

Proposal for amendments to the 07 series of amendments to UN Regulation No. 83 (Uniform provisions concerning the approval of vehicles with regard to the emission of pollutants according to engine fuel requirements)

The text reproduced below was prepared by the expert from CITA proposing to amend the 07 series of amendments to UN Regulation No. 83, to define a reference value for particle number measurement.

I. Proposal

Paragraph 5.2.1, 3rd subparagraph, amend to read:

"Type II (carbon monoxide **and particle number (only PI-DI)** emission at idling speed);"

Paragraph 5.2.2, 3rd subparagraph, amend to read:

"Type II (carbon monoxide and monoxide **and particle number (only PI-DI)** emission at idling speed);"

Paragraph 5.2.3, add a new subparagraph after subparagraph 2:

"**Type II (particle number emission at idling speed);**"

Paragraph 5.2.2, Table A, amend to read:

Table A - Requirements

Application of test requirements for type approval and extensions

Vehicle category	Vehicles with positive ignition engines including hybrids								Vehicles with compression ignition engines including hybrids	
	Mono fuel				Bi-fuel ¹			Flex-fuel ¹	Flex fuel	Mono fuel
Reference fuel	Petrol (E5/E10) ⁷	LPG	NG/ Bio-methane	Hydrogen (ICE) ⁵	Petrol (E5/E10) ⁷ LPG	Petrol (E5/E10) ⁷ NG/ Biome-thane	Petrol (E5/E10) ⁷ Hydrogen (ICE) ⁵	Petrol (E5/E10) ⁷ Ethanol (E85)	Diesel (B5/B7) ⁷ Biodiesel	Diesel (B5/B7) ⁷
Gaseous pollutants (Type I test)	Yes	Yes	Yes	Yes ⁴	Yes (both fuels)	Yes (both fuels)	Yes (both fuels) ⁴	Yes (both fuels)	Yes (B5/B7 only) ^{2,7}	Yes
Particulate mass and particulate number (Type I test)	Yes ⁶	—	—	—	Yes (petrol only) ⁶	Yes (petrol only) ⁶	Yes (petrol only) ⁶	Yes (both fuels) ⁶	Yes (B5/B7 only) ^{2,7}	Yes
Idle emissions (Type II test)	Yes	Yes	Yes	—	Yes (both fuels)	Yes (both fuels)	Yes (petrol only)	Yes (both fuels)	Yes	Yes
Crankcase emissions (Type III test)	Yes	Yes	Yes	—	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	—	—
Evaporative emissions (Type IV test)	Yes	—	—	—	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	—	—
Durability (Type V test)	Yes	Yes	Yes	Yes	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (B5/B7 only) ^{2,7}	Yes
Low temperature emissions (Type VI test)	Yes	—	—	—	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes ³ (both fuels)	—	—
In-service conformity	Yes	Yes	Yes	Yes	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (B5/B7 only) ^{2,7}	Yes
On-board diagnostics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Paragraph 5.3.2, amend to read:

"5.3.2 Type II test (Carbon monoxide emission **and particle number emission test (only PI-DI)** test at idling speed)"

Paragraph 5.3.2.2, amend to read:

"5.3.2.2. For the Type II test set out in Annex 5, **paragraph 1 to 3**, to this Regulation at normal engine idling speed, the maximum permissible carbon monoxide content in the exhaust gases shall be that stated by the vehicle manufacturer. However, the maximum carbon monoxide content shall not exceed 0.3 per cent vol.

At high idle speed, the carbon monoxide content by volume of the exhaust gases shall not exceed 0.2 per cent, with the engine speed being at least 2,000 min⁻¹ and Lambda being 1 ± 0.03 or in accordance with the specifications of the manufacturer."

Add new paragraphs 5.3.2.3 and 5.3.2.3.1 to read

"5.3.2.3 for vehicles powered by compression ignition engine or by positive ignition engines with direct injection the following additional test has to be carried out

5.3.2.3.1 For the Type II test set out in Annex 5 to this Regulation (number 1, 2 and 4), at normal engine idling speed, the maximum permissible particle number in the exhaust gases shall be that stated by the vehicle manufacturer. However, the maximum particle number content shall not exceed 50.000 cm⁻³"

Paragraph 5.3.7.2, amend to read:

~~"5.3.7.2. When tested in accordance with Annex 5 to this Regulation (Type II test) at normal idling speed:~~

At normal idling speed:

- (a) The carbon monoxide content by volume of the exhaust gases emitted shall be recorded; and
- (b) The engine speed during the test shall be recorded, including any tolerances.
- (c) The particle number content by volume of the exhaust gases emitted shall be recorded; and**
- (d) The engine speed during the test shall be recorded, including any tolerances."**

Annex I, add new item 3.2.1.7.1 to read:

"3.2.1.7.1 Particle number content in the exhaust with the engine idling ((according to the manufacturer's specifications, positive ignition – direct injection engines only) cm⁻³"

Annex II, addendum, item 2.1, Type II, amend to read:

"Type II: CO per cent, Particle Number cm⁻³"

Annex 5, subtitle, amend to read:

"(Carbon monoxide emission test at idling speed and particulate number emission test (only PI-DI))

Annex 5, paragraph 2.2.1, amend to read:

"2.2.1. Vehicles that are fuelled either with petrol or with LPG or NG/biomethane or diesel shall be tested with the reference fuel(s) used for the Type I test."

Annex 5, paragraph 3, amend to read:

"3. Sampling of gases (vehicles with positive ignition engine)"

Annex 5, add a new paragraph 4 to read:

- “4 Particle number emission test at idling speed (vehicles with compression ignition engine or with positive ignition engine and direct injection)**
- 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**
- 4.3 The final result is the average value of the three measures of paragraph 4.2.3”**

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.

It includes as well the reference for PI – DI engines because of the relevance of that technology in particles emissions.
