

Draft Part IV of the Mutual Resolution (M.R.3) on Vehicle Interior Air Quality

This document contains a proposal to develop Part IV of the Mutual Resolution (M.R.3) on Vehicle Interior Air Quality (VIAQ) and the outcome of the VIAQ Informal Working Group under GRPE.

IV. Emission entering to the vehicle cabin with outside air pollutants and the interior air cleaning efficiency

1. Purpose

The part IV of the Mutual Resolution contains the provisions and harmonized test procedure for the measurement of interior air quality and the interior air cleaning efficiency concerning the protection of the driver and passengers from harmful emissions entering the vehicle cabin with outside air pollutants.

2. Scope and application

This part of Mutual Resolution applies to category 1-1 vehicle, as defined in the Special Resolution No. 1.¹

3. Definitions

For the purpose of this part, the following definitions apply:

- 3.1. "*Test vehicle*" means the new vehicle from series production to be tested, mileage from 3,000 – 15,000 km;
- 3.2. "*Test substances*" means the substances to be measured and are fine particulate matter (PM_{2.5}), nitrogen monoxide (NO), nitrogen dioxide (NO₂) carbon dioxide (CO₂);
- 3.3. "*Background concentration*" means the test substance concentration at the vehicle air intake at the start of the test;
- 3.4. "*Real driving test*" refers to the test in which test substances are sampled from the outside and interior air of a test vehicle moving at urban roads;
- 3.5. "*Sampling point*" means a point where the test substances are sampled.

4. Abbreviations

4.1. General abbreviations

VIAQ	Vehicle Interior Air Quality
HVAC	Heating, Ventilation and Air Conditioning

4.2. Chemical symbols and abbreviations

PM _{2.5}	Fine particulate matter
NO	Nitrogen monoxide [CAS#: 10102-43-9]
NO ₂	Nitrogen dioxide [CAS#: 10102-44-0]
CO ₂	Carbon dioxide [CAS#: 124-38-9]

¹ ECE/TRANS/WP.29/1045, as amended by Amends. 1 and 2 (Special Resolution No. 1, www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html)

5. General provisions

- 5.1. When instructed to include this test procedure in national standards, Contracting Parties are invited to adopt this part of Mutual Resolution regarding the comparison of internal measurement of air pollutants entering into the cabin and measurement of pollutants in outside air.
- 5.2. This part of the Mutual Resolution does not hold regulatory status within Contracting Parties. Contracting Parties refer to the VIAQ recommendation when used for the assessment on vehicle interior air quality with the technical prescriptions of their own standards or regulations.
- 5.3. There are several test methods available for assessing vehicle interior air quality and this Mutual Resolution takes into account these existing standards.
- 5.4. This part of Mutual Resolution will encourage the improvement of vehicle body and air cleaning and heating, ventilation and conditioning system design to increase air quality inside the passenger cabin.
- 5.5. Due to the different levels of development, different regional cultures, and the costs associated with interior air quality control technology, the regulatory stringency is expected to be different from region to region for the foreseeable future. The setting of interior pollutant concentration limit values, therefore, is not part of this recommendation for the time being.

6. Normative references

- 6.1. ISO 16000-1:2004 Indoor air – Part 1: General aspects of sampling strategy.
- 6.2. UN Regulation No. 83 - Rev.5 – Uniform provisions concerning the approval of vehicles with regard to the emission of pollutants according to engine fuel requirements (Annex 4a - Appendix 7).
- 6.3. Proposal for a new UN Regulation No. [XXX] on uniform provisions concerning the approval of light duty passenger and commercial vehicles with regards to real driving emissions (RDE) (Working document ECE/TRANS/WP.29/GRPE/2023/3).
- 6.4. CWA 17934:2022 - Real drive test method for collecting vehicle interior air quality data.

7. Requirements for the test vehicle

- 7.1. Test vehicles should only be new vehicles from serial production. Used vehicles are not included. The selection of vehicles should be based on a worst case to minimize testing cost. For the purpose of emissions entering into the cabin with outside air equipment for air purification is only allowed in the test cars if it is serial equipment.
- 7.2. The new vehicle should have been run in for between 3000 and 15000 km and have age more than one month.
- 7.3. General inspection of the test vehicle should be performed before testing.
- 7.4. The vehicle should be excluded from the test in case of a positive answer to any of the criteria below:
 - (a) Does the vehicle not have a full service history?

- (b) Is there a Malfunction Indication Light showing on the vehicle instrument panel?
 - (c) Has the vehicle had unauthorised vehicle repairs?
 - (d) Has any part of the vehicle's heating and ventilation system replaced with non-original parts?
 - (e) Through visual inspection of the vehicle, are there any damaged ventilation system relevant components?
 - (f) Are there any obstructions to the vehicle air intake path?
 - (g) Is the vehicle not in overall safe operating condition?
 - (h) Is there any damage to the body of the vehicle, including but not limited to doors, windows and the rear?
- 7.5. The test vehicle should be equipped with OEM-approved cabin air filter artificially aged to 3000 km. Filter type needs to be documented.
- 7.5.1. The filter aging procedure.
- TBD**
- 7.5.2. If the model of vehicle of the OEM has no filter in its definition, the vehicle shall be tested with this procedure without an additional filter.

8. Requirements for the test apparatus, instrument and equipment

- 8.1. Test substances. During the tests concentrations of substances listed below should to be measured:
- (a) Fine particulate matter (PM_{2.5}) inside and outside vehicle cabin;
 - (b) Nitrogen monoxide (NO) inside and outside vehicle cabin;
 - (c) Nitrogen dioxide (NO₂) inside and outside vehicle cabin;
 - (d) Carbon dioxide (CO₂) inside vehicle cabin only.
- 8.2. Sampling points and lines requirements.
- 8.2.1. The interior sampling point should be a head-height between the front headrests. Sampling tube should be directed to the rear of the vehicle to avoid affect of driver and passenger breathing to the CO₂ measurement.
- 8.2.2. The external sampling point should be as close as reasonably possible to the ventilation air intake.
- 8.2.3. The sampling lines to the analyser should be:
- (a) as short as possible;
 - (b) line lengths must be identical and not more than 2 m;
 - (c) as straight as possible;
 - (d) with few bendings as possible;
 - (e) with no sharp bendings;
 - (f) made of antistatic materials for particles measurement;
 - (g) made of PTFE for gases measurement;

- (h) with diameter compatible to measurement equipment, usually 6 mm or 8 mm (outer diameter).
- 8.3. Test substance concentration measurement methods.
- 8.3.1. For fine particles (PM_{2.5}): optical particle counter.
- 8.3.2. For nitrogen oxides (NO, NO₂): non-dispersive ultra-violet chemiluminescent detector, and for NO₂: iterative cavity-enhanced differential optical absorption spectroscopy.
- 8.3.3. For carbon dioxide (CO₂): Non-dispersive infra-red detector.
- 8.4. Test substance concentration measurement limits.
- 8.4.1. The measuring equipment should provide the lower and upper limits of measurable concentrations of the test substances at the presence of other components as in the table below.

<i>Test substance</i>	<i>Detection limit of measurement, not less than</i>	<i>Accuracy of measurement, not more than</i>
Fine particles PM _{2.5}	2.0 µg/m ³	TBD
Nitrogen monoxide NO	2 ppb	±1%
Nitrogen dioxide NO ₂	2 ppb	±1%
Carbon dioxide CO ₂	100 ppm	±3.0% of reading or ±50 ppm

- 8.5. Time resolution of measurement equipment should be less than 5 seconds and measurement data during the test should be saved on internal or external memory.
- 8.6. Test equipment should be suitable for mobile application.
- 8.7. Test equipment should fulfil common safety regulations.
- 8.8. Additional measurement equipment.
- 8.8.1. For tests using additional measurement equipment the following are to be used: thermometer, relative humidity meter, barometer. Limit of permissible basic error for the above-mentioned equipment is presented in the table.

<i>Parameter</i>	<i>Limit of permissible basic error</i>
Temperature	±1°C
Relative humidity	±2.5%
Atmospheric pressure	±0.1 kPa

9. Test procedure, test mode, and test conditions

- 9.1. The preparation procedure.
- 9.1.1. Take out cabin air filter and replace by new artificially aged one. Check correctness of air flow direction of the filter when replacing.
- 9.1.2. Check vehicle for tightness (sealings, windows, doors, trunk, roof). A vehicle with defective components should not be tested.
- 9.1.3. Ensure exhaust pipe is representative of serial production. Visually check exhaust pipe for tightness.

- 9.1.4. Before testing substance concentration, the measurement equipment and sampling system should be placed inside the test vehicle and warmed up ahead of the test start time in accordance with the equipment manual.
- 9.2. Meteorological conditions.
- 9.2.1. Ambient temperature in the range from +5°C to +25°C.
- 9.2.2. Relative humidity from 40% to 80%.
- 9.2.3. Atmospheric pressure from 85 to 110 kPa
- 9.2.4. Weather condition should be: no rain, fog, snow or standing water on the carriageway.
- 9.3. Test conditions.
- 9.3.1. The VIAQ performance shall be demonstrated by testing vehicles on the road, operated over their normal driving patterns, conditions and payloads. The test shall be conducted on paved roads (e.g. off-road operation is not permitted).
- 9.3.2. Background air pollution level:
- (a) fine particles PM_{2.5} concentration should be not less than 15 µg/m³ and not more than 500 µg/m³;
 - (b) NO **tbd**;
 - (c) NO₂ **tbd**;
 - (d) CO₂ **tbd**.
- 9.3.3. Windows, doors, sunroof or convertible soft top must be closed at all times. Heated or cooled seats should not be used.
- 9.3.4. When cleaning the vehicle prior to testing, only a damp cloth should be used. Fragrances and air fresheners should be avoided.
- 9.3.5. There should the driver and one passenger present in the vehicle for the duration of the test. No passengers should be on the rear seats. Clothing should cover both arms and legs. All outer clothing and shoes should be clean to minimize particle generation. This also applies to the vehicles interior such as seats or carpets. Fragrances and fresheners must not be active.
- 9.3.6. The occupants should avoid applying any fragrances or make-up prior to or during the test. Further, occupants should not have smoked the same day to avoid to add pollution to the test.
- 9.3.7. The trip shall consist of approximately 55 per cent urban and 45 per cent expressway speed bins. 'Approximately' shall mean the interval of ±25 per cent points around the stated percentages. The urban speed bin however can never be less than 40 per cent of the total trip distance.
- 9.3.8. Urban speed bin is characterised by vehicle speeds lower than or equal to 60 km/h.
- 9.3.9. Expressway speed bin is characterised by speeds above 60 km/h and up to 100 km/h.
- 9.3.10. Local speed limits remain in force during a test, notwithstanding other legal consequences. Stop periods, defined by vehicle speed of less than 1 km/h, shall account for 6-30 per cent of the time duration of urban operation. Urban operation may contain several stop periods of 10 s or longer.
- 9.3.11. The trip duration shall be between 60 and 90 minutes.

- 9.3.12. The minimum distance of each, urban and expressway speed bins shall be 16 km.
- 9.3.13. The start and the end points of a trip shall not differ in their elevation above sea level by more than 100 m. In addition, the proportional cumulative positive altitude gain over the entire trip and over the urban operation shall be less than 1,200 m/100 km.
- 9.4. Vehicle conditioning.
 - 9.4.1. Before testing, the vehicle shall be preconditioned in the following way: The vehicle shall be driven, preferably on the same route as the planned real driving testing, or for at least 10 min for urban operation or 30 minutes with a minimum average velocity of 30 km/h. 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 9.2, 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.
 - 9.4.2. 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.
- 9.5. HVAC system settings:
 - for automatic mode: temperature 22°C, if possible, adjust manually: fan speed 50%/medium;
 - for manual mode: fan speed 50%/medium, temperature 50%/medium, fresh air mode;
 - air conditioning: switched ON;
 - 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.
- 9.6. Real driving test procedure.
 - 9.6.1. Measure ambient air temperature, relative humidity, pressure and background air pollutants concentration listed at 9.3.2.
 - 9.6.2. Start the engine, adjust HVAC operation mode, switch on the PM analyzers and drive for at least 10 min.
 - 9.6.3. Drive to the beginning of the test route, start PM analyzers, GPS logger.
 - 9.6.4. Drive on the route urban and expressway parts.
 - 9.6.5. Park the car, stop the PM measurement, GPS logger.
 - 9.6.6. Switch off PM analyzer and the engine.
 - 9.6.7. Save measurement protocols from PM analyzers and GPS track from logger to the computer.
 - 9.6.8. Take another background measurement according to paragraph 9.6.1. Vehicle real driving test is complete.

10. Calculation, presentation of results, precision and uncertainty

10.1. Calculation of results.

10.1.1. Calculate the fine particles cleaning efficiency by formula:

$$\eta_{pm} = \left(1 - \frac{C_{pm}^{in}}{C_{pm}^{out}}\right) \cdot 100\%$$

where:

C_{pm}^{in} is the average inside PM_{2.5} concentration [$\mu\text{g}/\text{m}^3$],

C_{pm}^{out} is the average outside PM_{2.5} concentration [$\mu\text{g}/\text{m}^3$].

10.2. Data reporting shall use the format in Annex 7. Additions to the report should be agreed on between the client and the laboratory.

11. Performance characteristics

11.1. Calibration procedure.

11.1.1. Calibration should be done according to GTR 15.

11.1.2. Calibration and linearization of the equipment shall be performed according to manufacturer recommendations prior to the commencement of measurements.

11.1.3. After the equipment is installed in the vehicle, a dynamic calibration shall be performed. The dynamic calibration ensures that the paired instruments are measuring the same concentrations. The dynamic calibration should be run each time: before the test series; if there is a new or changes to an existing test equipment installation on a vehicle; and after the first test to ensure in correct measurement. For the purposes of this calibration test, a stainless steel Y-piece should be used to split the air from the exterior sample probe equally between the interior and exterior measurement instruments. At the end of the calibration, the Y-piece should be removed and the installation returned to the test configuration.

11.1.4. The dynamic calibration test should be run for at least 30 minutes and expose the vehicle to concentrations in the range defined in paragraph 9.3.2. The Pearson correlation coefficient between the data points from each matched pair of measurement devices shall be calculated. For a valid calibration, the r^2 on all devices should be at least 0.98.

11.1.5. The drift of the zero response of the particle number instruments, defined as the mean response to HEPA filtered air at the inlet of the sampling line during a time interval of at least 30 seconds, shall be tested prior to each test and shall be less than $3 \mu\text{g}/\text{m}^3$.

11.1.6. The drift of the zero response of the carbon dioxide instruments, defined as the mean response to ambient air at the inlet of the sampling line during a time interval of at least 30 seconds, shall be tested prior to each test.

11.1.7. Annual calibration following supplier recommendation.

12. Quality assurance/quality control

12.1. The tests proceeded in accordance to paragraph 9. of part IV are valid if all quality requirements listed in this paragraph are fulfilled.

12.2. Quality control requirements for real driving test are listed in the table below.

<i>Subclauses</i>	<i>Description</i>	<i>Criterion</i>	<i>Frequency</i>	<i>Comments</i>
9.2.1	Ambient temperature	+5 to +25°C	Each test	Control at the beginning and at the end of each test
9.2.2	Relative humidity	40 to 80%	Each test	Control at the beginning and at the end of each test
9.2.3	Atmospheric pressure	85 to 110 kPa	Each test	Control at the beginning and at the end of each test
9.3.2	Background PM _{2.5} concentration	15 to 500 µg/m ³	Each test	Control at the beginning and at the end of each test
tbd				
tbd				

12.3. Quality control requirements for particle and gas analysis are listed in the table below.

<i>Subclauses</i>	<i>Description</i>	<i>Criterion</i>	<i>Frequency</i>	<i>Comments</i>
11.1	Particle analyzer calibration	tbd	Each test series	Procedure in accordance to 11.1
tbd				

Annex 7**Test report of emissions entering to the vehicle cabin with outside air pollutants and the interior air cleaning efficiency**

Reporting Format and Data Exchange

The data exchange file shall be constructed as follows. Test substance concentrations as well as any other relevant parameters shall be reported and exchanged as a csv-formatted data file. Parameter values shall be separated by a comma, ASCII-Code #h2C. The decimal marker of numerical values shall be a point, ASCII-Code #h2E. Lines shall be terminated by carriage return, ASCII-Code #h0D. No thousand separators shall be used.

Headers of the Reporting and Data Exchange File

<i>Line #</i>	<i>Parameter</i>	<i>Basic Data Type [A=Alpha or N=Numeric (max length, fractional digits)]</i>	<i>Data Type [Enumeration String, Decimal, Integer]</i>	<i>Total Digits</i>	<i>Fractional Digits</i>	<i>Minimum Value</i>	<i>Maximum Value</i>	<i>Allowed Values for: Enumeration or Description or Units</i>
1	Process Code	N(2)	Integer			0	99	Version of Test Report. 1 st dataset is N=0, highest value is the latest correction of existing dataset
2	Name of Witness	A(250)	String					Only if applicable. Full name of witness, company name and contact information for certification of test. Use "Self-Certified" if no witness is required.
3	Test ID Code	A(50)	String					Serial Test Identification
4	Name of Vehicle Test Operator(s)	A(50)	String					Given (First) and Family (Last) Names
5	Name of Analytical Test Operator(s)	A(50)	String					First and last name of test operator
6	Vehicle Laboratory and Address	A(200)	String					Name of Vehicle Test Laboratory, Street, City, State, Country, Postal (ZIP) Code
7	Analytical Laboratory and Address	A(200)	String					Name of Sample Test Laboratory, Street, City, State, Country, Postal (ZIP) Code
8	Valid or Void	A(5)	String					Enter if the test value is void or valid
9	Test Comments	A(1000)	String					Test Report Comments

<i>Line #</i>	<i>Parameter</i>	<i>Basic Data Type [A=Alpha or N=Numeric (max length, fractional digits)]</i>	<i>Data Type [Enumeration String, Decimal, Integer]</i>	<i>Total Digits</i>	<i>Fractional Digits</i>	<i>Minimum Value</i>	<i>Maximum Value</i>	<i>Allowed Values for: Enumeration or Description or Units</i>
10	Production Date	A(10)	String					Ref. ISO 8601 (e.g. YYYY-MM-DD)
11	Vehicle Test Date	A(10)	String					Ref. ISO 8601 (e.g. YYYY-MM-DD)
12	Analytical Test Date	A(10)	String					Ref. ISO 8601 (e.g. YYYY-MM-DD)
13	Manufacturer Name	A(50)	String					Original Equipment Manufacturer (OEM)
14	Factory Name	A(50)	String					Place of Manufacturer
15	Vehicle Identification Number	A(17)	String					17-character vehicle identification number (VIN)
16	Vehicle Class (Category 1-1 Vehicle Only)	A(1)	Enumeration					A = Mini Vehicle B = Small Vehicle C = Medium Vehicle D = Large Vehicle E = Executive Vehicle F = Luxury Vehicle J = Sport Utility Vehicle (including off-road vehicles) M = Multi-Purpose Vehicle S = Sports Vehicle P = Small Pickup Truck T = Standard Pickup Truck
17	Model Name	A(50)	String					Manufacturer's Model Name
18	Exterior Color	A(50)	String					Paint Color
19	Odometer Reading	N(5)	Integer					Distance traveled [km] should be from 3000 till 15000 km
20	Vehicle History	A(50)	String					Optional Description of Test Vehicle
21	Climate Control System Type/Characteristics	A(200)	String					Description of Climate Control System
22	HVAC Operation Control	A(1)	Enumeration					M = Manual A = Automatic
23	Cabin Filter Type	A(1)	Enumeration					D = Dust Filter H = Hybrid Filter N = No Filter

<i>Line #</i>	<i>Parameter</i>	<i>Basic Data Type [A=Alpha or N=Numeric (max length, fractional digits)]</i>	<i>Data Type [Enumeration String, Decimal, Integer]</i>	<i>Total Digits</i>	<i>Fractional Digits</i>	<i>Minimum Value</i>	<i>Maximum Value</i>	<i>Allowed Values for: Enumeration or Description or Units</i>
24	Cabin Air Additional Cleaning Device	A(1)	Enumeration					N = Not Equipped Y = Equipped
25-29 ⁽¹⁾
30	Weather Conditions	A(50)	String					Description of Weather Conditions During Test
31	Ambient temperature – before test	N(2,1)	Decimal	3	1	-99.9	+99.9	[deg. Celsius]
32	Ambient pressure – before test	N(3,1)	Decimal	4	1	0.0	999.9	[kPa]
33	Relative humidity – before test	N(2,1)	Decimal	3	1	0.0	99.9	[percent]
34	Ambient temperature – after test	N(2,1)	Decimal	3	1	-99.9	+99.9	[deg. Celsius]
35	Ambient pressure – after test	N(3,1)	Decimal	4	1	0.0	999.9	[kPa]
36	Relative humidity – after test	N(2,1)	Decimal	3	1	0.0	99.9	[percent]
40	Background Fine Particulate Matter (PM2.5) – before test	N(4,1)	Decimal	5	1	0.0	9999.9	[$\mu\text{g}/\text{m}^3$]
41	Background – Nitrogen Monoxide – before test	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-43-9 [$\mu\text{g}/\text{m}^3$]
42	Background – Nitrogen Dioxide – before test	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-44-0 [$\mu\text{g}/\text{m}^3$]
43	Background – Carbon Dioxide – before test	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 124-38-9 [ppm]
44	Background Fine Particulate Matter (PM2.5) – after test	N(4,1)	Decimal	5	1	0.0	9999.9	[$\mu\text{g}/\text{m}^3$]
45	Background – Nitrogen Monoxide – after test	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-43-9 [$\mu\text{g}/\text{m}^3$]

<i>Line #</i>	<i>Parameter</i>	<i>Basic Data Type [A=Alpha or N=Numeric (max length, fractional digits)]</i>	<i>Data Type [Enumeration String, Decimal, Integer]</i>	<i>Total Digits</i>	<i>Fractional Digits</i>	<i>Minimum Value</i>	<i>Maximum Value</i>	<i>Allowed Values for: Enumeration or Description or Units</i>
46	Background – Nitrogen Dioxide – after test	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-44-0 [µg/m ³]
47	Background – Carbon Dioxide – after test	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 124-38-9 [ppm]
48-49 ⁽¹⁾
50	Urban Bin Part	N(2,1)	Decimal	3	1	0.0	99.9	[%]
51	Expressway Bin Part	N(2,1)	Decimal	3	1	0.0	99.9	[%]
52	Trip Distance Urban Part	N(2,1)	Decimal	3	1	0.0	99.9	[km]
53	Trip Distance Expressway Part	N(2,1)	Decimal	3	1	0.0	99.9	[km]
54	Trip Duration	N(3,1)	Decimal	4	1	0.0	999.9	[min]
55	Elevation Above the Sea Level at Start	N(3,1)	Decimal	4	1	0.0	999.9	[m]
56	Cumulative Altitude Gain	N(3,1)	Decimal	4	1	0.0	999.9	[m]
57-59 ⁽¹⁾
60	Fine Particulate Matter (PM2.5) – Inside – Average	N(4,1)	Decimal	5	1	0.0	9999.9	[µg/m ³]
61	Fine Particulate Matter (PM2.5) – Inside – Maximal	N(4,1)	Decimal	5	1	0.0	9999.9	[µg/m ³]
62	Fine Particulate Matter (PM2.5) – Inside – Minimal	N(4,1)	Decimal	5	1	0.0	9999.9	[µg/m ³]
63	Fine Particulate Matter (PM2.5) – Outside – Average	N(4,1)	Decimal	5	1	0.0	9999.9	[µg/m ³]
64	Fine Particulate Matter (PM2.5) – Outside – Maximal	N(4,1)	Decimal	5	1	0.0	9999.9	[µg/m ³]
65	Fine Particulate Matter (PM2.5)	N(4,1)	Decimal	5	1	0.0	9999.9	[µg/m ³]

<i>Line #</i>	<i>Parameter</i>	<i>Basic Data Type [A=Alpha or N=Numeric (max length, fractional digits)]</i>	<i>Data Type [Enumeration String, Decimal, Integer]</i>	<i>Total Digits</i>	<i>Fractional Digits</i>	<i>Minimum Value</i>	<i>Maximum Value</i>	<i>Allowed Values for: Enumeration or Description or Units</i>
	– Outside – Minimal							
66	Fine Particulate Matter (PM2.5) – Cleaning Efficiency	N(2,1)	Decimal	3	1	0.0	99.9	[%]
67	Nitrogen Monoxide – Inside – Average	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-43-9 [µg/m ³]
68	Nitrogen Monoxide – Inside – Maximal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-43-9 [µg/m ³]
69	Nitrogen Monoxide – Inside – Minimal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-43-9 [µg/m ³]
70	Nitrogen Monoxide – Outside – Average	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-43-9 [µg/m ³]
71	Nitrogen Monoxide – Outside – Maximal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-43-9 [µg/m ³]
72	Nitrogen Monoxide – Outside – Minimal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-43-9 [µg/m ³]
73	Nitrogen Monoxide – Cleaning Efficiency	N(2,1)	Decimal	3	1	0.0	99.9	[%]
74	Nitrogen Dioxide – Inside – Average	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-44-0 [µg/m ³]
75	Nitrogen Dioxide – Inside – Maximal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-44-0 [µg/m ³]
76	Nitrogen Dioxide – Inside – Minimal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-44-0 [µg/m ³]
77	Nitrogen Dioxide – Outside – Average	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-44-0 [µg/m ³]

<i>Line #</i>	<i>Parameter</i>	<i>Basic Data Type</i> [A=Alpha or N=Numeric (max length, fractional digits)]	<i>Data Type</i> [Enumeration String, Decimal, Integer]	<i>Total Digits</i>	<i>Fractional Digits</i>	<i>Minimum Value</i>	<i>Maximum Value</i>	<i>Allowed Values for: Enumeration or Description or Units</i>
78	Nitrogen Dioxide – Outside – Maximal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-44-0 [µg/m ³]
79	Nitrogen Dioxide – Outside – Minimal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 10102-44-0 [µg/m ³]
80	Nitrogen Dioxide – Cleaning Efficiency	N(2,1)	Decimal	3	1	0.0	99.9	[%]
81	Carbon Dioxide – Inside – Average	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 124-38-9 [ppm]
82	Carbon Dioxide – Inside – Maximal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 124-38-9 [ppm]
83	Carbon Dioxide – Inside – Minimal	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 124-38-9 [ppm]
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(1) Additional parameters may be added here to characterize test conditions.
