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**INTERSTATE COUNCIL FOR STANDARDIZATION, METROLOGY AND CERTIFICATION
(ISC)**

**INTERSTATE
STANDARD**

GOST 33554—2015

Motor Vehicles

**CONTENT OF POLLUTANTS IN THE INTERIOR OF DRIVER'S CAB AND PASSENGER
COMPARTMENT**

Technical requirements and test methods

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Preface

Objectives, basic principles and the order of works in the interstate standardisation have been set out in GOST 1.0-2015 "Interstate system of standardisation. Key provisions" and GOST 1.2-2015 "Interstate system of standardisation. Interstate standards, rules and recommendations for interstate standardisation. Principles for developing, adopting, updating and revoking interstate standards".

Information regarding the standard

1 DEVELOPED by the Federal State Unitary Enterprise "Central Scientific Research Institute for Automobile and Auto-Motor Transport" NAMI (FGUP "NAMI")

2 IMPLEMENTED by the Interstate Technical Committee on Standardisation MTK 56 "Road Transport"

3 ADOPTED by the Interstate Council for the Standardisation, Metrology and Certification (Minutes No. 81P of October 27, 2015)

Votes in favour:

National classification of countries (ISO 3166) 004-97	Country code according to the national classification [MK] (ISO 3166) 004-97	Abbreviated name of the national authority for standardisation
Armenia	AM	Ministry of Economy of the Republic of Armenia
Belarus	BY	Gosstandart of the Republic of Belarus
Kazakhstan	KZ	Gosstandart of the Republic of Kazakhstan
Kyrgyzstan	KG	Kyrgyzstandart
Russia	RU	Rosstandart
Tajikistan	TJ	Tajikstandart

4 In accordance with Order No. 663-st of the Federal Agency for Technical Regulation and Metrology of June 22, 2016, the interstate standard GOST 33554-2015 shall enter into force as a national standard of the Russian Federation on 1 April, 2017.

5 INTRODUCED FOR THE FIRST TIME

Information on the amendments to this standard is published in the annually issued index "National Standards", and the texts of the amendments and corrections is published in the monthly indices "National Standards". In case of revision (replacement) or revoking of the standard, an appropriate notice will be published in the monthly information index "National Standards". The relevant information, notice and texts are also published in public information resources - on the official website of the Federal Agency for Technical Regulations and Metrology.

INTERSTATE STANDARD

Motor Vehicles

CONTENT OF POLLUTANTS IN THE INTERIOR OF DRIVER'S CAB AND PASSENGER
COMPARTMENT

Technical requirements and test methods

Date of entry into force: 2017-04-01

1 Scope

This standard specifies the limits, test and measurement methods of air pollutants in the interior compartment (hereinafter – driver's cab, driver's compartment, passenger compartment) of the vehicle.

This standard applies to vehicles of categories M, N, L₆, L₇ (as defined in [1]^{*)}) with internal combustion engines, having a closed interior compartment and a maximum design speed of at least 25 km/h.

2 Normative references

This standard uses references to the following interstate standards:

GOST 8.578-2014 State system for ensuring the consistency of measurements. State system for controlling the instruments measuring the content in gaseous media

GOST 12.1.007-76 Safety standards system. Harmful substances. Classification and general safety requirements

GOST 17.2.6.02-85 Environmental protection. Atmosphere. Automatic gas analysers for controlling air pollution. General technical requirements

Note: When using this standard, it is expedient to check the validity of the reference standards in the public information resources - on the official Internet website of the Federal Agency for Technical and Metrological Regulation or in the annual information index "National standards" published as of January 1 of the current year, and in the information index "National Standards" monthly published in the current year. If the reference standard has been replaced (amended), the use of the present standard must be governed by the replaced (amended) standard. If the reference standard has been revoked without replacement, then the provision the reference standard had been included in is applied only in the part which does not include the reference.

3. Terms and definitions

This standard uses the following terms of specific meaning:

3.1 **pollutant:** chemical or biological substance or a mixture of those substances that are contained in the ambient air and, in certain concentrations, likely to have harmful effects on human health and/or the environment.

3.2 **background pollution:** Concentration of pollutants in the atmospheric air.

^{*)} ALO editorial note: See item [1] of the bibliography.

3.3 **hazard class of the pollutant:** A code classifying the hazard degree of the pollutant¹ with regard to its harmful chemical effects on human health.

Note: Pursuant to GOST 12.1.007, in terms of the impact of chemical exposure on human health, harmful substances can be divided into four hazard classes:

- 1 extremely hazardous;
- 2 highly hazardous (in particular CH₂O, formaldehyde, NO₂, nitrogen dioxide);
- 3 moderately hazardous (in particular NO, nitrogen oxide);
- 4 low hazard (in particular carbon monoxide CO, saturated hydrocarbons from methane to heptane CH₄-C₇H₁₆,).

3.4 **vehicle:** A device with wheel driven transport chassis, of categories L, M and N intended for transporting passengers, goods or equipment fixed to it.

3.5 **vehicle type with regard to the content of polluting substances in the driver's cab and passenger compartment:** Vehicles showing no significant differences in terms of the following specifications:

- vehicle manufacturer (assembly plant);
- vehicle type specified by the manufacturer
- vehicle category (M or N);
- cab design, including sleeping accommodation (or the absence of it) for vehicles of categories N₂, N₃;
- location of the engine for vehicles of categories M, N
- engine (fuel type, operation process)
- location of the exhaust pipe in relation to the bodywork (cab) of the vehicle.

Note: Technical description includes vehicle specifications with regard to the pollutant content in the driver cab and passenger compartment, pursuant to Annex A.

3.6 **vehicle type specified by the manufacturer:** Vehicle type representing identical design features as set out in the general technical description.

3.7 **interior compartment:** The inside of the vehicle intended for the driver (crew), and passengers (passenger compartment, driver's cab, driver's compartment).

3.8 **passenger compartment:** The main, internal cabin of the vehicle intended for the carriage of passengers only, or of passengers and the driver.

3.9 **driver's compartment:** Space intended to be used by the driver only, including a driver seat, steering wheel, control systems, tools and other equipment indispensable to drive a vehicle.

3.10 **driver's cab:** A separate space in vehicles of category N intended for the driver and accompanying persons, featuring a driver seat, passenger seats and (optionally) sleeping accommodation and everyday home appliances (such as a cooker, basin, toilet - applicable for vehicles of category N₃).

3.11 **bodywork:** Part of the vehicle structure intended to carry and protect passengers, cargo and special equipment.

3.12 **air conditioning system:** A group of devices used to automatically maintain the set temperature inside the vehicle.

¹ The terms "pollutant" and "harmful substance" bear the same meaning in this standard.

3.13 **air cleaning system:** Air purifying device filtering out the pollutants from the inside of the vehicle.

3.14 **measuring instrument:** Technical equipment intended for measuring certain metrological characteristics specified in the standards, maintaining a physical quantity of a constant number (within a specified error tolerance), within a known time interval.

3.15 **breathing zone:** Space within 50 cm of the driver's or passenger's face.

3.16 **express analysis:** Analysis of polluting substances directly affecting the location of the analysed object by the method of direct measurement.

3.17 **chemical laboratory analysis:** Analysis of polluting substances carried out by the means of stationary gas analysis equipment.

3.18 **sampling device:** Aspiration devices (electric aspirators, pumps) intended for air sampling.

3.19 **sampling tubes:** Flexible tubes (ducts) manufactured from inert materials such as silicone or fluoropolymers.

3.20 **absorbing bags:** Devices intended for air sampling, of at least 0.1 dm³ capacity (elastic bags, pipettes) manufactured from gasproof inert materials (glass, polymeric films, polyamide etc.).

3.21 **concentrator:** Metal, polymer or glass cartridge binding and concentrating pollutants by means of chemical substances such as activated carbon, silica gel, polymer sorbent, aluminum oxide (III)).

3.22 **concentration of pollutants, mg/m³:** Mass concentration of pollutants.

3.23 **measurement method:** A table of specifically described operations, which, when carried out properly, will provide pollutant measurement results with a specific accuracy.

4 Classification of pollutants, normative requirements

4.1 The amount of the permissible pollutant content in the driver's cab/passenger compartment should not exceed the maximum admissible values of their concentration (MAC).

4.2 The classification of pollutants in this standard is determined by the type of engine.

For the classification of pollutants, their MAC value, as well as types of tested vehicle engines refer to table 1.

Table 1

Normalized pollutants	MAC; mg/m ³	Tested engine types*
Formaldehyde CH ₂ O	0.05	3, 4, 5
Nitrogen dioxide NO ₂	0.2	1, 2, 3, 4, 5
Nitrogen oxide NO	0.4	1, 2, 3, 4, 5
Carbon monoxide CO	5.0	1, 2, 3, 4, 5
Saturated hydrocarbons		
(C ₂ H ₅ —C ₇ H ₁₆)	50.0	1, 2, 3
Methane CH ₄	50.0	3, 5
*Engine types:		
1 - positive-ignition engine working on gasoline;		
2 - positive ignition engine working on liquefied petroleum gas (LPG);		
3 - positive ignition engine working on compressed natural gas (CNG)		
4 - compression ignition engines (diesel);		
5 - compression ignitions engines working on mixed fuel (diesel + CNG)		

5 Test method

The test method for the determination of the pollutant content inside the driver's cab/compartment and passenger compartment shall be implemented in accordance with Annex B.

Pollutant sampling and measurement procedures are shown in Annex C. Test results shall be drawn up in a protocol, the form of which is to be found in Annex D.

6 Safety requirements

During the tests it is necessary to comply with the requirements and instructions for occupational safety that are in force in the organisation that carries out these tests, as well as with the standards and rules for industrial safety specified by the competent authorities.

Annex A
(mandatory)

**Technical description of the vehicle with regard to the content of
polluting substances in the driver's cab and the passenger compartment:**

A.1 General specifications of the tested object

Form of general specifications of the tested object:

- 1 Vehicle make _____
- 2 Vehicle type specified by the manufacturer _____
- 3 Modification (variant, version) _____
- 4 Category _____
- 5 Class (vehicles of categories M₂, M₃) _____
- 6 Identification number (VIN) _____
- 7 Manufacturer, assembly plant(s), address(es) _____
- 8 Manufacturer's representative (address) _____
- 9 Applicant, address _____
- 10 Vehicles submitted for certification _____

A.2 Technical specifications of vehicles submitted for certification

The form of technical specifications of vehicles submitted for certification is specified by table A.1.

Table A.1 - Technical specifications of vehicles

Technical specifications of the vehicle		Vehicle modification			
		1	2	3	*)
1	Characteristics of the vehicle bodywork (driver's cab)				
1.1	Vehicle mass in running order in kg				
1.2	Bodywork type for vehicles of category M ₁ pursuant to the Consolidated resolution on the construction of vehicles (R.E.3) of the Inland Transport Committee of the UNECE [1]				
1.3	Bodywork types of special or specialized vehicles of categories M and N (armoured vehicles, ambulances, hearses, motor caravans and others)				
1.4	Bodywork design of vehicles of categories M ₂ and M ₃ (articulated, double deck, low-floor, with luggage compartment, driver's compartment included in the passenger compartment) and location of engine				
1.5	Design of the driver's cab of vehicles of categories N, L ₆ , L ₇ [cargo compartment included, presence of sleeper berth (for vehicles of categories N ₂ and N ₃)]				

*) ALO editorial note: Illegible character in the original document, should perhaps read "n".

2	Engine				
2.1	Model, manufacturer				
2.2	Type (regarding the operation process)				
2.3	Engine location				
2.4	Working capacity, cm ³				
2.5	Maximum power, kW, in rpm according to UN Regulation No. 85-00 [2]				
2.6	Rated (minimal) idle speed declared by the manufacturer, in rpm				
2.7	Used fuel (petrol, diesel, LPG, CNG)				
3	Fuel supply and exhaust systems				
3.1	Fuel tank (number of tanks, capacity, material, location)				
3.2	Fuel tank filler (design, sealing manner)				
3.3	Exhaust discharge and neutralization system: - neutraliser (model, brand, number) - exhaust pipe (number, location in relation to the bodywork, vehicle cab)				
3.4	Additional devices for reducing toxicity (evaporative emissions absorption system) - if applicable				
4	Heating and ventilation				
4.1	The presence (or absence) of an air purification system in the driver's cab or passenger compartment				
4.2	Presence (or absence) of air conditioning and air conditioning systems				
4.3	Ventilation, brief overview				
4.4	Sealing (material) of windows, doors, openings				
4.5	Heating (principal, auxiliary, backup), type				
4.6	Presence (or absence) of combustion heaters, brand, type (if applicable)				
4.7	Heat exchanger(s), type (air, fluid, electric)				

A.3 Diagrams, technical drawings

A.3.1 List of submitted diagrams and technical drawings

A.3.1.1 General appearance of the vehicle (with dimensions) for all vehicles submitted for certification.

A.3.1.2 Diagram of the internal design of the bodywork, passenger compartment, and/or driver's cab of the vehicle submitted for testing, indicating the location of driver and passenger seats, as well as the sleeper berth for all vehicles submitted for certification.

A.3.1.3 Diagrams of the vehicle bodywork (driver's cab) indicating the location of doors, windows, sunroofs, ventilation inlets/outlets, inside partition walls for all vehicles submitted for certification.

A.3.1.4 Diagrams of window, door, and opening components specifying the materials they have been made of for all vehicles submitted for certification.

A.3.1.5 Diagrams showing the location of fuel tank(s) in relation to the bodywork (driver's cab) and the design of the fuel tank(s) filler for all vehicles submitted for certification.

A.3.1.6 Diagram showing the orientation of the exhaust pipe(s) in relation to the vehicle bodywork (driver's cab) for all vehicles submitted for certification.

A.3.1.7 Diagrams (location) showing combustion heaters (if applicable) for all vehicles submitted for certification.

A.3.2 Maximum format of technical diagrams and drawings: A4.

A.4 Description of markings of the vehicle

The description of markings of the vehicle shall include:

location of the manufacturer's plate;

location of the vehicle identification number (VIN)

interpretation of the structure and the content of the VIN pursuant to [3].

A.5 General requirements for technical specifications

Technical specifications shall be submitted in triplicate, bearing the date, name and position of the signee, and the manufacturer's or applicant's stamp.

Annex B
(mandatory)**Test method for measuring the content of polluting substances in the driver's cab and the passenger compartment of a vehicle:****B.1 General requirements**

B.1.1 The test method described in this Annex shall be used for testing vehicles (including certification tests, inspection tests, and others).

B.1.2 Certification tests are performed on one vehicle representing a specific vehicle type (see chapter 3 item 3.6) pursuant to its technical specifications as referred to in Annex A.

B.1.3 When a vehicle is submitted for inspection, factory, assessment or other kinds of tests (except for certification tests), the technical specifications of this vehicle must also be submitted pursuant to Annex D (in accordance with provisions 1 and 2).

B.2. Testing conditions

B.2.1 Tests are carried out on paved roads with the slope of up to 6.0 %.

B.2.2 The vehicle shall fulfill the following conditions:

- windows, doors, quarter lights, ventilation hatches and canopy are closed;
- interior air recirculation system is off;
- when testing in mode I, pursuant to B.3, forced ventilation is switched on;
when testing in mode II, pursuant to B.3, the test shall be performed with both the forced ventilation switched on¹ and with the forced ventilation switched off;
- if the forced ventilation is switched on, the airflow level is in the lowest position;
- if a vehicle is equipped with an interior air cleaning system (IAC) the tests are carried out with the IAC system switched on.
- heating, climate control or air conditioning systems shall be used by the operator to provide the interior temperature of the driver's cab/ passenger compartment within a range of +18 to +30 °C. The recommended temperature is (20±1) °C.

B.2.2.1 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.

B.2.2.2 Vehicles of categories M and N are tested in running order and partially loaded (driver, operator, measuring instrument).

B.2.3 Normal meteorological conditions during testing shall be as follows:

- ambient air temperature: from -15°C to +30°C;
- relative humidity - from 30% to 90%
- wind speed - (3.5 ± 1.5) m/s;
- atmospheric pressure - from 84.0 to 108.7 kPa (from 630 to 800 mm Hg).

¹ Optional for vehicles of category M.

B.3 Test modes

The tests shall be carried out with two modes of operation of the vehicle:

- I - steady-state driving at the speed of (50 ± 5) km/h. Speed may be controlled on the basis of the speed meter.

Vehicles with a maximum design speed below 50 km/h are tested at 80% of their maximum design speed.

For vehicles equipped with a manual gearbox the highest gear to ensure stable movement 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.

B.4 Implementation of test

B.4.1 Test preparation

B.4.1.1 Identification of a test vehicle is conducted - its conformity to its technical specifications is checked in the case of certification tests; its conformity to the technical characteristics pursuant to Annex D (according to provisions 1 and 2) is checked in the case of other kinds of tests.

B.4.1.2 Visual evaluation of the vehicle's bodywork (driver's cab), window sealing, hatches, doors and exhaust system components is conducted. The vehicle tested shall not have any defects: cracks, chipped off windows, loose sealing and others.

B.4.1.3 Vehicles with any deviations from the declared technical specifications and/or bodywork (driver's cab) defects are not admitted for testing.

B.4.1.4 The vehicle submitted for testing shall be fuelled not less than 6 h before the beginning of the testing.

B.4.2 Test mode I

B.4.2.1 The test is carried out in road conditions according to B.2.1. No other vehicles with engine running or other sources of air pollution are permitted in the testing zone.

Before the testing, the vehicle's engine is switched off, the windows, doors and hatches are opened and the driver's cab/passenger compartment is ventilated for 1 to 5 minutes. Then the windows, ventilation hatches, and doors are closed and a gas analyser is turned on to carry out an express analysis.

Gas analyser mode throughout the entire testing process – pursuant to the manual of the gas analysing instrument.

B.4.2.2 The engine is switched on, it is ensured that the testing conditions are pursuant to B.2.2, the vehicle is started, stabilized and continuously driven with a controlled speed on an agreed route, heating up the engine and other vehicle aggregates as well as equalizing the temperature of all cooling liquids and lubricants and pressure in the lubrication system for (20 ± 5) min.

B.4.2.3 After (20 ± 5) min have passed, an express analysis is performed and/or air samples are taken at the measurement points according to C.4 (see figure C.1).

B.4.2.4 The express analysis shall be performed during a period of 20 to 30 minutes during which at least 5 instrument readings shall be taken for each of the pollutants to be determined. The duration of sampling is defined by the requirements of the appropriate measurement method.

B.4.2.5 The order of air sampling is pursuant to C.5.

B.4.3 Test mode II

B.4.3.1 Test mode II is carried out at an open parking place, immediately after test mode I. The vehicle is positioned in such a way that its exhaust pipe is oriented against the wind direction.

B.4.3.2 Prior to testing, the driver's cab/passenger compartment is aired pursuant to B.4.2.1.

B.4.3.3 An express analysis of pollutants in the ambient air shall be carried out. During the express analysis, the gas analyser rests on the installed seats of the test vehicle, the engine is off. The sampling tubes of the gas analyser are pulled out through the open windows or doors of the test vehicle at a distance of 0.5-1 m from the vehicle body.

B.4.3.4 The test shall begin when the concentration of pollutants in the test area does not exceed 0.3 MAC.

B.4.3.5 Test conditions shall be provided in accordance with B.2.2. The engine is switched on. The engine is operating in mode II with forced ventilation switched on.

B.4.3.6 After (20+5) min after reaching the operating temperature of the engine and other aggregates in order to equalize the temperature of all the cooling liquids and lubricants as well as the pressure in the lubricating system, an express analysis is made and air samplings are taken inside the vehicle at the points specified in C.4 (see fig. C.1) Registration and air sampling time shall be the same as in B.4.2.4.

B.4.3.7 After finishing express analysis and air sampling, the engine is switched off. The vehicle is aired in accordance with B.4.2.1.

B.4.3.8 The engine is switched on, the test is carried out again pursuant to B.4.3.5, B.4.3.6 with forced ventilation off.

B.4.3.9 The tests are finished, the engine is switched off and the air samples collected during mode I and II tests in all sampling points pursuant to B4 and from ambient air are handed over to the laboratory.

B.4.3.10 The air samples are stored in a thermostat or in an enclosed space under constant conditions (air temperature 20° C, relative humidity 50%). The period of sample storage prior to the performance of their laboratory chemical analysis is defined by the measurement methods.

B.5 Processing and drawing up of test results

B.5.1 The arithmetic mean value of its current concentrations measured at each measuring point according to C.4 at the modes I and II shall be considered as the result of the express analysis of each of the normalized pollutants.

B.5.2 When using a gas analyser working on the summing (collecting) principle of processing input data, the final value of the single measurement of each of the normalized pollutants at each measuring point according to C.4 of at the modes I and II shall be considered as the result of the measurements.

B.5.3 During laboratory chemical analysis, the arithmetic mean value of two consecutive measurements of pollutants in each of the samples taken at the measuring points (places) according to C.4 at the modes I and II shall be considered as the final result of the measurements of each of the normalized pollutants.

B.5.4 The test results are found to be positive if the quantitative pollutant measurements according to B.5.1-B.5.3 at all measurement points, in accordance with C.4, at test modes I, II do not exceed the values shown in table 1.

B.5.5 The test results are found to be negative if the quantitative pollutant measurements in one or more measurement points according to C.4 at one or both test modes exceed the normative values shown in table 1.

B.5.6 Based on the test results a protocol is drawn up pursuant to Annex D.

Annex C
(recommended)

Procedure of air sampling and measurements of pollutants

C.1 Air sampling

Air samples are taken by means of the aspiration method. A system intended for air sampling inside the tested vehicle includes air sampling instruments, a voltage converter (if necessary), absorbent bags (elastic bags, pipettes), concentrators, air sampling tubes. The speed of sampling is defined by the requirements of the appropriate measurement methods.

C.2 Measurement of pollutants in air samples

C.2.1 Measurement methods

Quantitative measurements of pollutants in the air of a vehicle's passenger compartment/driver's cab and in its ambient air shall be performed by a qualified measurement method.

The numbers of measurement methods shall be entered into the test protocol (see table D.2, Annex D).

When performing direct pollutants measurements with the use of a measuring instrument corresponding to C.3 of this Annex, it shall be allowed to carry out measurements in accordance with the measurement methods specified in the operational documentation of the measuring instrument. Confirmation of conformity of the measurement method with the mandatory metrological requirements for measurements is carried out during type approval of the measurement instrument.

C.2.2 Measurements of air pollutants' mass concentrations are carried out by the following methods:

- a) for formaldehyde CH_2O :
 - 1) high performance liquid chromatography UV detection;
 - 2) gas chromatography with nitrogen phosphorus detection, or mass spectrometer and capillary or packed columns;
 - 3) photo-electric colorimetric method
 - b) for nitrogen oxide NO and nitrogen dioxide NO_2 :
 - 1) chemiluminescence;
 - 2) high-sensitivity electrochemical detection;
 - c) for carbon monoxide CO:
 - 1) infrared photoacoustic spectroscopy;
 - 2) electrochemical detection;
 - 3) gas chromatography with Photo-Ionization Detection (PID) after catalytic reduction of carbon monoxide to methane;
 - d) for saturated hydrocarbons $\text{C}_2\text{H}_5\text{-C}_7\text{H}_{16}$:
 - PID, capillary and packed columns gas chromatography;
 - e) for methane CH_4 :
 - 1) PID or TCD (thermal conductivity detector) gas chromatography
 - 2) infrared photoacoustic spectroscopy;
-

C.2.3 The use of alternative pollutant measurement methods is permissible as long as they ensure the measurement is carried out with the required selectiveness employing measuring instruments meeting the metrological requirements set out in C.3.

C.3 Metrological requirements for measuring instruments

C.3.1 The measuring of pollutants in the air of the driver's cab/ passenger compartment is made by means of measuring instruments of approved type that passed the verification of their calibration and are working on the basis of the methods specified in C.2.

C.3.2 The measuring instruments shall provide the lower and upper limits of pollutants measurement at the presence of associated components (see table C.1).

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

Pollutant name	Lower limit of measurement, mg/m ³ , not more than	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 CO	1.0	50.0
Saturated hydrocarbons CH ₄ -C ₇ H ₁₆	1.0	500.0

C.3.3 The maximum permissible relative error Δ_0 of the measuring instruments must not exceed the values given in table C.2.

Table C.2 - Maximum permissible relative error Δ_0 of working measuring instruments used to measure the mass concentration of pollutants

Measuring range, mg/m ³	Maximum permissible relative error Δ_0 , %	
	WMI 2*	WMI 3*
From $1.0 \cdot 10^{-2}$ to 50.0	15-10	25-20
More than 50.0 up to $0.9 \cdot 10^3$	10-5	20-15

* WMI 2, WMI 3 – working measuring instruments of medium (WMI-2) and lower (WMI-3) accuracy class pursuant to GOST 8.578, designed for the analysis of gaseous media of the same composition.

C.3.4 Other measuring instruments

When performing the tests, other measuring instruments are used to measure the temperature, relative humidity, barometric pressure and wind speed. The maximum permissible error of the working instruments must not exceed the values given in table C.3.

Table C.3 - Maximum absolute permissible error Δ of working measuring instruments used to measure air temperature, relative humidity, atmospheric pressure and wind speed

Measured parameter	Maximum permissible absolute error, Δ
Temperature	$\pm 1^\circ\text{C}$
Relative humidity	$\pm 2.5\%$
Atmospheric pressure	$\pm 0.1 \text{ kPa}$
Wind speed	$\pm (0,2 + 3\% \text{ of the measured value}) \text{ m/s}$

C.4 Procedure of air sampling and/or express analysis of pollutants – air sampling points and places of pollutants express analysis

C.4.1 Air sampling and (or) express analysis of pollutants in the driver's cab/passenger compartment of vehicles of categories M, N₁, L₅, L₇ are carried out on the driver's seat within the driver's breathing zone (see figure C.1, item 1).

C.4.2 Air sampling and (or) express analysis of pollutants in the driver's cab of N₂, N₃ vehicle categories (equipped with a sleeper berth) are carried out analogously to C.4.1, and additionally at a height of 0.3 to 0.4 m from the horizontal bed (in the head zone of the sleeper berth) on the side of the exhaust pipe (see figure C.1, items 1 and 5).

C.4.3 Air sampling and (or) express analysis of pollutants in special or specialized vehicles of M₂ category are performed in the breathing zone of the driver and the passenger in the cab, on the driver's and the passenger's seat on the side of the exhaust pipe (see figure C.1, items 1 and 6).

C.4.4 Air sampling and (or) express analysis of pollutants in the passenger compartment of vehicles of categories M₂, M₃ (where there is no partition between the driver's and the passengers' compartment) are carried out in the breathing zone of the driver and the passengers in the driver's compartment and in the last row of seats on the side of the exhaust pipe (see figure C. 1, items 1, 4).

C.4.5 Air sampling and (or) express analysis of pollutants in vehicles of categories M₂, M₃ (if there is a partition between the driver's cab and the passenger compartment) are carried out in the breathing zone of the driver and the passengers in the driver's cab and in the second and last rows of seats of the passenger compartment on the side of the exhaust pipe (see figure C. 1, items 1, 2, 4).

C.4.6 Air sampling and (or) express analysis of pollutants in special or specialized vehicles of category M₃ are carried out in the breathing zone of the driver and the passengers in the driver's cab and in the front and rear parts of the passenger compartment on the side of the exhaust pipe (see figure C.1, items 1, 2, 6).

C.4.7 Air sampling and (or) express analysis of pollutants in double-decker vehicles of category M₃ are carried out on the ground deck analogously to C.4.4 or C.4.5 and on the upper deck in the front and rear parts of the passenger compartment on the side of the exhaust pipe.

C.4.8 Air sampling and (or) express analysis of pollutants in the passenger compartment of articulated vehicles of category M₃ are carried out in the places specified in C.4.4 and C.4.5, as applicable, and additionally at the place of articulation, at the height of $(1.5 \pm 0.1) \text{ m}$ from the horizontal plane of the floor in the vertical plane of symmetry (see figure C.1, items 1, 3, 4 or 1, 2, 3, 4).

C.4.9 When the design of the tested vehicle has not been defined by items C.4.1-C.4.8, the test operator may define the air sampling points and/or the places of express analysis of pollutants himself.

C.5 Air sampling order**C.5.1 Air sampling**

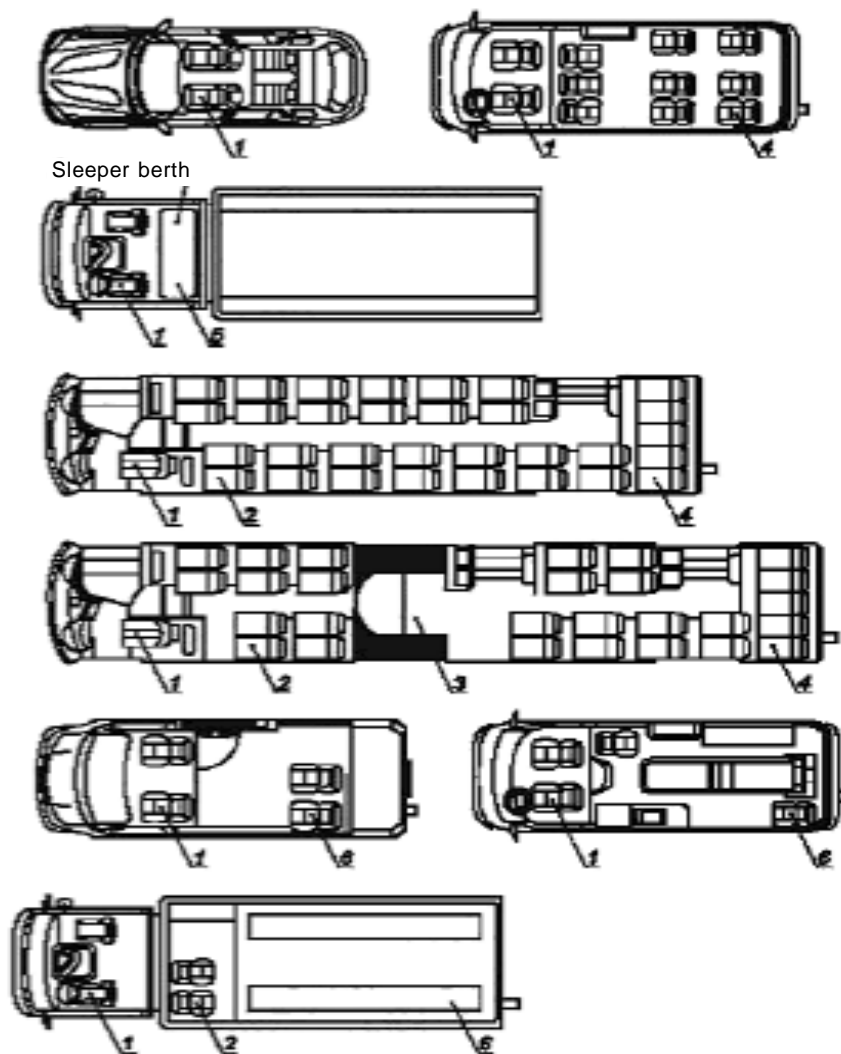
The inlet fitting of the sampling device shall be connected to the sampling tube, the opposite end of which is to be connected to the pipette or concentrator. The sampling device shall be turned on. Air volume equal to the amount from five to ten-fold pipette capacity shall be passed through the pipette; the volume of air passed through the concentrator shall be equal to the amount from fifty to hundredfold of its capacity.

C.5.2 Air sampling in elastic fluoropolymer bags

The output fitting of the sampling device shall be connected to the sampling tube the opposite end of which is to be connected to the elastic bag. Air is pumped (injected) into the elastic bag until the bag is filled with the air volume required for laboratory chemical analysis of pollutants.

C.5.3 When using pipettes and concentrators, at least two samples of air shall be collected at each measurement point and in each test mode. When using an elastic bag, the collected air volume shall provide at least two measurements of pollutants.

C.5.4 After finishing the air sampling process, the input and output of absorbing bags and concentrators shall be shut with clamps, the valve of the inlet fitting of elastic bags shall be shut, the labelling of taken samples shall be made as follows: the date and time of testing, the model of the tested vehicle, the sampling point (place) and the test mode shall be written on the outer surface of the sampling devices or on a label accompanying them.



1 - driver's breathing zone; 2 - breathing zone of the passenger sitting in front of the vehicle's passenger compartment; 3 - breathing zone of a standing passenger in the articulation area of a vehicle of category M₃; 4 - breathing zone of a seated passenger in the rear part of the vehicle's passenger compartment; 5 - breathing zone of a person sleeping in a sleeper berth; 6 - breathing zone of a seated passenger in the rear part of the passenger compartment of a special or specialized vehicle

Figure C.1 - The sampling points and locations of express analysis at the driver's compartment, passenger seats and the sleeper berth of a vehicle.

Annex D
(recommended)

Test protocol form

Name of the testing facility (branch, laboratory)

Number of the certificate of accreditation (register number)

_____ - release date

APPROVED

Manager of the testing facility (laboratory)

_____(signature)

Date of approval of the protocol

_____, 20 ____.

PROTOCOL No. __________ testing of the vehicle _____
(type of tests) (vehicle name)for conformity with _____
(GOST, Technical Regulation)

in relation to the content of harmful (polluting) substances in the air of the vehicle's interior compartment (driver's cab, driver's compartment, passenger compartment).

1 Tested object

- 1.1 Vehicle make _____
 - 1.2 Vehicle type specified by the manufacturer _____
 - 1.3 Modification (variant, version) _____
 - 1.4 Vehicle category _____
 - 1.5 Engine (model, number) _____
 - 1.6 Identification number (VIN) _____
 - 1.7 Mileage in km _____
 - 1.8 Applicant, address _____
 - 1.9 Manufacturer, assembly plant(s), address _____
 - 1.10 Representative of the manufacturer (if applicable), address _____
-

2 Technical specifications of the tested object

2.1	Vehicle cabin, design, presence/absence of a sleeper berth	
2.2	Vehicle bodywork, type, location of engine	
2.3	Presence of a luggage compartment (for vehicles of categories M ₂ and M ₃)	
2.4	Working capacity of engine, cm ³ (l)	
2.5	Maximum (nominal) engine power, in kW in rpm according to UN Regulation No. 85-00 [2]	
2.6	Minimal idle speed declared by manufacturer in rpm	
2.7	Fuel (petrol, diesel, LPG, CNG), brand, class	
2.8	Fuel tank, number, capacity, l, location	
2.9	Additional devices reducing the emission of harmful substances (neutraliser(s)' type and make)	
2.10	Number and location of exhaust pipe(s)	
2.11	Additional devices reducing the number of polluting substances in the air of the driver cab, passenger compartment (cabin) - air cleaning system, cabin filters	
2.12	Vehicles submitted for certification	
Notes:		
1 The technical description of the vehicle shall be annexed to the certification test protocols, only.		
2. Item 2.12 shall be completed in the certification test protocols, only.		

3. Test conditions

3.1 Test conditions and location

Test conditions	Value	Test location	Technical operator
Test date			
Atmospheric pressure, kPa			
Relative air humidity in %			
Ambient air temperature °C			
Air temperature inside the driver's cab/passenger compartment in °C			
Wind speed, m/s			

3.2 Measuring instruments used for the test

Name and designation, detector type	Function of the measuring instrument	Identification, serial, stock number, number of calibration, certificate, date of verification of the calibration	Measuring range	Range of maximum permissible error

3.3 Mass concentration of pollutants measured in ambient air within the test zone

Pollutant name	Mass concentration, mg/m ³

4 Test methods

The tests have been performed in accordance with the standard _____
(number and year of issue)

The list of test methods used for measurement of pollutants, maximum permissible error of the test methods, direct measurements

Pollutant name	Measurement method, number or operational documentation for measuring instruments when performing direct measurements	Range of maximum permissible error of measuring instruments, direct measurements *
When performing direct measurements, the range of maximum permissible error corresponds to the specifications given in the documentation of the measuring instrument.		

5 Test results

The mass-volume concentrations of pollutants in the air of the internal vehicle compartment (driver's cab, driver's compartment, passenger compartment,)

Pollutant name	Pollutant concentration expressed in mass and volume mg/m ³			MAC; mg/m ³
	Test modes			
	I	II		
		FV+*	FV-*	
	Sampling points			
1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6		
Formaldehyde CH ₂ O				0.05
Nitrogen dioxide NO ₂				0.2
Nitrogen oxide NO				0.4
Carbon monoxide CO				5.0
Saturated hydrocarbons C ₂ H ₅ -C ₇ H ₁₆				50.0
Methane (CH ₄)				50.0
* Forced ventilation on (FV+), forced ventilation off (FV-)				
Note: 1, 2, 3, 4, 5, 6 – pollutants sampling points at the driver's and passenger seats, pursuant to GOST requirements.				

6 Conclusion

When carrying out assessment it was concluded that the technical documentation is complete and correct and that the test object conforms to the information set out in the technical documentation.

Design differences of vehicles submitted to tests do not change the vehicle type with regard to the content of harmful (polluting) substances in the internal compartment (driver's cab/passenger compartment) of the vehicle, thus the test results include the following vehicles

a) ¹ Vehicle(s) submitted for certification

name, category of vehicle(s)

represent(s) one type of vehicle with regard to the content of harmful (polluting) substances in the internal compartment of a vehicle and meet(s) the requirements of TR CU 018/2011 (Annex 3, Art. 3)

b) ² vehicle(s) submitted for testing

name, category of vehicle(s)

is/are (not) in conformity with the requirements of TR CU 018/2011 (Annex 3, Art. 3) in regard to the content of harmful (polluting) substances in the internal compartment of the vehicle.

The test protocol can only be reproduced in its entirety and only with the permission of the testing laboratory (organisation).

The tests have been performed by (person in charge):

position

signature

initials, surname

Date _____

¹ Alternative conclusion form for the certification test protocol

² Alternative conclusion form for the control test protocol

Bibliography

- [1] ECE\TRANS\WP.29/78 Consolidated resolution on the construction of vehicles (R.E.3) of the Inland Transport Committee of the UNECE
- [2] Regulation No 85-00 of the Economic Commission for Europe of the United Nations (UN/ECE) Uniform provisions concerning the approval of internal combustion engines or electric drive trains intended for the propulsion of motor vehicles of categories M and N with regard to the measurement of net power and the maximum 30 minute power of electric drive trains
- [3] ISO 3779:2009 Road vehicles – Vehicle identification number (VIN). Content and structure

Key words: vehicles, polluting (harmful) substances, method and modes of testing, vehicle type in regard to the content of polluting (harmful) substances in the driver's cab and passenger compartment (interior compartment), permissible limit values of concentration in the places used, mass concentrations of pollutants, sampling, express analysis, pollutants direct measurements, measurement methods, measuring instruments
