

Proposal for amendments to Supplement 5 to the 03 series of amendments to UN Regulation No. 24 (Visible pollutants, measurement of power of Compression Ignition engine (Diesel smoke))

The text reproduced below was prepared by the expert from CITA proposing to amend the Supplement 5 to the 03 series of amendments to UN Regulation No. 24 (ECE/TRANS/WP.29/2018/143), to include provisions to define a reference value for particle number.

I. Proposal

Paragraph 4.1.4, amend to read:

“4.1.4 When determining the emission of visible pollutants, the measurements shall be made by the two methods described in annexes 4 and 5 to this Regulation relating ~~respectively~~ to tests at steady speeds and to **reference tests under free acceleration.**”

Paragraph 5.4.3, amend to read:

“5.4.3. The following additional symbols, a rectangle surrounding a figure expressing in m⁻¹ the absorption coefficient obtained during the tests under free acceleration; **and an oval surrounding a figure expressing in cm⁻³ the particular number measurement, both of them determined at the time of approval by the procedure described in annex 5 of this Regulation.**

Paragraph 8.3.1, amend to read:

“8.3.1 An engine which has not been run in shall be subjected to the test under free acceleration prescribed in annex 5 to this Regulation. The engine shall be deemed to conform to the approved type if the absorption coefficient determined does not exceed by more than 0.5m⁻¹ the figure shown in the approval mark or document for that engine (see paragraph 8.1 above). **Furthermore, the engine will be submitted to the particle number reference test prescribed in annex 5 to this Regulation. The engine shall be deemed to conform to the approved type if the particle number determined does not exceed by more than [50.000 cm⁻³] the figure shown in the approval mark or document for that engine (see paragraph 8.1 above).** On the request of the manufacturer, commercially available fuel may be used rather than the reference fuel.”

Paragraph 8.3.2, amend to read:

“8.3.2 If the figures determined in the test referred to in paragraph 8.3.1 above exceeds by more than 0.5m⁻¹ **for opacity or [50.000 cm⁻³] for particle number** the figures shown in the approval document for that engine, the engine shall be subjected to the test at steady speeds over the full load curve as prescribed in annex 4 to this Regulation. The emission levels shall not exceed the limits prescribed in annex 7 to this Regulation.”

Add a new paragraph 14.4.4 to read:

“**14.4.4 The following additional symbol an oval surrounding a figure expressing in cm⁻³ the particle number determined during the reference, in annex 5 of this Regulation.**”

Paragraph 17.3.1, amend to read:

17.3.1 A vehicle with an engine which has not been run-in shall be subjected to the test under free acceleration prescribed in annex 5 to this Regulation. The vehicle shall be deemed to conform to the vehicle type approved if the absorption coefficient determined does not exceed by more than 0.5 m-l the figure shown in the approval mark or document (see paragraph 17.1 above). **Furthermore, the engine will be submitted to the particle number reference test prescribed in annex 5 to this Regulation. The engine shall be deemed to conform to the approved type if the particle number determined does not exceed by more than [50.000 cm⁻³] the figure shown in the approval mark or document for that engine (see paragraph 17.1 above).** On the request of the manufacturer commercially available fuel may be used rather than the reference fuel. In the case of dispute, reference fuel has to be used.

Paragraph 17.3.2, amend to read:

“17.3.2 If the figures determined in the test referred to in paragraph 17.3.1 above exceeds by more than 0.5m-l **for opacity or [50.000 cm⁻³] for particle number** the figures shown in the approval mark or document for that engine (see paragraph 17.1 above) the engine shall be subjected to the test at steady speeds over the full load curve as prescribed in annex 4 to this Regulation. The emission levels shall not exceed the limits prescribed in annex 7 to this Regulation.”

Add a new paragraph 23.4.4 to read:

“23.4.4 The following additional symbol an oval surrounding a figure expressing in cm⁻³ the particle number determined during the reference, in annex 5 of this Regulation.”

Paragraph 24.3.1, amend to read:

“24.3.1 The emission of visible pollutants by the vehicle type submitted for approval shall be measured by the two methods described in annexes 4 and 5 to this Regulation, relating ~~respectively~~ to tests at steady speeds and to tests under free acceleration.”

Paragraph 26.3.1, amend to read:

“26.3.1 A vehicle which has not been run in shall be subjected to the test under free acceleration prescribed in annex 5 to this Regulation. The vehicle shall be deemed to conform to the type approved if the absorption coefficient determined does not exceed by more than 0.5 m-l the figure shown in the approval mark (see paragraph 26.1 above). **Furthermore, the engine will be submitted to the particle number reference test prescribed in annex 5 to this Regulation. The engine shall be deemed to conform to the approved type if the particle number determined does not exceed by more than [50.000 cm⁻³] the figure shown in the approval mark or document for that engine (see paragraph 16.1 above).** On the request of the manufacturer, commercially available fuel may be used rather than the reference fuel. In the case of dispute, reference fuel has to be used.”

Paragraph 26.3.2, amend to read:

“26.3.2 If the figures determined in the test referred to in paragraph 26.3.1 above exceeds by more than 0.5 m- 1 **for opacity or [50.000 cm⁻³] for particle number** the figures shown in the approval mark, the engine of the vehicle shall be subjected to the test at steady speeds over the full-load curve, as prescribed in annex 4 to this Regulation. The visible emission levels shall not exceed the limits prescribed in annex 7 to this Regulation.”

Annex 2, paragraph 11.1.2, amend to read:

“11.1.2 ~~Free acceleration tests~~ **Reference tests**”

Annex 2, paragraph 11.1.2.1, amend to read:

“11.1.2.1 Engine test in accordance with annex 5, paragraph 2”

Annex 2, add a new paragraph 11.1.2.3 to read:

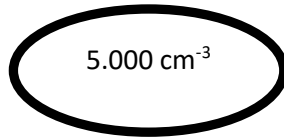
“11.1.2.3 Particle number measurement in accordance with annex 5, paragraph 4: cm⁻³”

Annex 2, add a new paragraph 19 to read:

“19. Make and type of the particle counter:”

Annex 2: renumber former paragraph 19 to 24 accordingly.

Annex 3, model A, add the following figure:



Annex 3, model A, add the following text at the end of the paragraph:

“... and de reference particle number is 5.000 cm⁻³”

Annex 5, title, amend to read:

“~~TEST UNDER FREE ACCELERATION~~ **REFERENCE TESTS**”

Annex 5, paragraph 2, amend to read:

“2 ~~TEST METHODS~~ **FREE ACCELERATION METHOD**”

Annex 5, add a new paragraph 4:

“4 **PARTICLE NUMBER EMISSION TEST AT IDLING SPEED**

4.1 **ensure that the EGR system is not switched off during the entire test by suitable means**

4.1.1 **If not possible or available: increase the engine speed from idling speed by 1000 rpm or more within 5 seconds**

4.2 **Run the engine at idle speed at least for 15 seconds**

4.2.1 **Insert the sampling probe into the exhaust pipe**

4.2.2 **Measurement of the number of particles over at least 15 seconds and averaging**

4.2.3 **repeat number 4.2.2 two more times without removing the sampling probe from the exhaust pipe**

4.2.4 **The final result is the average value of the three measures of paragraph 4.2.3. Any tolerance shall be considered, if necessary, by the user of the final result.”**

II. Justification

It is already possible to measure PN during periodical and road-side inspection. Some countries are in the last stages of developing their national legal requirements in that direction.

This proposal aims to adapt vehicle approval to that status quo by defining a reference value for PN. That reference facilitates to maintain the benefits of new cleaner vehicles during their life cycle.
