

Proposal for amendments to ECE/TRANS/WP.29/GRPE/2017/10

The text reproduced below was prepared by the IWG on Vehicle Interior Air Quality (VIAQ). The modifications to the current text of ECE/TRANS/WP.29/GRPE/2017/10 are marked in bold for new, or struck through for deletion.

I. Proposals

Part II, Text of the Mutual Resolution

Paragraph 1., amend to read:

"1. Purpose

This Mutual Resolution contains the provisions and harmonized test procedure for the measurement of interior air emission from interior materials, concerning the protection of passengers and driver from ~~toxic~~ **chemical** emissions emitted from interior materials used for the construction of vehicles.

Paragraph 3.2., amend to read:

"3.2. *"Production date"* is the ~~sign-off date from the production line~~ **date a new vehicle leaves the production line;**

Paragraph 3.3., amend to read:

"3.3. *"Test substances"* mean substances to be measured **in air**; ~~these are 8 substances, Formaldehyde, Acetaldehyde, Benzene, Toluene, Xylene, Ethylbenzene, Styrene, and Acrolein;~~ **Measured substances are Volatile Organic Compounds (VOCs) and the carbonyl compounds. VOCs range in volatility from n-C6 to n-C16 whose boiling point is in the range from (50 °C to 100 °C) to (240 °C to 260 °C). Carbonyl compounds include the aldehydes and ketones. In the test procedure the measured compounds are grouped by the term (VOC) and (carbonyl compounds) because each group currently requires two unique active sampling and analytical methods for measuring the test substances.**

3.3.1. "Carbonyl compounds" means Formaldehyde, Acetaldehyde and Acrolein. Carbonyl compounds" are to be measured according to ISO 16000-3;

3.3.2. “VOCs” means Volatile Organic Compounds ranging in volatility from n-C6 to n-C16, e.g. Benzene, Toluene, Xylene, Ethylbenzene and Styrene. VOCs are to be measured according to ISO 16000-6;

3.3.3. “Alternative VOC Measurement Method” means a method that is proven equivalent to ISO 16000-3 or 16000-6. Two possible alternative methods could be an advancement to the current active sampling and desorption method 16000-6 or a direct sampling measurement method;

Paragraph 4.2., amend to read:

"4.2.	Chemical symbols and abbreviations	
	CH ₂ O	Formaldehyde [CAS#: 50-00-0]
	C ₂ H ₄ O	Acetaldehyde [CAS#: 75-07-0]
	C ₃ H ₄ O	Acrolein, Acrylic Aldehyde [CAS#: 107-02-8]
	C ₆ H ₆	Benzene [CAS#: 71-43-2]
	C ₈ H ₁₀	Ethyl benzene [CAS#: 100-41-4]
	C ₈ H ₈	Styrene [CAS#: 100-42-5]
	C ₇ H ₈	Toluene [CAS#: 108-88-3]
	C ₈ H ₁₀	Xylene [CAS#: 1330-20-7]

Paragraph 5.3., amend to read:

"5.3. There are several test methods available for assessing vehicle interior air quality **this Mutual Resolution** taking into account existing standards. There are three test modes, each with their own testing method. These test modes would be subject to optional acceptance by Contracting Parties depending on their situations. Contracting Parties may optionally decide to the test modes.

Paragraph 7.1., amend to read:

"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 interior to minimize testing cost. ~~Therefore it is recommended to measure~~ vehicles with dark exterior and preferably black or dark interior colour. Furthermore grouping ~~cars~~ **vehicles** in families with similar interior emissions is recommended. This approach can be based on summing up vehicles with same interior line and similar interior volume.

Paragraph 7.3., amend to read:

"7.3. Transportation conditions from **assembly** plant to storing place and to **the** test facility

Paragraph 7.3.2., amend to read:

"7.3.2. All windows and doors **should remain** closed. HVAC outlets **should remain** closed, ~~if possible,~~ to avoid contamination.

Paragraph 7.3.3., amend to read:

"7.3.3. Ensure that no external off-gassing materials will be transported in the same cargo area. Minimize high solar load during all transportations. Documentation of all deviations from the normal transportation process in the test protocol ~~is needed.~~ **shall be reported in the comments.**

Paragraph 7.3.4., amend to read:

"7.3.4. Influence of the driver shall be as low as possible. The vehicle **driver and** handlers shall avoid the following: no smoking, eating, transportation of external items, and no perfume, inside or near the test vehicle.

Paragraph 7.4.2., amend to read:

"7.4.2. ~~Remove all protecting covers, foils, papers, stickers, absorbers, etc. at least 24 hours before measurement.~~ Do not use any cleaning agent to remove any residues. Dust wiping, vacuuming and cleaning with clear water is possible. Clear water cleaning form outside is possible.

Paragraph 7.4.4., amend to read:

"7.4.4. Workers should carefully deal with the vehicle to prevent contamination.
7.4.5. Remove all protecting covers, foils, papers, stickers, absorbers, etc. at least 24 hours before measurement.

Paragraph 7.5., amend to read:

"7.5. Storing conditions for the vehicle (~~one day before measurement~~) **the day, 24 hours before measurement**

Paragraph 8.1.1., amend to read:

"8.1.1. The whole vehicle test chamber shall be large enough to accommodate the complete test vehicle. **And include a heating, cooling, humidity, ventilation, and filter system for the air and solar lights if necessary.**

Paragraph 8.1.2., amend to read:

"8.1.2. The whole vehicle test chamber shall be capable of maintaining a temperature of $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$. ~~A heating and ventilation system (including the adjustment of the humidity) and, if necessary, a cooling system is necessary.~~ **between 23.0 to 25.0 °C.**

Paragraph 8.1.4., amend to read:

"8.1.4. Relative humidity ~~RH~~ during the parking and driving mode in the whole vehicle test chamber shall be documented.

Paragraph 8.1.5., amend to read:

"8.1.5. The maximum background concentration for each test substance shall not exceed 20 µg/m³ for each single component or a maximum of 10 per cent of the respective measured target **or limit** value, whichever is ~~greater~~ **less**. If this is not met, the source of the contamination shall be identified and removed or covered to exclude it from the test result.

Paragraph 8.2.1., amend to read:

"8.2.1. Infrared radiator, halogen radiator or other radiators to simulate sunlight. Wavelengths <300 nm shall be filtered out. The heating radiators used shall be powered to create a radiation density at the reference measurement point in the middle of the roof surface of the test vehicle ~~of 350 W/m² to 450 W/m² (400 W/m² ± 50 W/m²).~~ **400 W/m² ± 50 W/m² equal to 350 W/m² to 450 W/m².**

Paragraph 8.3., amend to read:

"8.3. Sampling trains

8.3.1. Requirements for VOCs and carbonyl compounds sampling and measurement of the air in the cabin of the test vehicle and in the whole vehicle test chamber.

8.3.12. Sampling from inside the test vehicle shall have four sampling trains or a single sample inlet but split into four parallel sampling trains. Two for the VOC measurements in parallel and two for the carbonyl compound measurements in parallel in the test vehicle. **The second method sample is an analytical backup only.** One sampling line with a manifold for the division of the sampling flow outside the test vehicle is allowed. The sample train consists of the sampling line, heated if necessary, the sorbent tube and the DNPH cartridge for carbonyl compounds, the gas meters and the pumps.

8.3.23. Sampling in the whole vehicle test chamber. Four sampling trains are used to determine the background concentration of VOCs and carbonyl compounds in the whole vehicle test chamber. The sampling trains are identical to those of 8.3.12., apart from the sampling line, which is much shorter and not heated.

8.3.34. Prior to sampling, the sampling system shall be checked under the sampling load conditions for air-tightness. Do not skip this critical step because leaks have a high impact on the test results due to the large backpressure of the tubes and cartridges. To check for leaks plug the inlet to the sample system. Then use a vacuum pump to bring the sampling system to 21 inches of Hg vacuum then close a valve between the sample system and the pump. After 30 seconds the sample system vacuum must be greater than 20 inches of Hg to proceed. If not, find and fix leak and repeat to proceed. **Do not change the sample trains in any way after the leak check procedure is performed.** Other equivalent leak checks can be employed.

8.3.45. Sampling lines are the tubing between the sampling points inside the test vehicle or via the manifold outside the test vehicle to the VOC sorbent tubes or DNPH cartridges respectively, see Annex I.

8.3.56. The sampling line shall be constructed as follows:

- (a) As short as possible (maximum 5 m) with an internal diameter of 4 mm or more;
- (b) Of inert, non-emitting and non-absorbing/non-adsorbing material, e.g. stainless steel or polytetrafluoroethylene (PTFE) or glass;
- (c) Proven that there are no contaminations or sink effects in the sampling line;
- (d) With heating device, if necessary, to prevent condensation or deposition on the inner walls. Best practice is to control temperature to about 20 °C above air temperature inside the test vehicle.

8.3.67. The tubing should be inserted between the door and the door frame or between the door frame and the glazing and should be sufficiently non-compressible to ensure an unimpeded flow of air.

8.3.78. The second chamber sampling line in the whole vehicle test chamber near the test vehicle goes to sorbent tubes or DNPH cartridges in parallel is identical to that described in the preceding vehicle sample line but no heating is necessary. This second sampling line is needed to monitor the background concentration of the whole vehicle test chamber. This

measurement is taken after the 24 hours temperature acclimation phase but prior to opening the vehicle doors for the VOC conditioning phase.

Paragraph 8.4., amend to read:

"8.4. Analytical equipment and materials

8.4.1. The analytical equipment used for the determination of VOCs and carbonyl compounds or formaldehyde alone shall be in accordance with ISO 16000-6 (VOCs) or ISO 16000-3 (carbonyl compounds), respectively. **Alternative VOC Measurement Methods can be used if the method is proven equivalent to ISO 16000-3 or 16000-6.**

8.4.2. It shall be proven for the VOC sorbent tubes and the DNPH cartridges that there is no breakthrough. This can be identified by a back-up sorbent tube ~~which~~ **that** is analysed separately, ~~see specified in ISO 16017-1.~~

~~8.4.3. Requirements for VOCs and carbonyl compounds sampling and measurement of the air in the cabin of the test vehicle and in the whole vehicle test chamber.~~

~~8.4.3.1. Carbonyl compounds (Formaldehyde, Acetaldehyde and Acrolein) are to be measured according to ISO 16000-3.~~

~~8.4.3.2. VOCs (Benzene, Toluene, Xylene, Ethylbenzene and Styrene) are to be measured according to ISO 16000-6.~~

Paragraph 9.1., amend to read:

"9.1. The ~~pre-treatment~~ **preparation** procedure is divided into three parts:

Paragraph 9.2., amend to read:

"9.2. ~~Pre-arrangements~~ **preparation** and preconditioning of the whole vehicle test chamber, ~~and the vehicle,~~ **sample trains**, and ~~performing~~

Paragraph 9.2.1., amend to read:

"9.2.1. ~~Pre-arrangements~~ **preparation**

Paragraph 9.2.2.2., amend to read:

"9.2.2.2. The whole vehicle test chamber should be under good ventilation, and the air exchange rate should be twice per hour or higher. The interior materials of the whole vehicle test chamber shall have no appreciable emissions regarding the indoor air inside the test vehicle, ~~(see 8.5. background concentrations).~~

See 8.3.8 about measuring the background concentration. The probe is positioned 1.0 m from the vehicle, see 9.4.1.1. for when and Annex I for where to take the measurement.

Paragraph 9.2.3.1., amend to read:

"9.2.3.1. The essential conditions for the surroundings are as follows. The temperature during the ambient mode is adjusted to 23.0 to 25.0°C, as close as possible to 25.0 °C via the whole test chamber conditioning system. The preconditioning is started by opening the door for 30 **to 60** min. After this, the door is closed for 16h ± 1h soak time, see Annex III.

Paragraph 9.2.4., amend to read:

"9.2.4. **Background Samples and** Field blanks

9.2.4.1. Prepare the **background samples and** field blanks before the measurements are started, see 8.5. Install ~~Tenax TA®~~ **background sorbent tube samples** for VOCs and one DNPH cartridge for carbonyl compounds in the sampling trains to measure the background concentration of the whole vehicle test chamber. ~~as well as Tenax TA® sorbent tube and DNPH cartridge in the sampling trains to measure the background concentration of the test vehicle.~~ The field blanks ~~samplers~~ shall be handled in the same way as those used for VOC or carbonyl compound measurements, but without drawing air through the sampling trains. ~~As soon as the samplers have been connected into the sample train, they shall be removed.~~ **The field blanks samples shall remain** sealed and retained for analysis with the interior air samples.

9.2.4.2. Perform at least one field blank **set** for each measurement series. Analytical GC-MS or HPLC blanks shall be performed according to 8.5.

Paragraph 9.3.1., amend to read:

"9.3.1. Ambient mode

Vehicle ~~parking period~~ **ambient mode** is at the specified temperature, 23.0 to 25.0 °C, as close as possible to 25.0 °C) for 16 ± 1 h, **for example overnight.** ~~at~~ **At the end of the soak period,** ~~which~~ the sampling of VOC-s and carbonyl compounds in the interior air is to be performed.

Paragraph 9.4., amend to read:

"9.4. Test procedure

Store ~~car~~ **vehicle** at 20 to 30 °C for 24 hours, ~~1d~~ before start.

Paragraph 9.4.1.1., amend to read:

- "9.4.1.1. After the conditions of the whole test chamber have been ~~set at~~ **controlled to** 23.0-25.0 °C, as close as possible to 25.0 °C and 50 per cent RH \pm 10 per cent RH and the air exchange rate in the test chamber has been adjusted to a recommended value of at least twice per hour, the test procedure is started. At this time, turn on the four sampling trains in the whole vehicle test chamber to determine the VOCs and carbonyl compounds background concentrations, two **thermal desorption** sampling trains for VOCs and two **DNPH cartridge sampling trains** for carbonyl compounds. The probe is positioned **1.0 m from the vehicle, see Annex I.** ~~in front of the cabin air intake.~~ The relative humidity and the temperature are measured in the same position. After the chamber sample is finished start the conditioning of the test vehicle by opening all doors for **30 to 60 minutes**. Install the sampling train including the two VOC sorbent tubes and the two DNPH cartridges, and leak-check the sampling train. An overview of the number of samples to be taken is given in Annex III.

Paragraph 9.4.1.3., amend to read:

- "9.4.1.3. There is no dynamic ventilation of the test vehicle. Before the sampling starts, purge the dead volume of the sampling line. Turn on the pumps of the four sampling trains, two for VOCs and two for carbonyl compounds, each in parallel. Perform the sampling of air samples in the test vehicle cabin in the ambient mode at room temperature, 23.0 to 25.0 °C, as close as possible to 25.0 °C, for 30 min. Adjust the flow rate to maximum 0.2 l/min for VOCs and **1.0 l/min** for carbonyl compound measurements. The measurement procedures specified in ISO 16000-6 and ISO 16000-3 shall be followed.

Paragraph 9.4.2.1., amend to read:

- "9.4.2.1. **Start the parking mode with the heating-up procedure. The following tasks shall be performed. Start heating with the heating radiators, see 8.2.** Turn off the pumps for the VOCs and carbonyl compounds sampling, read and register the measurement volumes and take the VOC sorbent tubes and DNPH cartridges, which are placed outside the vehicle cabin, out of the sampling train. Seal the sorbent tubes or cartridges and analyse according to ISO 16000-6 and ISO 16000-3. Furthermore, start the parking mode with the heating-up procedure, see Annex III. The following tasks shall be performed. ~~Start heating with the heating radiators (see 8.2.).~~ The irradiation is adjusted to 400 W/m² \pm 50 W/m² and maintained at that level for 4.5 hours, **see Annex III.** Adjust the air exchange rate to twice per hour or higher; this is a recommended value for the whole vehicle test chamber.

Paragraph 9.4.2.2., amend to read:

- "9.4.2.2. Install the two DNPH cartridges in the two sampling trains for the test vehicle measurement and two for the whole vehicle test chamber. Before the sampling begins, check the sampling train for leaks, see 8.3.3. and purge the dead volume. Turn the pumps of the four sampling trains on. Perform formaldehyde sampling in the test vehicle cabin at elevated temperatures for 30 min. The flow rate is adjusted to maximum 1.0 l/min for carbonyl compound measurements. The measurement procedure specified in ISO 16000-3 (carbonyl compounds) shall be followed.

Paragraph 9.4.3.2., amend to read:

- "9.4.3.2. Open the driver's door, start the engine. ~~Engine must be running during 30±2 min at idling speed with the minimum frequency of idling, declared by the manufacturer. After 1 min engine running close the driver's door. The doors and windows of test vehicle shall be closed during the whole mode. Forced ventilation system of test vehicle shall be off.~~ Turn on the air conditioning. **Set vehicle temperature at 23.0 °C in case of an automatic conditioning or lowest operation for semi-automatic and manual conditioning systems. For test vehicles without automatic air-conditioning systems, the fan is in highest performance mode with fresh-air ventilation, see Annex III. Close the drivers' doors. Complete these steps of the procedure in 60 seconds; meaning, after a maximum of 60 seconds of engine running the driver's door shall be closed. The doors and windows of test vehicle shall remain closed during the entire driving mode. Engine must be running during the entire mode at the vehicle's idling speed with the minimum frequency of idling declared by the manufacturer. in less than 60 s (at 23 °C in case of automatic conditioning or lowest operation for semi-automatic and manual conditioning systems; for test vehicles without automatic air conditioning systems, the fan is in highest performance mode with fresh air ventilation) (see Annex III).**

Paragraph 9.4.3.3., amend to read:

- "9.4.3.3. After ~~1-2 min of engine operation,~~ **60 seconds of closing the door,** turn on the pumps of the four sampling trains, (two for VOCs and two for carbonyl compounds, each in parallel). The sampling of air samples in the test vehicle cabin is performed at elevated temperature for 30 min. The flow rate is adjusted to maximum 0.2 l/min for VOCs and 1.0 l/min for carbonyl compound measurements. The measurement procedures specified in ISO 16000-6 (VOCs) and ISO 16000-3 (carbonyl compounds) shall be followed.

Paragraph 9.4.3.4., amend to read:

"9.4.3.4. ~~At the same time, turn on the four sampling trains in the whole vehicle test chamber to determine the VOCs and carbonyl compounds background concentrations (two sampling trains for VOCs and two for carbonyl compounds).~~

9.4.3.5.——Turn off the engine. Stop the pumps of the sampling trains and the heating radiators/lamps. The sampling volumes shall be read and registered. The VOC sorbent tubes and DNPH cartridges shall be taken out of the sampling train for the analysis as specified in ISO 16000-6 and ISO 16000-3. Stop the continuous measurements for temperature and relative humidity. This is the end of the test mode.

Paragraph 10., amend to read:

"10. Calculation, presentation of results, and precision and uncertainty

Calculation and presentation of results are performed according to ISO 16000-6 and ISO 16000-3. The precision and uncertainty shall also be followed as specified in ISO 16000-6 and ISO 16000-3. ~~There is an informative test report (see Annex IV) which~~ **Data reporting shall use the format in Annex IV. Additions to the report** should be agreed on between the client and the laboratory.

Paragraph 11., amend to read:

"11. Performance characteristics

The detection limits and standard deviations for VOCs given in ISO 16000-6 and for carbonyl compounds in ISO 16000-3 ~~are~~ **shall be** met in this measurement procedure. The condition to meet these performance characteristics is that there are no contaminations or sink effects in the sampling lines. This shall be proven before the measurements and shall be documented.

Paragraph 12., amend to read:

"12. Quality assurance/quality control

An appropriate level of quality control shall be employed following ISO 16000-3 and ISO 16000-6, namely:

(a) Field blanks are prepared according to 9.2.4.;

- (b) The field blank level is acceptable if artefact peaks are no greater than 10 per cent of the typical areas of the ~~substances~~ **VOCs and carbonyl compounds** of interest;
- (c) Desorption efficiency of VOCs and carbonyl compounds should be checked according to ISO 16000-3 and ISO 16000-6;
- (d) The collection efficiency can be assessed by using back-up tubes or taking samples of different sampling volumes less than the safe sampling volume;
- (e) Repeatability of the measuring method shall be determined, e.g. using collection and analysis of duplicate samples — a coefficient of variation ≤ 15 per cent (ISO 16000-3 and ISO 16000-6) from the duplicate measurements should be reached;
- (f) The recovery of C6 to C16 hydrocarbons shall be 95 per cent mass fraction (ISO 16000-6);
- (g) Documentation illustrating traceable calibrations for temperature, humidity, and flow measurements.

Annex III, amend to read:

Test schedule

Modes	Ambient Mode					Parking Mode		Driving Mode
	Temperature Precondition	Sample	VOC Precondition	Soak	Sample	Soak	Sample	Sample
Duration	24 Hours	30 Minutes	30 to 60 Minutes	16 (+/- 1) Hours	30 Minutes	4 Hours	30 Minutes	30 Minutes
Start Time (hh:mm), Target times assume minimum of range	00:00	24:00	24:30	25:00	41:00	41:30	45:30	46:00
Chamber Temperature	20 °C to 30 °C	23.0 °C to 25.0 °C, as close as possible to 25.0 °C				As close as possible to 25.0 °C		
Chamber Humidity	50 % RH ± 10 % RH					As close as possible to 50 % RH		
Solar Load	OFF					400 ± 50 W/m ²		
Vehicle Age	28 ± 5 days and less than 80 km							
Vehicle Doors	CLOSED	OPEN	CLOSED				OPEN <1 min	
Vehicle Windows	CLOSED							
Vehicle Engine	OFF						ON	
Vehicle Climate Settings Auto or Manual Systems	OFF						Auto or Face Mode	
Air Conditioning	OFF						ON	
Fan	OFF						Auto or High	
Temperature Setting	OFF						23 °C or Lowest But Not MAX AC	
Air Inlet Position	OPEN						Auto	
Outlet Vents and Position	Fully OPEN and Upright							

<i>Modes</i>	<i>Ambient Mode</i>				<i>Parking Mode</i>		<i>Driving Mode</i>
Total Tube Samples ¹ Vehicle				2			2
Total Tube Samples ¹ Chamber	2						
Total Tube Samples ^{1,2} Field Blank	2						
Tube Sampling Times	30 Minutes			30 Minutes		30 Minutes	30 Minutes
Tube Sampling Flow Rate Ranges ³	0.1 L/min to 0.2 L/min			0.1 L/min to 0.2 L/min		0.1 L/min to 0.2 L/min	0.1 L/min to 0.2 L/min
Tube Sampling Volume Ranges ³	3 L to 6 L			3 L to 6 L		3 L to 6 L	3 L to 6 L
Total Cartridge Samples ¹ Vehicle				2		2	2
Total Cartridge Samples ¹ Chamber	2						
Total Cartridge Samples ^{1,2} Field Blank	2						
Cartridge Sampling Times	30 Minutes			30 Minutes		30 Minutes	30 Minutes
Cartridge Sampling Flow Rate Ranges ³	0.4 L/min to 1.0 L/min			0.4 L/min to 1.0 L/min		0.4 L/min to 1.0 L/min	0.4 L/min to 1.0 L/min
Cartridge Sample Volume Ranges ³	12 L To 30 L			12 L To 30 L		12 L To 30 L	12 L To 30 L

Annex IV, amend to read:

Test report

Line #	Parameter	Basic Data Type [A=Alpha or N=Numeric (max length, fractional digits)]	Data Type [Enumeration String, Decimal, Integer]	Total Digits	Fractional Digits	Minimum Value	Maximum Value	Allowed Values for: Enumeration or Description or Units
1	Process Code	N(2)	Integer			0	99	Version of Test Report. 1st 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
10	Production Date	A(10)	String	|	|	|	|	Ref. ISO 8601 (e.g. YYYY-MM-DD)
11	Transportation Date	A(10)	String	|	|	|	|	Ref. ISO 8601 (e.g. YYYY-MM-DD)
12	Storage Date	A(10)	String	|	|	|	|	Ref. ISO 8601 (e.g. YYYY-MM-DD)
13	Preconditioning Date	A(10)	String	|	|	|	|	Ref. ISO 8601 (e.g. YYYY-MM-DD)

Line #	Parameter	Basic Data Type [A=Alpha or N=Numeric (max length, fractional digits)]	Data Type [Enumeration String, Decimal, Integer]	Total Digits	Fractional Digits	Minimum Value	Maximum Value	Allowed Values for: Enumeration or Description or Units
14	Vehicle Test Date	A(10)	String	|	|	|	|	Ref. ISO 8601 (e.g. YYYY-MM-DD)
15	Analytical Test Date	A(10)	String	|	|	|	|	Ref. ISO 8601 (e.g. YYYY-MM-DD)
16	Elapsed days from the production date	N(3)	Integer	|	|	|	|	Time in days from production to end of sampling
17-20 ⁽¹⁾
21	Manufacturer Name	A(50)	String					Original Equipment Manufacturer (OEM)
22	Factory Name	A(50)	String					Place of Manufacturer
23	Vehicle Identification Number	A(17)	String					17-character vehicle identification number (VIN)
24	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
25	Model Name	A(50)	String					Manufacturer's Model Name
26	Exterior Color	A(50)	String					Paint Color
27	Interior Color	A(50)	String					Seat Trim Color
28	Interior Seat Material Type	A(50)	String					Description of Seat Cover Material (e.g. Leather, Cloth, color, etc.)
29	Odometer Reading	N(5)	Integer					Distance traveled [km] should be <80 km
30	Vehicle History	A(50)	String					Optional Description of Test Vehicle

<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>
31	Climate Control System Type/Characteristics	A(20)	String					Description of Climate Control System
32	AC Operator Control	A(1)	Enumeration					M = Manual A = Automatic
33-49 (1)	...	...	...					...
50	Chamber - Formaldehyde	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 50-00-0 [µg/m ³]
51	Chamber - Acetaldehyde	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 75-07-0 [µg/m ³]
52	Chamber - Acrolein	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 107-02-8 [µg/m ³]
53	Chamber - Benzene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 71-43-2 [µg/m ³]
54	Chamber - Toluene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 108-88-3 [µg/m ³]
55	Chamber - Xylene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 1330-20-7 [µg/m ³]
56	Chamber - Ethylbenzene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 100-41-4 [µg/m ³]
57	Chamber - Styrene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 100-42-5 [µg/m ³]
58-69 ⁽¹⁾	Decimal	6	1	0.0	99999.9	...
70	Blank - Formaldehyde	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 50-00-0 [µg/m ³]
71	Blank - Acetaldehyde	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 75-07-0 [µg/m ³]
72	Blank - Acrolein	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 107-02-8 [µg/m ³]
73	Blank - Benzene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 71-43-2 [µg/m ³]
74	Blank - Toluene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 108-88-3 [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>
75	Blank - Xylene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 1330-20-7 [µg/m ³]
76	Blank - Ethylbenzene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 100-41-4 [µg/m ³]
77	Blank - Styrene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 100-42-5 [µg/m ³]
78-89 ⁽¹⁾	Decimal	6	1	0.0	99999.9	...
90	Ambient Mode Vehicle - Formaldehyde	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 50-00-0 [µg/m ³]
91	Ambient Mode Vehicle - Acetaldehyde	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 75-07-0 [µg/m ³]
92	Ambient Mode Vehicle - Acrolein	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 107-02-8 [µg/m ³]
93	Ambient Mode Vehicle - Benzene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 71-43-2 [µg/m ³]
94	Ambient Mode Vehicle - Toluene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 108-88-3 [µg/m ³]
95	Ambient Mode Vehicle - Xylene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 1330-20-7 [µg/m ³]
96	Ambient Mode Vehicle - Ethylbenzene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 100-41-4 [µg/m ³]
97	Ambient Mode Vehicle - Styrene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 100-42-5 [µg/m ³]
98-109 ⁽¹⁾	Decimal	6	1	0.0	99999.9	...
110	Parking Mode Vehicle - Formaldehyde	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 50-00-0 [µg/m ³]
111-129 ⁽¹⁾	Decimal	6	1	0.0	99999.9	...
130	Driving Mode Vehicle - Formaldehyde	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 50-00-0 [µg/m ³]
131	Driving Mode Vehicle - Acetaldehyde	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 75-07-0 [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>
132	Driving Mode Vehicle - Acrolein	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 107-02-8 [µg/m ³]
133	Driving Mode Vehicle - Benzene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 71-43-2 [µg/m ³]
134	Driving Mode Vehicle - Toluene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 108-88-3 [µg/m ³]
135	Driving Mode Vehicle - Xylene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 1330-20-7 [µg/m ³]
136	Driving Mode Vehicle - Ethylbenzene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 100-41-4 [µg/m ³]
137	Driving Mode Vehicle - Styrene	N(4,1)	Decimal	5	1	0.0	9999.9	CAS#: 100-42-5 [µg/m ³]
138-149 ⁽¹⁾	Decimal	6	1	0.0	99999.9	...
150	Storage Temperature	N(2,1)	Decimal	3	1	0.0	99.9	Unit [°C]
151	Storage Humidity	N(2,1)	Decimal	3	1	0.0	99.9	Unit [% RH]
152	Preconditioning Temperature	N(2,1)	Decimal	3	1	0.0	99.9	Unit [°C]
153	Preconditioning Humidity	N(2,1)	Decimal	3	1	0.0	99.9	Unit [% RH]
154	Ambient Mode Vehicle Cabin Temperature	N(2,1)	Decimal	3	1	0.0	99.9	Unit [°C]
155	Ambient Mode Vehicle Cabin Humidity	N(2,1)	Decimal	3	1	0.0	99.9	Unit [% RH]
156	Ambient Mode Chamber Temperature	N(2,1)	Decimal	3	1	0.0	99.9	Unit [°C]
157	Ambient Mode Chamber Humidity	N(2,1)	Decimal	3	1	0.0	99.9	Unit [% RH]
158	Parking Mode Vehicle Cabin	N(3,1)	Decimal	4	1	0.0	999.9	Unit [°C]

<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>
	Temperature							
159	Parking Mode Vehicle Cabin Humidity	N(2,1)	Decimal	3	1	0.0	99.9	Unit [% RH]
160	Parking Mode Chamber Temperature	N(2,1)	Decimal	3	1	0.0	99.9	Unit [°C]
161	Parking Mode Chamber Humidity	N(2,1)	Decimal	3	1	0.0	99.9	Unit [% RH]
162	Driving Mode Vehicle Cabin Temperature	N(2,1)	Decimal	3	1	0.0	99.9	Unit [°C]
163	Driving Mode Vehicle Cabin Humidity	N(2,1)	Decimal	3	1	0.0	99.9	Unit [% RH]
164	Driving Mode Chamber Temperature	N(2,1)	Decimal	3	1	0.0	99.9	Unit [°C]
165	Driving Mode Chamber Humidity	N(2,1)	Decimal	3	1	0.0	99.9	Unit [% RH]
166-179 (1)	...	...	...	1	1	1	1	...

II. Justification

1. The amendments to most paragraphs are editorial corrections to improve the wording clarification.
 2. The amendment to paragraph 3.3. to 3.3.3. adds “carbonyl compounds” and “VOCs” to further define and classify test substances.
 3. The amendment to paragraph 8.1.5 considers the current level of background concentration, and sets the background requirements to $20 \mu\text{g}/\text{m}^3$ for each single component or a maximum of 10 per cent of the respective measured target or limit value, whichever is less
 4. The amendment to paragraph 9.2.3.1. gives flexibilities with no affects to the tests for opening the door time from “60 minutes” to “30-60 minutes”.
 5. The amendment to paragraph 9.4.3.2. gives specific set temperature for HVAC setting in driving mode and changes from “23-25 °C” to “23 °C”. The temperature in the driving mode will then be going down from the resulting temperature of the parking mode to the set temperature of 23 °C.
 6. The amendment to Annex IV includes additional information with regard to production date, transportation date, storage date, preconditioning date, vehicle test date, analytical test date, elapsed days from the production date, and temperature and humidity of ambient, parking and driving test modes.
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