speed bins shall be 16 km."

Annex 9, Paragraph 4.1.1., amend to read:

"4.1.1. Assessment of  $(v \times a_{pos})_{k-}[95]$  per speed bin (with  $v$  in [km/h])

If  $\bar{v}_k \leq 74.6 \text{ km/h}$  and

$$(v \times a_{pos})_{k-}[95] > (0.136 \times \bar{v}_k + 14.44)$$

is fulfilled, the trip is invalid.

If  $\bar{v}_k > 74.6 \text{ km/h}$  and

$$(v \times a_{pos})_{k-}[95] > (0.0742 \times \bar{v}_k + 18.966)$$

is fulfilled, the trip is invalid.

Upon the request of the manufacturer, and only for those N1 or N2 vehicles where the vehicle ~~power-to-test-mass-ratio~~ **power-to-test-mass-ratio** is less than or equal to 44 W/kg then:

If  $\bar{v}_k \leq 74.6 \text{ km/h}$  and

$$(v \times a_{pos})_{k-}[95] > (0.136 \times \bar{v}_k + 14.44)$$

is fulfilled, the trip is invalid.

If  $\bar{v}_k > 74.6 \text{ km/h}$  and

$$(v \times a_{pos})_{k-}[95] > (-0.097 \times \bar{v}_k + 31.635)$$

is fulfilled, the trip is invalid."

## II. Justification

1. In paragraph 3.3.7. the text in brackets is a repeat of content in an Annex. It is good practice to keep definitions to one sentence where possible. Adding “of the tested vehicle” avoids any confusion with family test mass definitions.
  2. The syntax of the term “power-to-mass-ratio” (with hyphens between all words) should be consistent throughout the document
  3. Where a requirement only applies to the approval authority which issued the approval this should be made clear in the text.
  4. Additional to the technical specifications listed in Annex 5, the Regulation assumes measurement accuracies of PEMS equipment. It therefore appears reasonable that the PEMS equipment is required to also deliver these measurement accuracies.
  5. As vehicles are designed to be driven predominantly forwards, and rearwards driving although normal practice is an exceptional situation, the possibility to drive rearwards for extended periods should be removed.
  6. “Velocity” as a physical term is a vector and has to be accompanied by a direction. For clarity this should be replaced with “speed”
  7. A large (> 20 K) ambient temperature difference between one day and the next is not representative of real life and can result in unrepresentative catalyst performance. The possibility of a preconditioning at 23 °C followed by a test at below freezing should therefore be removed.
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