

**INTRODUCTION OF
INTERSTATE STANDARD
GOST 33554-15**

Pollutants content in the interior of driver's cab and passenger compartment. Technical requirements and test methods

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Background

Interior cabin air contains a significant concentrations of CO, NO, NO₂, SO₂, different classes of light hydrocarbons including volatile organic compounds (VOC), formaldehyde, carbonyls, carcinogenic polycyclic aromatic hydrocarbons (PAH) and other toxicants.

Even at the level of hygienic standards the content of pollutants in the air of vehicles causes adverse reactions such as: tiredness, drowsiness, discomfort, irritation of eyes, nose and throat, headache, worsening neuro-behavioral responses. All of the above has a negative impact on road safety.

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.

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

This standard sets the requirements to the pollutants content in the air of passenger compartment and cabin resulting of the fuel combustion in the engines and the evaporation of fuel and lubricants from the vehicle systems.

Purpose of these works:

- Provide better driving environment to the consumer
- The design modification of vehicles to improve the sealing of the vehicles

The Progress of Standard Development

1998 - first edition of standard «Content of harmful substances in the air of cabin and saloon. Rates and methods of determination» GOST 51206-98

2004 – second edition of standard of Russian Federation «Content of pollutants in the air of passenger compartment and cabin. Norms and test methods» GOST R 51206-04

2008 - Standard was included to the list of Russian Federation rules which have to regulate the design 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 the driver's cabin air and uses in procedure of certification of vehicles

2011 - Standard was included to the list of Russian Federation and Custom Unions countries rules which have to regulate the design 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 vehicles certification

2015 – third edition of the interstate standard «Pollutants content in the interior of driver's cab and passenger compartment. Technical requirements and test methods» GOST 33554-15

In **2009 – 2016** About 2450 vehicles of M1, M2, M3, N1, N2, N3 categories were tested and 51 vehicles exceeded the limits of these standards.

Introduction of Test Method

1 Specification and method for the determination of limited pollutants

The present standard applies to vehicles of M and N categories equipped with internal-combustion engines and having maximum design speed not less than 50 km/h.

The standard sets the requirements to the pollutants content in the air of passenger compartment and cabin resulting of the fuel combustion in the engines and the evaporation of fuel and lubricants from the vehicle systems.

The standard does not apply to vehicles not destined for public roads (off-road tippers, agricultural and forestry tractors and others).

Substances to be limited, their limits and engine types in respect of which vehicle should be tested :

Pollutant	Chemical formula	Limits, mg/m ³	Type of engine
Formaldehyde	CH ₂ O	0,050	3,4,5
Nitrogen dioxide	NO ₂	0,200	1,2,3,4,5
Nitrogen oxide	NO	0,400	1,2,3,4,5
Carbon monoxide	CO	5,00	1,2,3,4,5
Saturated hydrocarbons	C ₂ H ₆ - C ₇ H ₁₆	50,00	1,2,3
Methane	CH ₄	50,00	3,5

NOTE: The following of the engine types are applied: 1 - positive ignition engine; 2 - positive ignition engine working on liquefied engine working on liquefied petroleum gas; 3 - positive ignition engine working on natural gas; 4 - diesel engine; 5 - gas diesel engine.

2 Test conditions

The tests are carried out on coated roads with slope no more than $2,0 \pm 0,5$ %.

The following conditions have to be fulfilled for the determination of pollutants content in the air of passenger compartment and cabin:

- windows, doors, quarter lights, ventilation hatches are closed;
- air conditioning system is switched off;
- interior air recirculation system is switched off;
- forced ventilation is switched on;
- heating system is switched off.

Introduction of Test Method

Meteorological conditions for conducting tests

Parameter	Value	Parameter	Value
Ambient air temperature, °C	From -15 to +30	Wind speed, m/sec	(3,5±1,5)
Relative humidity, %	30 - 90	Atmospheric pressure, kPa	84,0 - 108,7

Test modes

The test is carried out for two modes:

I - steady-state motion 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 standing vehicle the mode with the minimal stable idling speed (declared by the manufacturer) is used.

Note. There should be no other vehicles near the test vehicle during the test.

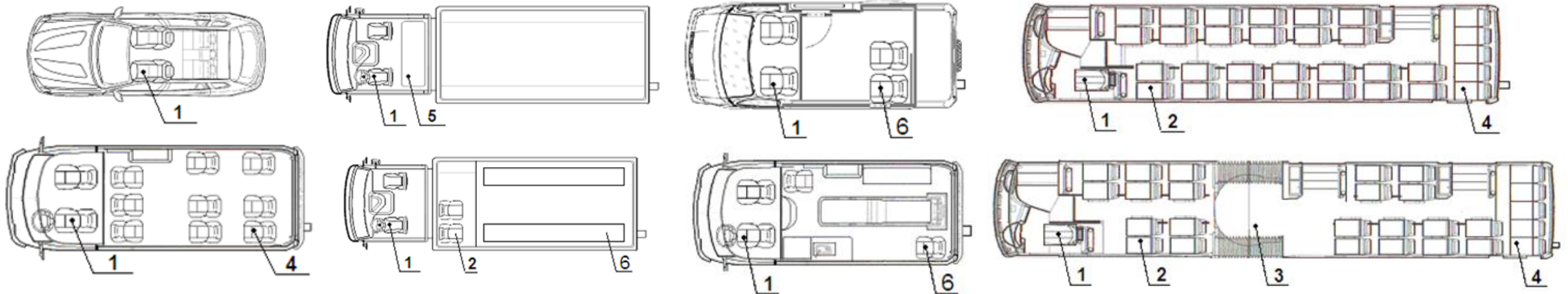


Introduction of Test Method

3 Air sampling, express analysis and points for air sampling and express analysis

The air sampling and (or) the express analysis of pollutants on the driver's place, in the passenger compartment and the cabin for vehicles of M and N categories are made at height of $1,0 \pm 0,1$ m from the floor level.

Points of air sampling and express analysis of pollutants at driver's place and passenger seats of vehicles.



- 1, – point of air sampling for vehicles of M, N categories; 5 – point of air sampling (sleeping area) for vehicles of category N2, N3;
- 1, 2, 4, 6 - points of air sampling for vehicles of M₂, M₃ categories and special vehicles;
- 3 - point of air sampling for vehicles of M₃ category (articulated bus)

Procedure of air sampling and carrying out measurements of pollutants during the test modes (recommended)

Pollutants		Recommended procedures
Formaldehyde	CH ₂ O	Air sampling and measurement in stationary laboratory or express analysis
Nitrogen dioxide	NO ₂	Air sampling and measurement in stationary laboratory or express analysis
Nitrogen oxide	NO	Air sampling and measurement in stationary laboratory or express analysis
Carbon monoxide	CO	Only express analysis
Saturated hydrocarbons	C ₂ H ₆ - C ₇ H ₁₆	Only gas sampling and measurement in stationary laboratory
Methane	CH ₄	Only air sampling and measurement in stationary laboratory

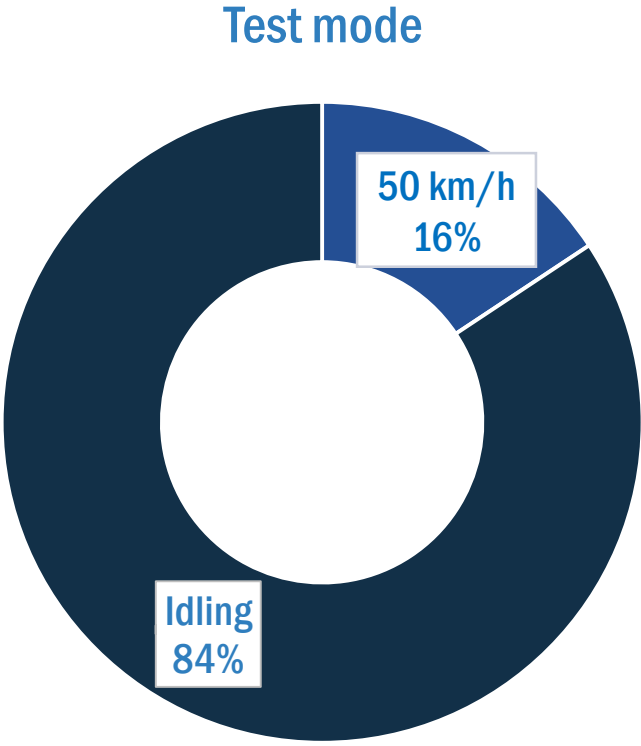
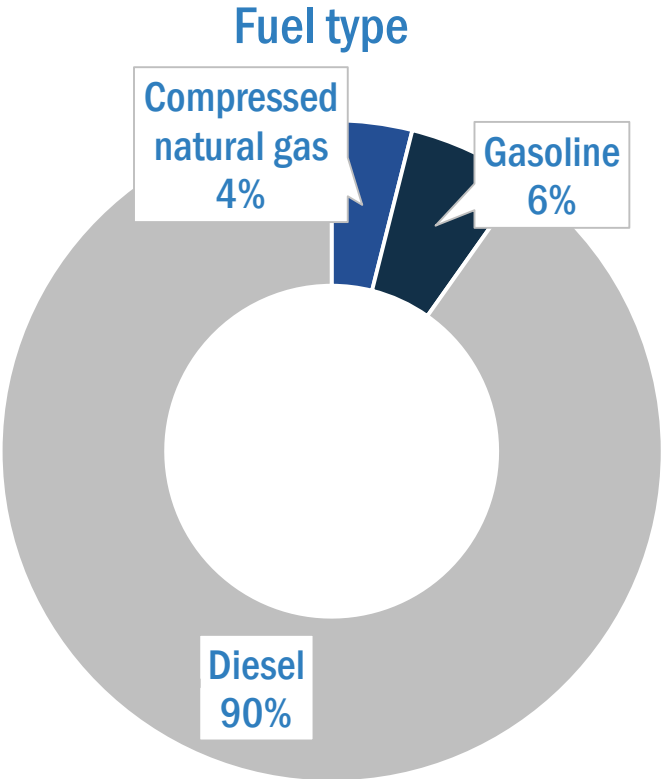
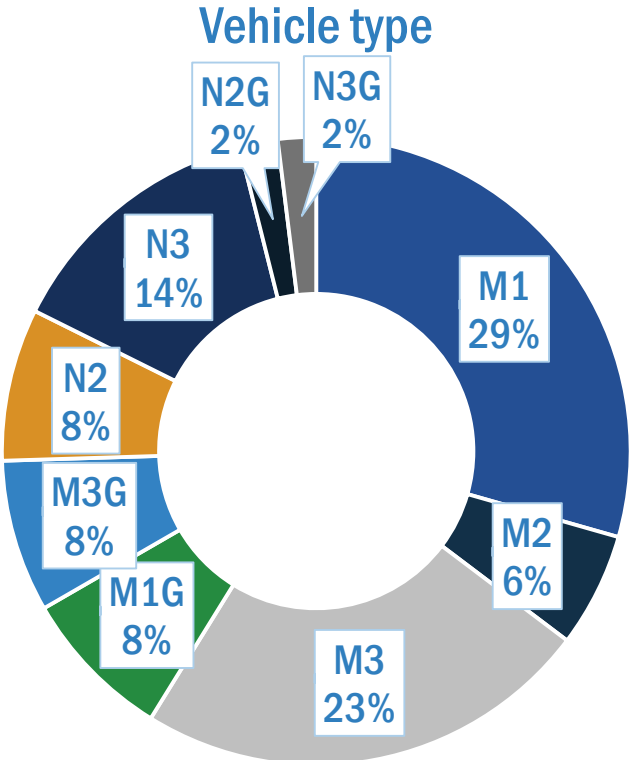
Interstate standard introduction

- 1. Providing air quality in the interior of the vehicles is one of the most important elements of road traffic safety.**
- 2. Standard regulations are proven to be effective to reduce pollutants inside all types of vehicles.**
- 3. It needs to fulfill the procedures of the design developments to improve vehicles sealing.**
- 4. The main reasons of incompatibilities with standard requirements are shown below:**

Basic reasons of incompatibility – design defects:

- a – adjustment of the engine during idling mode;**
- b – not optimal location of the exhaust pipe;**
- c – not optimal construction of fuel tank and its elements;**
- d – different defects of vehicles assembly;**
- e – malfunction of the exhaust system;**
- f – penetration of the exhaust gases from ventilation or air conditioning system;**
- g – insufficient seal tightness of doors, windows, hatches;**
- h – malfunction of autonomous heater**

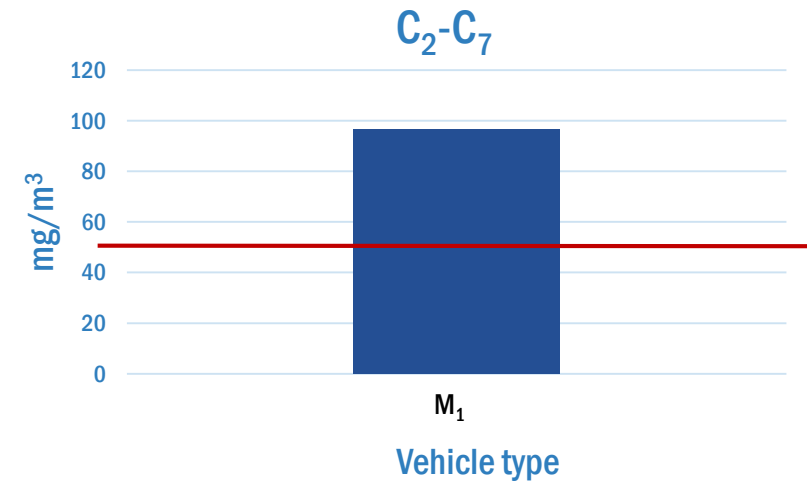
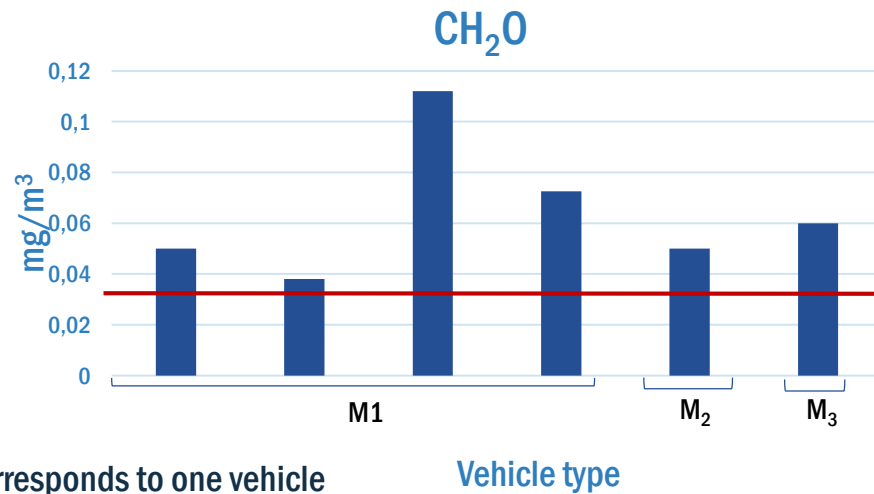
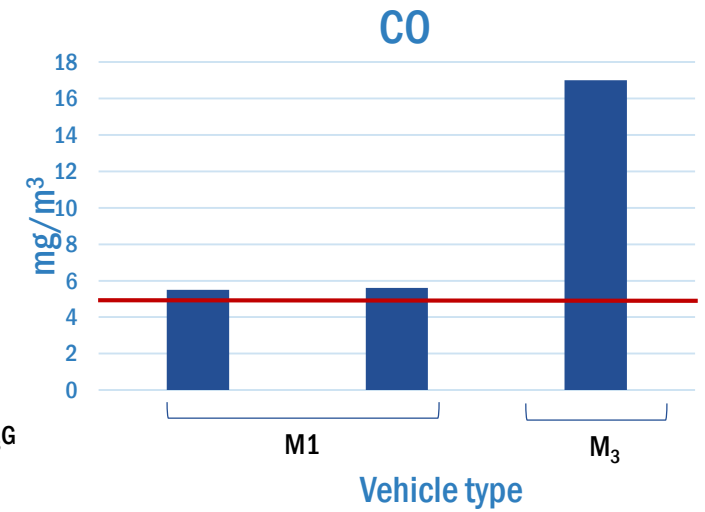
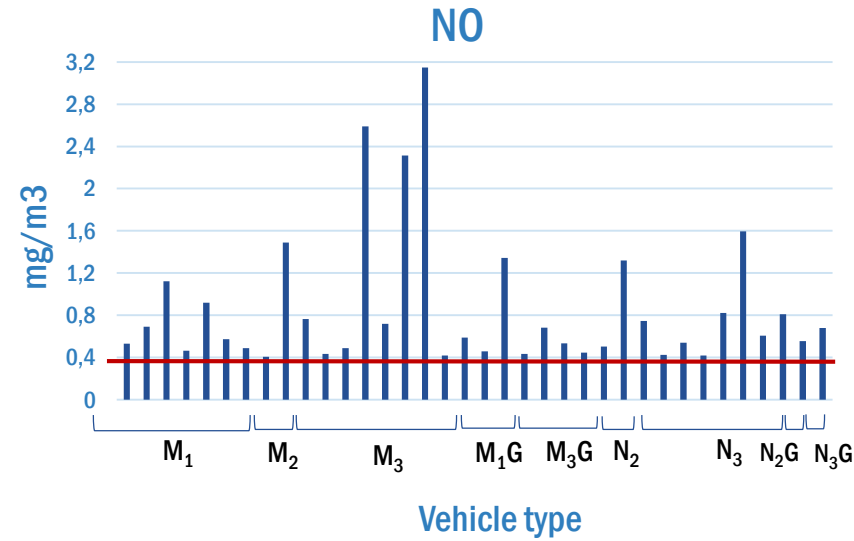
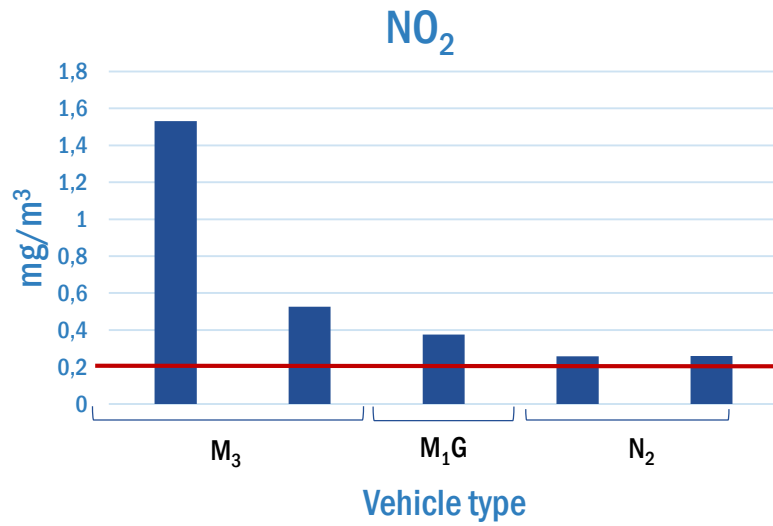
Part of the vehicles (domestic and foreign production) in which the excess of the limit values was recorded by the GOST R 51206-2004 when tested in the Russian Federation (RF)



2450 vehicles were tested
51 vehicles did not meet the requirements



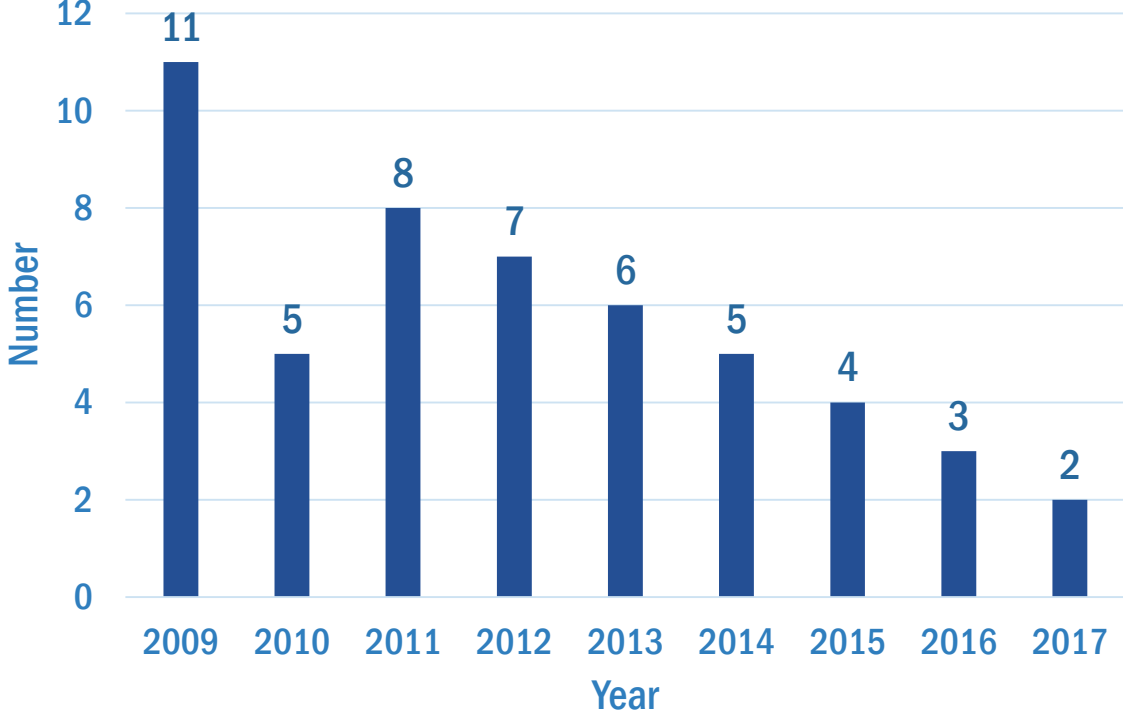
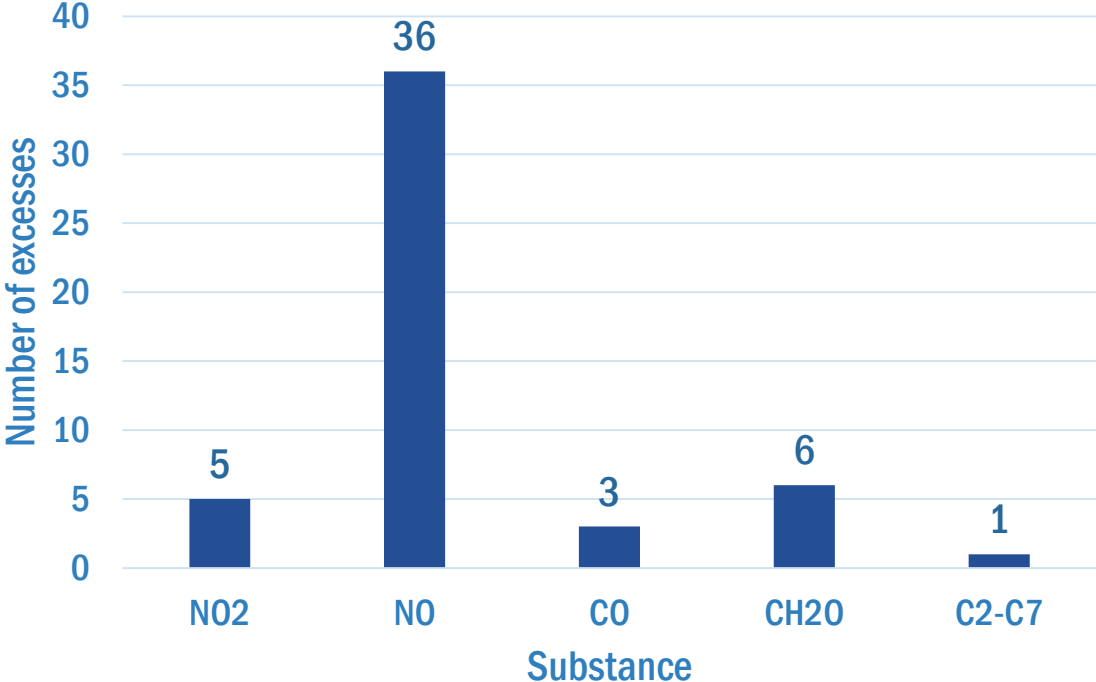
Excess of the limit values depending on the vehicle type detected by the GOST R 51206-2004 when tested in RF



* One column corresponds to one vehicle
 2450 vehicles were tested
 51 vehicles did not meet the requirements



Number of limit-exceeding events detected by the GOST R 51206-2004 when tested in RF



2450 vehicles were tested
51 vehicles did not meet the requirements



Thank you for your attention!
We are ready to answer your questions.

