



Comments on UN VIAQ IWG 24th session

Brussels, November 2022

WORKING ITEMS TO COMMENT

Subtitle



List of tasks

VIAQ IWG
Vehicle Interior Air Quality
Informal Working Group

Working Item	Tasks
5. Test Conditions	Test conditions for urban and urban motorway driving must be clearly defined
6. Sampling Points/Sampling Lines	External sampling position must be further defined. Sampling lines maximal length and minimal diameter must be defined
7. Background air pollution level	The group need to set background levels to all measured components (regarding item 9)
8. Cabin air filter age	Make a round robin test to see influence on filter age and define milage diapason
9. PM and gas components to be Measured	<ol style="list-style-type: none">1. Substantiate inclusion of PN to list of measured components taking into account modern tendencies to ambient and interior air quality requirements2. Investigate the influence of fluctuation of external concentration of CO₂ in ambient air to interior concentration of CO₂ (do we need to measure external CO₂ simultaneously with internal)
11. Test equipment requirements	Further check realistic values for measured concentration diapason and time resolution
13. Test Modes	Investigate the necessity and validity of laboratory test inclusion to test procedure
14. HVAC Modes	Investigate the influence of fan speed to measurements results and necessity to set not fan handle position, but air flow value trough HVAC (e.g. 200 m ³ /h)
15. Test Procedure	To write draft test procedure and discuss in the next meetings
16. Test Protocol	This item must further be updated, when test procedure will be finalized

5. TEST CONDITIONS



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- Is a good starting point



5. Test Conditions

Proposals:

- The test must be primarily conducted on city roads and urban locations
- Road condition Paved streets
- It is recommended to avoid long tunnels, high altitudes and construction areas.

Each trip shall meet the conditions below:

- Average speed 30...50 km/h
- Maximum Instantaneous vehicle speed 80 km/h
- Test duration 30...120 min
- Average altitude 0...700 m
- A normal driving style shall be adopted.

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5. Test Conditions

Alternatively:

EU and UN Requirements for urban part of RDE*:

- Vehicle speeds lower than or equal to 60 km/h
- The average speed (including stops) of the urban driving part of the trip should be between 15 and 40 km/h.
- Stop periods, defined by vehicle speed of less than 1 km/h, shall account for 6-30 % of the time duration of urban operation. Urban operation may contain several stop periods of 10 s or longer. However, individual stop periods shall not exceed 300 consecutive seconds; else the trip shall be avoided.
- The start and the end point of a trip shall not differ in their elevation above sea level by more than 100 m.
- Altitude lower or equal to 700 meters above sea level.
- The minimum distance of operation shall be 16 km.

*Requirements regarding: Commission Regulation (EU) 2017/1151

The item needs additional discussion

5. Test Conditions

Proposals:

- Windows, doors, sunroof or convertible soft top must be closed at all times. Heated or cooled seats should not be used.
- The vehicle shall have been driven at least 50 km in the seven days prior to the start of the test, to ensure that the vehicle has been in regularly use prior to the test and not left unused for a long period.
- When cleaning the vehicle prior to testing, only a damp cloth should be used. Fragrances and air fresheners should be avoided.
- There should be the driver and one passenger present in the vehicle for the duration of the test. All outer clothing of the driver should be made of polyester to minimise particle generation from the driver. Clothing should cover both arms and legs.
- The occupants should avoid applying any fragrances or make-up prior to or during the test. Further, occupants should not have smoked for at least 24 hours before a test.

6. SAMPLING POINTS / LINES



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- Ext. Sampling point positioned at the air intake of the HVAC or water separation
- Sampling lines as short as possible
- Line lengths must be identical
- As few bendings as possible
- No sharp bendings
- Antistatic line for particles
- PTFE line for gases
- Line diameter compatible to measurement equipment, usually 6mm or 8mm

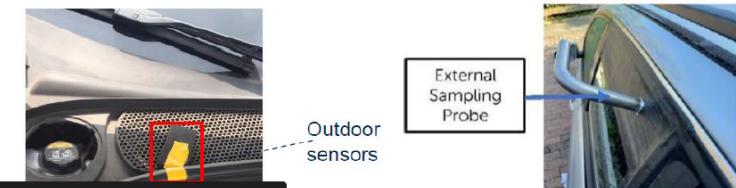
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6. Sampling Points/Sampling Lines

Proposals:

1. The interior sampling point should be a head-height between the front headrests
2. The external sampling point should be
 - 2.1. As close as reasonably possible to the ventilation air intake. Sampling should be isokinetic
 - 2.2. A forward-facing, horizontally oriented sampling probe securely mounted to minimize vehicle aerodynamic influences, at least 5 cm from the vehicle surface
 - 2.3. Not measured, and used PM_{10} and $PM_{2.5}$ data from real-time roadside monitoring stations
3. The sampling lines to the analyzer that is designed to minimize particle losses from 10 nm to 2.5 μm . The sampling lines should be constructed of materials to minimize electrostatic particle losses (for example, conductive materials) and sized to minimize inertial and/or diffusional particle losses

The item needs additional discussion



7. BACKGROUND POLLUTION LEVEL



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- >30 (or 50) $\mu\text{g}/\text{m}^3$ PM_{2.5}

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7. Background air pollution level

Proposals:

PN 5 000...100 000 #/cm³

PM_{2.5} concentration:

- 5...100 $\mu\text{g}/\text{m}^3$
- 10...200 $\mu\text{g}/\text{m}^3$
- 81...150 $\mu\text{g}/\text{m}^3$
- > 30 $\mu\text{g}/\text{m}^3$

8. CABIN AIR FILTER AGE



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- OEM-approved filters only
- Used filter with max. 3.000km mainly with fresh air mode **or** artificially aged filter (aging to be defined)
- Filter age/mileage to be documented

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8.Cabin air filter age

Proposals:

HVAC filter age:

- New, OEM-approved
- Normal filters use for 3000 km or Ageing procedure
- Original OEM HVAC filter with max. 3000 km
- Aged filter out of filter replacement cycle which driving mileage 10 000 km~15 000 km
- Both New and Aged

If a vehicle is not installed with a filter by the OEM, the vehicle to be tested with no filter present.

If necessary to achieve test validity, the filter should be replaced with a matching part to the OEM original. The car should then be driven on the road for a minimum of 100 km before starting the test.

9. PM AND GAS COMPONENTS



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- Particle size distribution incl. PN per size/fraction between 0.1-1µm (exterior and interior)
- NO_x (NO₂ and NO) (exterior and interior)
- CO₂ (interior only)

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9. PM and gas components to be Measured

Proposals:

PN
PM_{2.5}
PM₁₀
CO
CO₂
NO₂

Optionally:

small fraction PM (0.1-1 µm)
tVOC
PAH
NO_x (NO₂ & NO)
NH₃
O₃

11. TEST EQUIPMENT REQUIREMENTS



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- Test equipment according to particulates/gases of chapter 9
- Test Equipment suitable for mobile application
- Test Equipment fulfils common safety regulations
- Detection limit chosen as such to enable save measurement

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11. Test equipment requirements

Proposals:

PN concentration 0 to 500,000 #/cm³

PM concentration (<2.5 µm) 0 to 0.5 mg/m³

PM concentration (<10 µm) 0 to 1 mg/m³

CO concentration 0 to 1 ppm

CO₂ concentration 0 to 5,000 ppm

NO₂ concentration 0 to 0.5 ppm

Alternatively:

PM concentration (<2.5 µm) 0 to 100 mg/m³

PM concentration (<10 µm) 0 to 100 mg/m³

13. TEST MODES



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- At first the goal of the measurement has to be defined:
 - Comparison between all cars (not possible, see CEN WS 104) – not recommended by CLEPA
 - Comparison between identical car with different configuration? – to be discussed
 - **Best practice to measure VIAQ? – CLEPA favorized**
- Urban city meets the most challenging situations
- Lab Test might be more comparable, but does it show realistic behaviour? (should be discussed)

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13. Test Modes

Proposals:

1. Urban (city) driving
2. Real driving conditions (urban + rural + motorway)
3. Stationary test
4. Laboratory test (see VIAQ-22-11, VIAQ-23-05, VIAQ-23-10, VIAQ-23-11)

14. HVAC MODES



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- HVAC mode to be chosen is dependent from goal of the measurement (see 13) → we should clarify that first!
- AC off (humid evaporator influences particle and gas separation, but is not a constant factor in the system, due to its dependency on environmental conditions during the test drive)
- 22°C
- Manual mode
- Mid fan speed
- AQS deactivated? (to be discussed, because it can enable better air quality)

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14. HVAC Modes

Proposals:

HVAC system settings:

- For Automatic mode: temperature 19°C, fan speed if can be manually adjusted 50%/medium
- For manual mode: fan speed 50%/medium, temperature 50%/medium, fresh air mode
- Air conditioning switched OFF
- Ventilation flaps fully open and directed straight ahead
- If a vehicle has manufacturer-installed air quality sensors, these should be left in the predominant mode

Alternatively:

- Temperature 23°C
- For manual HVAC: xx% fresh, yy% in recirculation