

**Interior air of road vehicles –Pollution content in the interior of
driver cab and passenger compartment
Technical requirements and test methods**

Draft version of the standard

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Introduction

It is well known, that automobiles create a dangerous environment for human beings.

The goal of this standard is to focus on a different approach to considering the quality of air inside the vehicle.

The concentration of dangerous substances inside various types of vehicles exceeds the safety levels, resulting in drivers and passengers inhaling polluted air.

The contamination of cabin interior air is a result of exhaust gases penetrating through the air-conditioning and ventilation systems of the vehicle, cracks of hardening elements, and the emissions of pollutants from vehicle interior parts and materials.

Numerous studies have shown /1/ that interior cabin air contains a significant concentrations of CO, NO, NO₂, SO₂, different classes of hydrocarbons including VOC, formaldehyde and other carbonyls, carcinogenic polycyclic aromatic hydrocarbons (PAH) and other toxicants.

The presence of the above pollutants in the air compartment (cab) vehicle deteriorates adaptive responses of the human body. Even at the level of hygienic standards the content of pollutants in the air of vehicles manifest negative reactions such as: tiredness, drowsiness, discomfort, irritation of eyes, nose and throat, headache, worsening neurobehavioral responses. All of the above has a negative impact on road safety.

It is important to note that the problem of polluted air in vehicles equipped with "air", "climate control" is not solved.

Since the oxides of carbon, nitrogen, aliphatic hydrocarbons (methane - heptanes) even at high concentrations have no smell. The operation of the vehicles air conditioning and climate control provided only the specified conditions of temperature and humidity, creating the illusion of prosperity, and safety. In fact, the above concentrations of pollutants can be much higher than the levels required by the hygienic standards and can negatively affect the health of passengers.

This standard specifies the list of normalized pollutants to be measured in the cabin air of vehicles of M, N categories, testing and determination methods.

Standard was included in enumeration of Russian Federation rules which have to fix the construction of the vehicles according to the compliance of the requirements of the Technical Regulation on safety of wheeled vehicles with respect to the content of pollutants in cabin air and uses in procedure of certification of vehicles [2] .

Interior air of road vehicles –Testing methods of road vehicles for sampling and determination of pollutants/pollutants concentrations in cabin interiors

1 Scope

The present standard applies to vehicle of M, N categories equipped with internal combustion engines and having maximum design speed not less than 25 km/h. The standard sets the nomenclature and requirements to the pollutants content in air of cabin interiors which are the products of fuel combustion in the engines and evaporation of fuel and lubricants from the vehicle systems. The standard sets the testing method and methods of determination of normalized pollutants. The standard does not apply to vehicles not destined for public roads (agricultural and forestry tractors and others).

2 Normative references

The following referenced documents are indispensable for the application of this standard:

ISO 7996:1985 *Ambient air - Determination of the mass concentration of nitrogen oxides - Chemiluminescence method*

ISO 8186:1989 *Ambient air -- Determination of the mass concentration of carbon monoxide -- Gas chromatographic method*

ISO 16000-1:2004 *Indoor air - Part 1: General aspects of sampling strategy*

ISO 16000-2:2004 - *Indoor air - Part 2: Sampling strategy for formaldehyde*

ISO 16000-3:2004 - *Indoor air - Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air- Active sampling method*

ISO 16000-6:2004 - *Indoor air- Determination of volatile organic compounds in indoor air and test chamber by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS or MS FID*

World Health Organization (WHO). *Air quality guidelines for particulate matter, ozone, nitrogen dioxide. Global update 2005. Summary of risk assessment*

3 Terms and definitions

3.1 pollutant chemical or biological substance or a mixture of those substances that are contained in the atmospheric air and in certain concentrations affect negatively on health of population and environment

3.2 background pollution

a concentration of pollutants in the atmospheric air produced by all sources excluding a test vehicle

3.3 pollutants to be measured:

- aliphatic saturated hydrocarbons with number of carbon atoms up to 7
- carbon monoxide
- nitric oxide
- nitrogen dioxide
- formaldehyde
- methane

3.4 express analysis

analysis, which combines the simultaneous air sampling and fast analysis of pollutants by means of automatic gas analyzers

3.5 vehicle mass in running order

mass of a vehicle fully filled with fuel, lubricants, coolants and other liquids, fitted with spare wheel, tools and so on, with driver but without load and/or passengers

3.6 sampling collection

air sampling by means of aspiration method for quantitative chemical analysis

3.7 pollutants concentration

the pollutants mass concentrations in milligrams per cubic meter (mg/m^3)

3.8 cabin interior

inner part of vehicle used for placing of driver and passengers, further saloon, driver cab, cabin

3.9 climate control system

combination of devices for supporting of setting heat conditions

4 Apparatus and materials

4.1 General

4.1.1 There are two ways for measuring of pollutants content in the air of cabin interiors:

- in laboratory conditions with preliminary sampling;
- in road conditions (express analysis) by means of gas analyzers installed and running inside the tested vehicle

4.1.2 The procedure of air sampling of normalized pollutants The list of normalized pollutants to be measured in the air of cabin interiors is described in Annex B.

4.2 Sampling system

4.2.1 Sampling in the test vehicle

Four sample lines are employed: two for the aliphatic hydrocarbons C₁-C₇ and two for formaldehyde in parallel in the test vehicle (to check the repeatability) (ISO 16000-1:2004 Indoor air - Part 1, ISO 16000-2:2004 - Indoor air - Part 2 for formaldehyde). Sampling lines for formaldehydes shall be leak checked and shall have a vacuum decay rate of max. 30 kPa for an average time of 10s. The nozzle is plugged for the leak check. Sampling lines are installed inside the test vehicle and consists of tubing between the sample point and pump.

4.2.2 Characteristics of sampling line:

- 1) Tube connecting sample device with pump shall be as short as possible - not more than 2m with internal diameter of 4mm or more made of inert, non-emitting and non-adsorbent, non- absorbent materials (e.g. poly tetra-fluoro ethylene (PTFE));
- 2) It should be checked that there are no contamination or sink effects in the sample lines.
- 3) The pump (aspirator) is used with voltage converter (if necessary), recommended sampling rates - (0,5±0,1) l/min for aliphatic hydrocarbons C₁-C₇ and formaldehyde, (3 ÷ 5)±1) l/min for CO, NO, NO₂ (sampling in the bag).
- 4) Sampling system for aliphatic saturated hydrocarbons C₁-C₇ may also be used for collecting of background concentrations before beginning test mode II.
- 5) Sampling devices consist of:
 - bag of inert non adsorbent materials (Tedlar, other types of fluoropolymer films), with a capacity about (5 . 50)cm³;
 - glass or polymeric pipettes with a capacity of (0,1 . 0,3)l;
 - sorbent tubes, concentrators, cartridges according to ISO 16000-3 and ISO 16000-6, and other measurement techniques.

5 General requirements

5.1 Pollutants to be measured

The nature and amount of pollutants in interior air of vehicles depend on the engine type and motor fuel: it could be individual pollutants, such as formaldehyde, nitrogen dioxide or nitrogen oxide, carbon monoxide and others or groups of pollutants, such as aliphatic saturated hydrocarbons and etc.

The limit values for certain measuring chemical agents shall be established in any relevant International, European or National Standards. The content of pollutants in the air of vehicles passenger compartment and cabin shall not exceed their limit values (stated, for example in [3], [4]).

The analytical instruments used shall enable the determination of pollutants in relevant measurement ranges.

The list of normalized pollutants to be measured is given in Table 5.1.

Table 5.1 . List of normalized pollutants to be measured in the air of cabin interiors and engine types to be tested

Pollutant	Chemical formula	Type of engine
Formaldehyde	2	3,4,5
Nitrogen dioxide	NO ₂	1,2,3,4,5
Nitrogen oxide	NO	1,2,3,4,5
Carbon monoxide		1,2,3,4,5
Aliphatic saturated hydrocarbons	2 6 . 7 16	1,2,3
Methane	4	3,5
<p>NOTE The following of the engine types are applied:</p> <ol style="list-style-type: none"> 1 . positive ignition engine; 2 . positive ignition engine working on liquefied petroleum gas; 3 . positive ignition engine working on natural gas; 4 . diesel engine; 5 . gas diesel engine. 		

5.2. Determination of pollutants

The content of pollutants in the air of cabin interiors shall be measured in road conditions (express analysis) or in laboratory by means of gas analyzers using methods listed in 5.2.1 and having characteristics specified in Annex B

5.2.1 Methods of determination:

1) Formaldehyde (CH₂O):

- high-performance liquid chromatography with ultra-violet detector according to ISO 16000-3;
- gas chromatography with nitrogen-phosphorus (NPD) or mass-spectrometric detectors and packed or capillary columns;
- photoelectric colorimeter.

2) Nitrogen dioxide and oxide (NO₂ and NO):

- chemiluminescence and heterogeneous chemiluminescence according to ISO 7996:1985;

3) Methane (CH₄) and aliphatic saturated hydrocarbons (2 6 . 7 16):

- gas chromatography with flame-ionization detector (FID) and packed or capillary columns according to ISO 16000-6;

4) Carbon monoxide (CO):

- gas chromatography with FID after conversion CO into methane according to ISO 8186:1989;
- optical acoustic infrared spectroscopy;
- electro-chemical detection.

It is allowed to use other methods of analysis which will provide the required selectivity and measurement accuracy.

5.2 Test object

Technical data shall be applied to testing vehicle in accordance with Annex C.

The testing vehicle shall meet the requirements of technical specification.

The testing vehicle should have not visible or hidden body defects, seals of windows, hatches, doors and exhaust systems.

Vehicles are not permitted for tests with any deviations from the declared technical characteristics and with body defects.

Vehicles of M, N categories are tested in the running order with a partial load .

Test method is described in Annex A. The test procedures of air sampling and measuring are carried out according to Annex B.

6 Safety measures

During road tests of vehicles it is necessary to comply with the requirements and labor protection provisions that are in force in the organization that carries out these tests.

Annex A

Test method on pollutants determination in the air of cabin interior (passenger compartment and cabin)

A.1 General

The test method on determination of the pollutants content in the air cabin interiors of vehicles categories M,N is described.

The test vehicle shall have the specifications according to Annex C.

A.2 Test conditions

A.2.1 The tests are carried out on roads with slope up to $6,0 \pm 0,5$ %.

A.2.2 The following conditions have to be fulfilled before and during the test:

- windows, doors, quarter lights, ventilation hatches are closed;
- air conditioning and climate-control systems are on;
- interior air recirculation system is off;
- forced ventilation is switched on, the airflow level of forced ventilation is in the lowest position;
- if a vehicle is equipped with an interior air cleaning system (IAC) the tests are carried out with the switched IAC system

Heating, climate control or air conditioning systems should be used by the operator to provide the interior temperature within a range from +18 to +30 °C. Recommended temperature should be (20 ± 1) °C.

A.2.3 If it is impossible to provide the air temperature within the specified range the test shall be stopped and carried out at other weather conditions that will provide the above temperature limits.

A.2.4 Meteorological conditions during testing are listed in table A.1.

Table A.1. . Parameters and values of meteorological conditions

Parameter	Value	Parameter	Value
Ambient air temperature, °C	From -15 to +30	Wind speed, m/s	$2,5 \pm 1,5$
Relative humidity, %	not more than 90	Atmospheric pressure, kPa	From 84,0 Pa to 18,7 P (from 630 mm Hg to 800 mm Hg)

A.3 Test modes

Two vehicle's test modes are carried out during the test:

I . steady-state driving at the speed of 50 ± 5 km/h.

For vehicles equipped with a manual gearbox the highest gear to ensure the stable moving is to be selected.

II . idling

For a stationary vehicle idling with the minimal stable revolutions per min (rpm) declared by the manufacturer is used.

A.4 Standard test procedure

A.4.1 Preparation for tests

A.4.1.1 Identification of a test vehicle is conducted - its compliance to a technical characteristics is checked.

Vehicles with any deviations from the declared technical characteristics are not permitted for tests.

A.4.1.2 The vehicle should be fueled not less than 6 h before testing.

A.4.1.3 Sampling lines and gas analyzers for express analysis and sampling system shall be installed inside the testing vehicle before the testing.

The gas analyzers are working during the whole test in accordance with the requirements of the equipment operation.

A.4.2 Test mode No I

The test is carried out in road conditions according to A.2.1.

A.4.2.1 Before the testing the ventilation of the vehicle is conducted. The engine is off, the windows, doors and hatches of testing vehicle are opened. After 5 ± 1 min ventilation is finishing, windows, doors and hatches are closed. The test conditions are provided according to A.2.2.

A.4.2.2 The engine, gas analyzers are switched on. The driving on a testing road with the speed of 50 ± 5 km/h begins.

A.4.2.3 After 20 ± 5 min driving (after reaching the working engine temperature) an express analysis and/or air sampling are taken during movement at the points (places) according to 4.5.1, Figure B.1, Annex B. The registration and recording of 5-6 instrument readings of each of the normalized pollutants shall be taken during the mode. Sampling procedure shall be taken according B.6 of Annex B. Duration of sampling is defined by the requirements of appropriate standard and methods of measuring.

A.4.3. Test mode No II

Tests mode II are carried out at an open parking place immediately after test mode I.

A.4.3.1 The vehicle is located so that its exhaust pipe is against the basic wind direction.

A.4.3.2. The determination (express analysis) of background pollutants are carried out in the ambient air. The gas analyzers are on fixed locations in the testing vehicle, the engine is off. Sampling tubes from the inlet fitting of gas analyzers are pulled out through the open windows or doors of the test vehicle at a distance of 1-2 m from the vehicle body.

A.4.3.3 The ventilation of the test vehicle before the test mode II may be carried out simultaneously with the express analysis of background pollutants.

The test shall begin after finishing of measuring the background concentrations.

A.4.3.4 The engine is on, the test mode is performed according to A.3, the test conditions as in A.2.

A.4.3.5 After 20±5 min (after reaching the operating temperature of the engine) an express analysis is made and/or air sampling are taken inside the vehicle in points (places) specified in 4.5.1, Fig. B.1 of Annex B.

Air samples are taken according to B.6. of Annex B.

A.4.3.5 After finishing of express analysis and air sampling gas analyzers and pump are switched off.

A.4.3.6 The air samples collected during the tests modes I, II and background determinations are transmitted to an analytical laboratory for quantitative analysis.

A.4.3.7 Air samples are stored in an oven or indoors under constant conditions (20° C, relative humidity 50%). Timing of sample storage requirements are defined by measurement procedures.

A.5. Processing of test results

Test report are made on the test results according to Annex C.

a) The result of each of the normalized pollutants in case of express analysis is the arithmetic mean value of its current concentrations measured at each measuring point (places) according to B.5.1 of Annex B at the modes I and II.

b) The result in case of the gas analyzer using a summing (collecting) the principle of processing input data is final value of the unit of measurement of each of the limited pollutants at each measuring point (places) according to B.5.1 of Annex B at the modes I and II.

c) The results of quantitative measurements of each of the pollutants during laboratory chemical analysis is the arithmetic mean value of two consecutive measurements of pollutants in each of the sample taken at the measuring points (places) according to B.5.1 of Annex B at the modes I and II.

d) The test results are found to be positive if the quantitative pollutants measurements according to A.5.1, A.5.2, A.5.3, at all measurement points (places) in accordance with B.5.1, at test modes I, II do not exceed (equal to) the normative requirements. e) The test results are found to be negative, if quantitative pollutants measurements in one or more measurement points (places) according to B.5.1 at one or both test modes exceed the normative requirements.

Annex B

Procedure of air sampling and measurements of pollutants

B.1 Air sampling

B.1.1 Air samples are taken by means of the aspiration method. Requirements to the sampling systems, their elements and sampling parameters are given in 4.2.

B.2 Pollutants measuring

Quantitative pollutants measurements in the air of vehicles passenger compartment and cab shall be performed by a qualified measurement technique.

When performing the direct pollutants measurements with using measurement tools corresponding to B.3 of this Annex one shall be allowed to carry out measurements in accordance with qualified measurement techniques, amended by operational documentation. Demonstration of compliance with mandatory metrological requirements to measurements are carried out during type approval of measurement instruments.

B.3 Metrological requirements for measurement tools

The measuring of pollutants in the air of passenger compartment and cab is made by means of measurement tools of approved type, passed the check and working on the basis of methods according to 5.2.

Measurement instruments should provide the lower and upper limits of pollutants measurement at the presence of associated components (Table B.1).

Table B.1 The lower and upper limits of measurements for some pollutants

Name of pollutant	Chemical formula	Lower limit of measurement, mg/m ³ , not more	Upper limit of measurement, mg/m ³
Formaldehyde	CH ₂ O	0,015	0,350
Nitrogen dioxide	NO ₂	0,02	2,00
Nitrogen oxide	NO	0,03	4,00
Carbon monoxide		1,0	50,0
Aliphatic saturated hydrocarbon	4 · 7 · 16	1,0	50,0

Maximum allowable relative errors % of measuring instruments should not exceed the values given in Table B.2.

Table B.2 Maximum allowable relative error % of working measuring instruments used to measure the mass concentration of pollutants

Measuring range, mg/m ³	Maximum allowable relative error σ , %	
	WMI - 2 ^{*)}	WMI - 3 ^{*)}
From $1,0 \cdot 10^{-2}$ to 50,0	15-10	25-20
More than 50,0 to $0,9 \cdot 10^3$	10-5	20-15
*) WMI - 2, WMI - 3 . working measuring instruments, designed for the analysis of gaseous media component the same composition of medium (WMI-2) and lower (WMI-3) groups of precision		

B.4 Other measuring instruments

When performing the tests other measuring instruments are used to measure the temperature, relative humidity, barometric pressure and wind speed. Output accuracy of working instruments should not exceed the values given in Table B.3.

Table B.3 . Limit of allowable absolute error (σ) of working measuring instruments used to measure air temperature, relative humidity, atmospheric pressure and wind speed

Parameter	Limit of allowable absolute error,
Temperature	± 1
Relative humidity	$\pm 2,5$ %
Atmospheric pressure	$\pm 0,1$ P
Wind speed	$\pm(0,2 + 3\%)$ of measured value, m/s

B.5 Procedure of air sampling and express analysis of pollutants

B.5.1 Sampling points and places of pollutants express analysis

- a) Air sampling and (or) express analysis of pollutants in the cab driver and passenger compartment (cabin) of vehicle categories M_1 , N_1 are carried out on the driver's seat in his breathing zone at height of $1,0 \pm 0,1$ m from the floor level (point 1, Figure B.1).
- b) Air sampling and (or) express analysis of pollutants in the cabin of vehicles of categories N_2 , N_3 (equipped with sleeper) are carried out analogously B.5.1(a) and additionally at a height of 0.3 to 0.4 m from the horizontal bed (in the head sleeper) (point 1, 5, Figure B.1).
- c) Air sampling and (or) express analysis of pollutants in specific or specialized vehicle of category M_2 , performed in the breathing zone of driver, passenger in the cab on the driver's and the passenger's seats on the hand of the exhaust pipe (points 1, 6, Figure B.1).
- d) Air sampling and (or) express analysis of pollutants in the passenger area of vehicles categories M_2 , M_3 (no partition between the driver's and passenger spaces) are carried out in the breathing zone of the driver and passengers in the driver's

compartment and at the last row of seats on the hand of the exhaust pipe (points 1, 4, Figure B. 1).

e) Air sampling and (or) express analysis of pollutants in vehicles of categories M_2 and M_3 (with partition between the driver's and passenger spaces) are carried out in the breathing zone of the driver and passengers in the driver's compartment and in the passenger area at the second and the last row of seats on the hand of exhaust pipe (points 1, 2, 4, Figure B.1)

f) Air sampling and (or) express analysis of pollutants in specific or specialized vehicle category M_3 are carried out in the breathing zone of the driver and passengers in the cab and in the front and rear of the passenger compartment on the hand of the exhaust pipe (points 1, 2, 6, Figure 1).

g) Air sampling and (or) express analysis of pollutants in the double-decker vehicle category M_3 are carried out on the ground floor or similar B.5.1(d,e) on the second floor . at the front and rear part of the passenger space on the hand of the exhaust pipe.

h) Air sampling and (or) express analysis of pollutants in the passenger area of jointed vehicle category M_3 are carried out in the places specified in B.5.1.(d,e) and further - at the place of articulation at the height of $(1,5 \pm 0,1)$ m from the horizontal plane of the floor in the vertical plane of symmetry (points 1,3,4 or 1, 2, 3, 4, Figure B.1).

i) When the design of testing vehicle can not define by positions (a . h) of B.5.1 test executor may myself define the points of air sampling (or) places express analysis.

B.6 Air sampling order

B.6.1 Air sampling

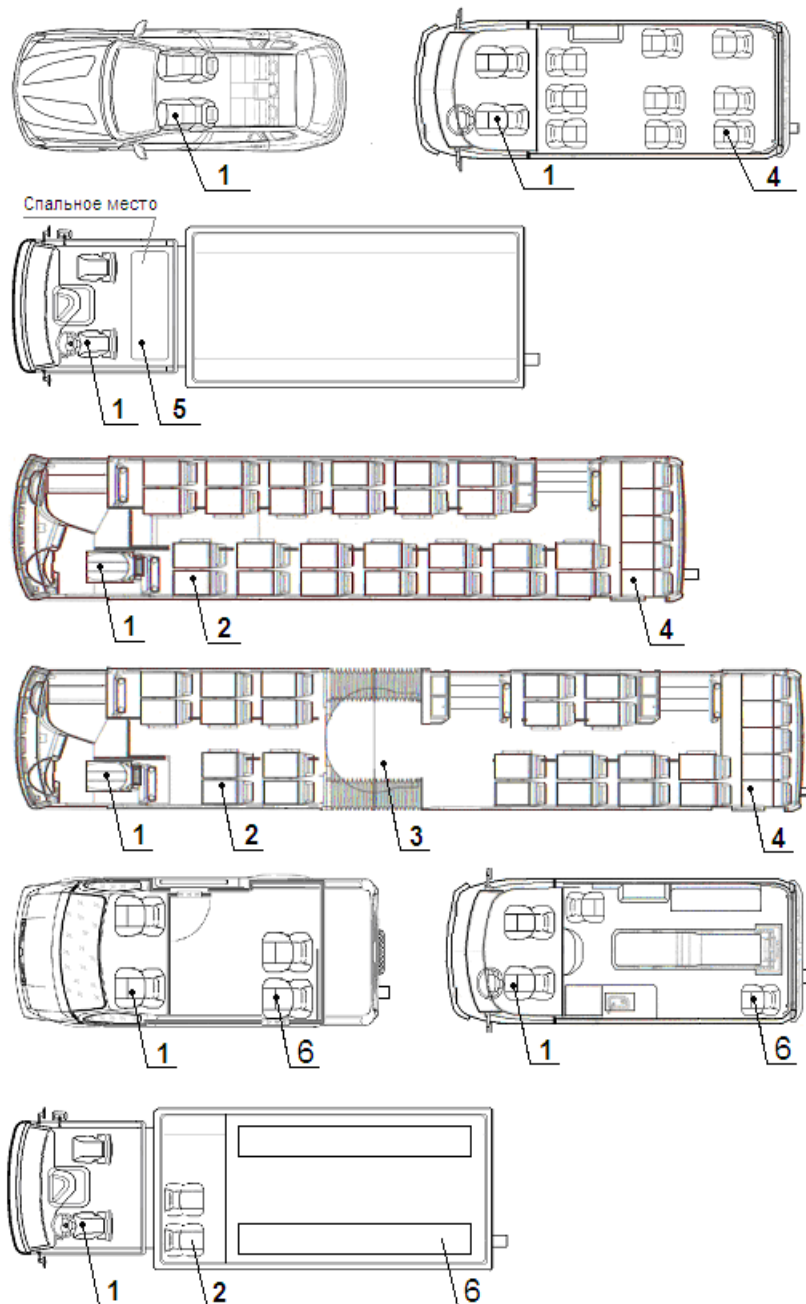
Sampling tube is connected to the inlet fitting of pump, opposite end of sampling tube is connected to the pipette or cartridge, sorbent tube hub. The pump is on. Air volume equal to five, ten - fold pipettes capacity shall be passed through a pipette. The volume of air passed through the hub, cartridge, sorbent shall be defined by the requirements of relevant standards.

B.6.2 Air sampling in the (Tedlar, Teflon) bag.

The nipple (fitting) of the bag shall be connected to the output fitting of pump. Air is pumped into the bag - it needs to fill air volume required for laboratory chemical analysis of pollutants.

B.6.3 At least two samples of air (using a pipettes, cartridge, hubs and sorbent tubes) shall be collected during each test mode, in each measurement point (place). The air volume of the bag shall provide at least 2 measurements of normalized pollutants.

B.6.4 Input and output of sample devices and inlet fitting of bags shall be shut with clamps after finishing of air sampling. The labeling of taken samples shall be made: the date and time of testing, the model of tested vehicle, sampling point (place) and test mode shall be written at the outer surface of the sampling device or at the accompanying label.



- 1 . for vehicles categories M_1, N ;
- 1, 4 . for vehicles categories $2, 3$ (the driver's compartment is not separated from the passenger area);
- 1, 2, 4 . for vehicles categories $2, 3$ (the driver's compartment is separated from the passenger area);
- 1, 2, 3, 4 . for vehicles categories 3 (joint bus);
- 1, 6 . for special and specialized vehicles categories M_2 ; 1, 2, 6 . for special and specialized vehicles categories 3 ;
- 5 . for vehicles categories N_2, N_3 with sleeper

Figure B.1 . The sampling points and places of express analysis at the driver , passenger seats, sleeper of vehicle

**Annex C
(Informative)
Test report form**

REPORT No. _____
on test of vehicle _____

C.1 General data

Vehicle mark, model	
Vehicle type	
Vehicle modification	
Category	
Mileage, km	
VIN code	
Engine mode, number	
Year of manufacture	
Manufacturer's name and address	
Ecological class	
Vehicle mass in running order, kg	
Bodywork (cabin)	
– bodywork type, location of engine (for category of M)	
– cab type, presence of sleeper (for category of N)	
Engine:	
– capacity, cm ³	
– maximum power, kW at rpm according to Rule N 85-00 EEC OON	
– minimal idle speed declared by manufacturer, rpm	
– used fuel (mark, standard)	
Fuel tank(s), location, material, capacity, l	
Exhaust pipe(s) location	
Additional devices for reducing emissions [type, model of catalytic converter(s)]	
Additional devices for reducing of air pollutants at the driver's cab and passenger compartment – air purification system, cabin air filters	
Heating system (heat exchanger type), type of independent heater (if applicable).	

C.2 Test conditions and measuring devices

The test procedure were carried out according to Annex A.

C.2.1 Test conditions:

Table C.1 . Test conditions

Test site characteristics	
Atmospheric pressure, kPa	
Relative humidity, %	
Ambient air temperature, °C	
Air temperature inside of passenger compartment (cabin), °	
Wind speed, m/s	
Test track characteristics	

Test date:

Test executor/responsible person:

C.2.2 Measuring instruments used for the test

Table C.2 Technical data of measuring instruments

Name and designation, detector type	Function	Serial number number of calibration certificate, date of calibration	Measuring range	Basic error (relative, absolute)

Table C.3 Methods of pollutants determination, error of measuring, direct measurements

Name of pollutant	Method of determination or operational documentation for measuring instruments when the direct measurements	Limit of basic error for measuring instruments *)
*) Basic error limits correspond to the specifications given in the documentation when the direct measurements		

C.3 Testing results

The mass concentrations of pollutants in the ambient air of the test area are shown in Table C.4.

Table C.4 Mass concentrations of pollutants in the ambient air of the test area

Name of pollutant	Mass concentration, mg/m ³

The mass concentrations of pollutants in the air of the vehicles passenger compartment (cabin) are shown in Table C.4

Table C.5 The mass concentrations of pollutants in the air of the vehicles passenger compartment (cabin)

Name of pollutant	Chemical formula	Test mode	
		I	II
		Mass concentration, mg/m ³	
		Sampling points (places)	
		1, 2, 3,4, 5, 6	1, 2, 3,4, 5, 6
Carbon monoxide	CO		
Methane	CH ₄		
Aliphatic saturated hydrocarbons	C ₂ H ₆ . C ₇ H ₁₆		
Nitrogen oxide	NO		
Nitrogen dioxide	NO ₂		
Formaldehyde	CH ₂ O		

Note 1, 2, 3, 4, 5, 6 . Sampling points (places) at the driver and passenger seats - according to B.5.1.

C.4 Conclusion

Signature

Data_____

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