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**FEDERAL AGENCY  
ON TECHNICAL REGULATING AND METROLOGY**

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**NATIONAL  
STANDARD OF THE  
RUSSIAN  
FEDERATION**

**GOST R  
54618-2011**

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**Global navigation satellite system**

**ROAD ACCIDENT EMERGENCY RESPONSE  
SYSTEM**

**Compliance test methods of in-vehicle emergency call  
system/device for electromagnetic compatibility,  
environmental and mechanical resistance requirements**

**Official Edition  
English Version Approved by Interstandard**



**Moscow  
Standartinform  
2011**

## Foreword

The purposes and principles of standardization in the Russian Federation are established in the Federal Law No. 184-ФЗ "On Technical Regulating", dated 27.12.2002. Application rules of national standards of the Russian Federation are established in GOST R 1.0-2012 "Standardization in the Russian Federation. Main provisions"

### Details

1 DEVELOPED by Open joint-stock company "Navigational information systems" Non-Profit Partnership "Promotion of Development and Use of Navigation Technologies"

2 SUBMITTED by Technical Committee for standardization TC 363 "Radio navigation"

3 APPROVED AND INTRODUCED by Decree No. 753-*cm*, dated 08.12.2011, of Federal Agency on Technical Regulating and Metrology

4 This Standard specifies the main normative statements of the following international document:  
UNECE Regulation No. 10 "Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility"

5 INTRODUCED FOR THE FIRST TIME

*Information on amendments to this Standard is published in the annual information index "National standards". The text of the amendments and corrections are available in the monthly information indices "National standards". In case of revision (replacement) or cancellation of this Standard, corresponding notice is published in the monthly information index "National standards". Corresponding information, notices and texts are also available in the information system of common access — in the official Internet site of Federal Agency on Technical Regulating and Metrology*

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**(Amended Wording, Amendment No. 1).**

## Introduction

This Standard is a part of the complex of standards "Global navigation satellite system. Road accident emergency response system".

The road accident emergency response system "*ERA-GLONASS*" provides decrease of severity of traffic accidents and other emergencies in the roads of the Russian Federation by reducing the emergency response time of the available field services.

The in-vehicle emergency call system is the key structural element of the "*ERA-GLONASS*" system providing generation and transmission of the minimum required data on the vehicle during the traffic accident and supporting bilateral voice communication with the available emergency field services.

This Standard is a part of the complex of standards "Global navigation satellite system. Road accident emergency response system".

The basic provisions of this Standard are interrelated with the following foundational National standards from the set "Global Navigation Satellite System. Road Accident Emergency Response System":

GOST R 55530-2013 Global navigation satellite system. Road accident emergency response system. Functional test methods of in-vehicle emergency call system and data transfer protocols;

GOST R 55532-2013 Global navigation satellite system. Road accident emergency response system. Test methods of in-vehicle emergency call system crash detection feature.

**(Amended Wording, Amendment No. 1).**

This Standard, alongside with the abovementioned standards of the set devoted to the Road accident emergency response system "*ERA-GLONASS*," have been developed in order to create an evidentiary basis for conformity to the requirements of the Technical Regulation "On Safety of Wheeled Vehicles" of the Customs Union in part of vehicle equipment with in-vehicle emergency call systems and devices.

**NATIONAL STANDARD OF THE RUSSIAN FEDERATION****Global Navigation Satellite System****ROAD ACCIDENT EMERGENCY RESPONSE SYSTEM****Compliance test methods of in-vehicle emergency call system/device for electromagnetic compatibility, environmental and mechanical resistance requirements**

Date of Introduction — 2012—09—01

**1 Scope**

This Standard applies to in-vehicle emergency call systems/devices operating on the basis of the global navigation satellite system of the Russian Federation (*GLONASS*). They are the structural elements of the road accident emergency response systems named "*ERA-GLONASS*".

This Standard establishes test methods for compliance of the specified systems with the established requirements for their electromagnetic compatibility and for their resistance to climatic and mechanical loads. The considered requirements are established in GOST R 54620 for the purposes of conformity assessment (assurance) against the requirements of the Technical Regulation [3].

**(Amended Wording, Amendment No. 1).**

**2 Normative references**

The following standards are referred to in this Standard:

GOST R 8.568-97 State System for Ensuring Uniform Measurements. Certification of test equipment. Main principles

GOST R 50397-92 Electromagnetic compatibility of technical facilities. Terms and definitions

GOST R 50607-93 Electromagnetic compatibility of technical facilities. Electric equipment of automobiles. Noise generated by electrostatic discharges. Technical requirements and test methods

GOST R 51319-99 Electromagnetic compatibility of technical facilities. Industrial radio-noise measuring devices. Technical requirements and test methods

GOST R 52230-2004 Car-and-tractor electric equipment. General specifications

GOST R 52928-2010 Global navigation satellite system. Terms and definitions

GOST R 54620-2011 Global navigation satellite system. Road accident response system. In-vehicle emergency call system/device. General technical requirements

GOST 9.311-87 Unified system of corrosion-and-ageing protection. Metal and non-metal inorganic coatings. Corrosion-damage evaluation method

GOST 12.1.030-81 Occupational safety standards system. Electric safety. Protection earth. Neutralling

GOST 12.3.019-80 Occupational safety standards system. Electric test and measurements. General safety requirements

GOST 14254-96 (IEC 529:1989) Protection degree (IP codes) provided by shells

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*Amendment No. 1 is inserted*

GOST R 55530-2013 Global navigation satellite system. Road accident emergency response system. Functional test methods of in-vehicle emergency call system and data transfer protocols

GOST R 55532-2013 Global navigation satellite system. Road accident emergency response system. Test methods of in-vehicle emergency call system crash detection feature

GOST 30630.0.0-99 Environment stability test methods for machines, instruments and other industrial products. General requirements.

**(Amended Wording, Amendment No. 1).**

GOST 16019-2001 Land-based mobile radio-communication equipment. Requirements for resistance to mechanical and climatic loads. Test methods

GOST 28751-90 (ISO 7637/1,2) Automobile electric equipment. Electromagnetic compatibility. Conduction noise generated by power lines. Technical requirements and test methods

GOST 29157-91 Electromagnetic compatibility of technical facilities. Automobile electric equipment. Noise generated by onboard control-and-signal lines. Requirements and test methods

GOST 30429-96 Electromagnetic compatibility of technical facilities. Industrial noise generated by the equipment and devices installed together with the radio-receiving service systems of civil purpose. Norms and test methods

**Note** — Users of this Standard are highly advised to check validity of the above referenced standards in the official Internet site of Federal Agency on Technical Regulating and Metrology or in the annual information index “National standards” published as on January the 1<sup>st</sup> of the current year. It may be also checked in the corresponding monthly information indices of the current year. If the referenced standard is replaced or amended, then the replacing (amended) standard shall be selected by the User of this Standard. If the referenced standard is cancelled without a replacement, then the statement containing the specified reference may be used only in its part not touching this reference.

### 3 Terms, definitions, designations and abbreviations

3.1 Terms of this Standard comply with GOST R 50397 and GOST R 52928. This Standard specifies the following terms with corresponding definitions:

3.1.1 **in-vehicle emergency call system/device (IVS)**: System/device installed on a wheeled vehicle of a relevant Category and used to evaluate vehicle location, speed and movement direction based on the signals generated by the GLONASS Global Navigation Satellite System (GNSS) either alone or in cooperation with other active GNSS, to transmit messages containing vehicle data in automatic (system) or manual (device) mode when a road accident or an accident of other type occurs, and to ensure duplex voice connection with emergency services over wireless mobile communication networks.

**Notes**

1 In-vehicle emergency call systems are intended for Category M1 vehicles within the scope of UNECE Regulations [4] and [5], and for Category N1 vehicles within the scope of UNECE Regulation [5].

2 In-vehicle emergency call devices are intended for Category M1 vehicles outside the scope of UNECE Regulations [4] and [5], Category N1 vehicles outside the scope of UNECE Regulation [5], as well as for Category M2, M3, N2 and N3 vehicles.

3 The time frames for vehicle equipping with in-vehicle emergency call systems/devices are specified in [3].

4 In case of road accidents or accidents of other type, in-vehicle emergency call systems are capable of transmitting vehicle data messages in manual mode as well.

5 In case of road accidents or accidents of other type, an in-vehicle emergency call device may also be capable of transmitting vehicle data messages in automatic mode. The types of accidents to be detected automatically and the time frames for implementation of the function for automatic transmission of vehicle data in the device are established in [3].

3.1.2 **conductive industrial radio noise**: Electromagnetic noise transmitted through one or several conductors.

3.1.3 **equipment strength:** Ability of the equipment to hold its parameters within the established limits under the given climatic (mechanical) loads.

3.1.4 **road accident emergency response system ("ERA-GLONASS" system):** Automated geographically distributed Federal State Information System that uses the signals of the GLONASS Global Navigation Satellite System and of other active GNSS to provide for prompt collection of data related to road accidents or other emergencies on the roads of the Russian Federation as well as for processing, storage and transmission of such data to emergency services, and to enable access to the said data for the concerned governmental or local authorities, officials, legal and natural persons.

3.1.1 and 3.1.4 (Amended Wording, Amendment No. 1).

*Note* — Analogue of the "ERA-GLONASS" system is the newly developed all-European *eCall* system harmonized with the "ERA-GLONASS" system by its main functional properties: 1) using tone modems as the main mechanism of data transmission, 2) using unified structure (format) of mandatory data transmitted as a part of the minimum data set on the traffic accident, 3) using unified rules of beginning and ending bilateral vocal communication with the persons available in the vehicle cabin, etc.

3.1.5 **test (for noise resistance) rigidity degree:** Conditional No. assigned by the normative documentation to the technical-facility test for noise resistance. It specifies intensity of the noise load applied to the object under test. The noise-load parameters are specified for each test-rigidity degree.

3.1.6 **stability of the equipment:** Ability of the equipment to hold its parameters within the established limits under the applied climatic (mechanical) loads and after their removal.

3.1.7 **workability of the equipment:** Ability of the equipment to hold its parameters within the established limits under the applied climatic (mechanical) loads.

3.2 The following designations and abbreviations are used in this Standard:

IVS — in-vehicle emergency call system;

IVD — in-vehicle emergency call device;

RTA — road traffic accident;

MSD — minimum set of data;

GNSS — global navigation satellite system;

TC — vehicle;

OS — operating system;

PC — personal computer;

CWP — check workplace;

OD — operating documentation;

CAN — Controller Area Network (the standard of the industrial network providing connection of different actuation mechanisms, gauges, and the means of automatics into a common network);

USB — Universal Serial Bus.

3.2 (Amended Wording, Amendment No. 1).

## 4 General provisions

4.1 The object under test is the in-vehicle emergency call system (hereinafter referred to as the system).

Number of the IVS specimens shall be no less than 3. The test (check) shall be carried out for each of the IVS specimens under test in the volume specified in Sections from 5 to 7.

### 4.2 Test conditions

The IVS test for electromagnetic compatibility and for resistance to mechanical loads is carried out under normal climatic conditions in compliance with GOST P 52230 (clause 4.2):

- air temperature is 25 °C ( $\pm 10$ );

- relative air humidity is from 45 % to 80 %;

- atmosphere pressure is from 84.0 to 106.7 kPa (from 630 to 800 mm Hg).

The IVS test for resistance to climatic loads is carried out under the climatic conditions characterized by the load parameters specified in corresponding clauses of Section 6.

The IVS components working under different operating conditions are tested separately in compliance with the established requirements. The IVS may be tested as a complete set only under the most rigid test modes.

The IVS maintenance shall not be carried out during the test.

#### 4.3 Test safety requirements

The IVS parameters are measured during the test in compliance with GOST 12.1.030, GOST 12.3.019, safety requirements [2], and operating documentation for measuring devices and the test equipment.

The measuring devices and the test equipment may be switched on only when their external grounding is available. Connection of the terminals of the protective grounding to the grounding contour shall be carried out before providing all other connections. Their disconnection shall be carried out only after providing all other disconnections.

The IVS under test may be connected to (disconnected from) the cables, test devices and measuring devices only under condition that the devices of the test facility are deenergized and disconnected from power circuits of the system under test.

4.4 Test equipment shall be certified in compliance with GOST R 8.568.

Measuring devices shall be of the approved type. Their certification shall be valid during the test.

4.5 The IVS workability check shall be carried out in compliance with a special diagnostic program (hereinafter referred to as the IVS test program).

4.5.1 The IVS test program is developed by the IVS manufacturer. It is delivered at a separate request.

4.5.2 Required functions of the IVS test program:

- selection of the required trouble-shooting test by the user;
- performing the required test (performing the required test sequence, starting and stopping the test, setting the IVS diagnostic parameters, etc.) using the manual (an automatic) test mode;
- setting the required number of automatic test cycles from 1 to 10000;
- displaying the obtained test results in their short form (for example: all the tests are carried out successfully, an error is detected during the test, etc.) on the PC monitor and writing them into a text file (the text format is defined by the IVS manufacturer);
- displaying the obtained test results in a detailed form (the obtained test results and optional test information defined by the IVS manufacturer) on the PC monitor and writing them into a text file (the text format is defined by the IVS manufacturer);
- carrying out of the IVS test in compliance with GOST R 54620 (clause 7.6);
- enabling generation of data files (arrays) containing the test results, for transmission of such data over wireless mobile communication networks in accordance with the requirements of GOST R 54620 (clauses 7.6.13 and 7.6.14);
- obtaining the information using the versions of the available hardware platforms and the software of all the IVS components including the versions of the hardware platforms and the software of the available GNSS receivers, GSM/UMTS modems, tone modems, control processors;
- reading and deleting the IVS internal memory;
- reading and assigning the IVS adjustment parameters;
- updating all the IVS component software.
- mandatory availability of a testing procedure that provides for pressing of the "Emergency call" button when the activation is tested in manual mode, both for in-vehicle emergency call devices and for in-vehicle emergency call systems.

#### **(Amended Wording, Amendment No. 1).**

4.5.3 If any converters of electric signals are required to provide operation of the IVS test program (for example, an USB-CAN converter), then the given converters shall be delivered by the IVS manufacturer in a complete set in compliance with the approved test program.

4.6 Completeness of the IVS under test (installed in standard equipment configuration on the conveyor of the manufacturer of the vehicle) is provided by the manufacturer of the vehicle.

Completeness the IVS under test (installed in auxiliary equipment configuration either in a service/adjusting center or on the platform of the dealer (manufacturer) of the vehicle after its manufacture), is provided by the system manufacturer in compliance with GOST P 54620 (Sections 5 and 21).

#### 4.7 Test report

The test report shall contain the IVS test (check) results and measurement results. It shall specify:

- name of the test laboratory (centre), its post address, phone, fax and e-mail address;
- identification parameters of the specimen under test;
- test conditions;
- information on the selected test (measurement) method in compliance with this Standard;
- selected test equipment and measuring devices;
- the list of Sections (subclauses, clauses and paragraphs) of GOST R 54620 and other standard documentation containing the requirements checked for compliance and the obtained compliance test results;
- conclusion on compliance of the specimen under test with the established requirements;
- job title, surname and signature of the person responsible for the test and measurements;
- job title, surname and signature of the head of the test laboratory (centre) certified by the seal of the test laboratory (centre);
- test (measurement) date, the test report approval (registration) date.

### 5 Testing the in-vehicle emergency call system/device for compliance with the established requirements for electromagnetic compatibility

#### 5.1 Test volume and test conditions

5.1.1 The IVS test (check) sequence for compliance with the electromagnetic-compatibility requirements established in [3], [4] and GOST R 54620 (clause 13.4) is specified in table 1.

**(Amended Wording, Amendment No. 1).**

Table 1

Test (check) name	Clause No., figure No.
OD completeness check	5.2.1
IVS completeness check	5.2.2
IVS workability check under rated power-supply voltage	5.2.3, figure A.1
IVS workability check under changes of power-supply voltage	5.2.4, figure A.2
IVS workability check under power-supply voltage of reverse polarity	5.2.5, figure A.2
Check of protection of the IVS external electric circuits from their short circuit to the poles of the source of power-supply	5.2.6, figure A.2
Check of the IVS workability under conductive noise in power circuits	5.2.7, figure A.3
Check of the degree of the IVS noise emission into the onboard network	5.2.8, figure A.4
Check of the IVS workability under the noise generated in control (alarm) circuits	5.2.9, figure A.3
Check of the IVS workability under the noise generated by electrostatic discharges	5.2.10, figure A.2
Check of compliance with requirements for radio-noise voltage generated on the connectors of the IVS power-supply sockets	5.2.11, figure A.5
Check of compliance with requirements for intensity of the electromagnetic field generated by the IVS	5.2.12, figure A.5
Check of the IVS workability under electromagnetic radiation in the frequency range from 20 to 2000 MHz	5.2.13, figure A.6
<p><b>Notes</b></p> <p>1 The test (check) sequence specified in table 1 may be changed.</p> <p>2 The IVS (its OD) completeness check and the IVS workability check under rated power-supply voltage (under changes of power-supply voltage) are carried out at the beginning of the test.</p>	

5.1.2 The test is carried out under the climatic conditions specified in clause 4.2.

5.1.3 The test equipment, auxiliary equipment and measuring devices shall comply with table 2.

Table 2

Equipment name	Required technical characteristics of test devices and test equipment
Test generator of pulse noise in the onboard network of vehicle	Generation of conductive-noise impulses in compliance with GOST 28751
Onboard network equivalent	In compliance with GOST 28751
Connecting terminal (capacity clamp)	In compliance with GOST 29157
V-type network equivalent	In compliance with GOST R 51319
Oscillograph	Frequency band is up to 100 MHz (error is 3 %)
Source of power-supply device	Output voltage from 0 to 30 V, maximum load current 10 A
PC	External interface — USB 2.0; OS — Windows 2000/XP
System of testing the technical means for resistance to electrostatic discharges	Voltage of electrostatic discharges from 0 to 15 kV
System of testing the technical means for resistance to electromagnetic radiation	Frequency range from 20 to 2000 MHz
System for measuring the electromagnetic field of radiated industrial radio noise	Frequency range from 0.009 to 1000 MHz

## 5.2 Electromagnetic-compatibility test sequence

### 5.2.1 OD completeness check

The OD (enclosed to the delivered IVS) is complete, if the test documentation complies with GOST R 54620.

The in-vehicle emergency call system manufactured in auxiliary equipment configuration is considered to stand the check, if the OD completeness complies with GOST R 54620 (clause 21.2) and the OD processing procedure complies with GOST R 54620 (Section 22).

The in-vehicle emergency call system manufactured in standard equipment configuration is considered to stand the check, if the OD completeness complies with requirements of the manufacturer of the vehicle.

### 5.2.2 IVS completeness check

The IVS is complete, if it complies with requirements of GOST R 54620.

The in-vehicle emergency call system manufactured in auxiliary equipment configuration is considered to stand the check, if the system delivered complete set complies with GOST R 54620 (clause 21.1), and the logos established in GOST R 54620 (Section 22) are available on the IVS controls.

The in-vehicle emergency call system manufactured in standard equipment configuration is considered to stand the check, if the IVS delivery complete set complies with the requirements established by the manufacturer of the vehicle.

### 5.2.3 IVS workability check under rated power-supply voltage

5.2.3.1 The following IVS workability-check procedure is carried out in a special workplace prepared in compliance with the connection scheme specified in figure A.1 (Appendix A):

- install the test program on the PC (see figure 4.5) providing the IVS workability check (if the program is not available);
- set the output voltage of the power-supply device G1 equal either to 12.0 V ( $\pm 0.1$ ) or to 24.0 V ( $\pm 0.1$ ) depending on the power-supply system of the considered vehicle;
- connect the required check devices to the IVS in compliance with the connection schemes specified in figures from A.2 to A.6 depending on the selected test type. All the connected devices shall be switched off;
- switch-on the PC and wait till its OS is loaded;
- actuate the test program from the PC;
- switch-on the power-supply device G1 and other power-supply devices of the connected units. The indicators of the system state (arranged in the main dialogue window of the test program) shall inform the user on the interaction of the interface block and the connected IVS specimen with the PC. If an error is indicated, then switch-off the power supplies and check up correctness of the device connections.

- make sure that the IVS self-diagnostic test succeeded in accordance with GOST R 54620 (clause 6.17).

5.2.3.2 The IVS workability check procedure consists of the automated performance of the test sequence selected in the main dialogue window of the test program.

The considered check procedure is:

- select all the tests (for example, press the button «Select all») on the insert "Test" of the test program;

- make sure that the «Cyclic mode» is switched off;

- start the selected test sequence by pressing the button "Start";

- control the process of automatic performing the selected test sequence.

**Note** — The IVS self-diagnostic test in manual mode for emergency call initialisation shall include pressing the "Emergency call" button.

5.2.3.1 and 5.2.3.2 (**Amended Wording, Amendment No. 1**).

5.2.3.3 The IVS is considered to stand the test and to be workable, if error messages (generated by the test program) are not available during the check.

**5.2.4 IVS workability check under changes of power-supply voltage (changes of minimum and maximum power-supply voltage established in GOST R 52230)**

5.2.4.1 Prepare a CWP in compliance with clause 5.2.3.1 using the connection scheme specified in figure A.2.

5.2.4.2 Set the rated voltage for the power-supply device G1. Carry out the checks in compliance with clause 5.2.3.2.

5.2.4.3 Set minimum output voltage of the power-supply device. Carry out the checks in compliance with clause 5.2.3.2.

5.2.4.4 Set the maximum output voltage of the power-supply device. Carry out the checks in compliance with clause 5.2.3.2.

5.2.4.5 The IVS is considered to stand the test, if the workability checks carried out in compliance with clause 5.2.3.2 and 5.2.3.3 are successful.

**5.2.5 Workability check of the IVS loaded by power-supply voltage of reverse polarity in compliance with GOST R 52230**

5.2.5.1 The workability check of the IVS loaded by power-supply voltage of reverse polarity is carried out in a special CWP prepared in compliance with clause 5.2.3.1, using the connection schemes specified in figure A.2.

5.2.5.2 Switch-off the power-supply device G1.

5.2.5.3 Disconnect cables 2 and 3 from the power-supply device.

5.2.5.4 Connect the plug «+» of the cable 1 to the negative plug of the power-supply device G1. Connect the plug «-» of the cable 1 to the positive plug of the power-supply device G1.

5.2.5.5 Energize the power-supply device G1 for no less than 5 minutes

5.2.5.6 Switch-off the power-supply device G1.

5.2.5.7 Check the IVS in compliance with clause 5.2.1 using the scheme specified in figure 1.

5.2.5.8 The IVS is considered to stand the check, if the workability check carried out under the switched-off power-supply voltage of reverse polarity is successful.

**5.2.6 Check procedure for protection of external electric circuits of the IVS from their short circuit to the poles of the power-supply source in compliance with GOST R 52230**

5.2.6.1 Prepare the check bench in compliance with clause 5.2.3.1.

5.2.6.2 Disconnect the X1 connector of the cable 1 from the module A.2 (see figure A.2).

5.2.6.3 Provide alternate short-term short circuit (no more than 3) of each contact of the X1 connector of the cable 1 to the contacts «+» and «-» of the dc source A3 using a jumper or some other element.

5.2.6.4 Provide alternate short-term short circuit (no more than 3) of contacts from 1 to 7 of the connector "DAT" to the poles «+» and «-» of the dc source A3 using a jumper or some other element.

5.2.6.5 Connect the X1 connector of the cable 1 to the module A2 and carry the IVS out workability check.

5.2.6.6 The IVS is considered to stand the test, if after an alternate short circuit of each contact (of the IVS connectors to the poles of the IVS power-supply device) workability check is successful.

### 5.2.7 Check procedure for the IVS workability under conductive noise generated in power-supply circuits

5.2.7.1 The IVS workability under conductive noise generated in the onboard network is checked in compliance with GOST 28751 (Section 3).

5.2.7.2 The check is carried out using a test pulse-noise generator of the *ИГА* 12-24.1 type in the onboard network of the vehicle.

*Note* — The IVS workability under conductive noise generated in the onboard network may be checked using the devices of other types providing generation of test impulses of 1, 2, 2a, 3a, 3b, 4, 5, 6, and 7 types in compliance with GOST 28751.

5.2.7.3 Prepare a CWP in compliance with clause 5.2.3.1 using the scheme specified in figure A.3.

5.2.7.4 Apply the test impulses to the IVS.

5.2.7.5 Required number of impulses and the test duration:

- no less than 5000 impulses for each test impulse of the types 1 and 2; time interval between the impulses is 0.5 s;

- no less than 1 hour for each test impulse of the types 3a and 3b; time interval between the impulses is 0.1 s;

- no less than one impulse for each test impulse of the types 4, 5, 6, and 7; time interval between the impulses is 1 minute

5.2.7.6 Parameters of test impulses shall comply with rigidity degree IV established in GOST 28751 for 12 V (24 V) onboard networks.

5.2.7.7 Workability of the IVS under the applied test impulses is checked periodically in compliance with clause 5.2.3.2.

5.2.7.8 During the test impulses and after them error messages shall not be available in the "*Report*" window of the test program. It corresponds to the functional class A specified in GOST 28751.

5.2.7.9 The IVS specimen is considered to stand the check, if it complies with GOST 28751 for the rigidity degree IV of the functional class A under test impulses of the types 1, 2, 2a, 3a, 3b, 4, 5, 6, and 7.

### 5.2.8 Check of the IVS self-generated noise emission degree in the onboard network

5.2.8.1 The IVS self-generated noise emission into the onboard network of the vehicle is checked in compliance with GOST 28751 (Section 3).

5.2.8.2 Prepare a CWP in compliance with clause 5.2.3.1 using the scheme specified in figure A.4.

5.2.8.3 During the check of the IVS in compliance with clause 5.2.3.2, control the noise voltage generated in the IVS onboard network using an oscillograph. Voltage levels of noise of all types (specified in GOST 28751) generated by the IVS for 12 V (24) V onboard networks shall not exceed the following limits:

- peak voltage for the noise of type 1 — -15 V (35 V);

- peak voltage for the noise of type 2 — 15 V (15 V);

- peak voltage for noise of type 3 — from -15 V (25 V) to 15 V (25 V).

The specified noise voltage values comply with emission degree I specified in GOST 28751.

5.2.8.4 The IVS specimen is considered to stand the check, if voltage levels of the noise (generated by the IVS) of all types do not exceed the values specified in clause 5.2.8.3.

### 5.2.9 Check of the IVS workability under noise in control (alarm) circuits

The IVS workability under noise in control (alarm) circuits is checked in compliance with GOST 29157 (Section 2).

The test is carried out using a test generator of pulse noise of type *ИГА* 12-24.1 in the onboard network of the vehicle.

*Note* — The IVS workability under noise in control (alarm) circuits may be checked using the equipment of other types providing generation of required test impulses in compliance with GOST 29157.

Prepare a CWP in compliance with clause 5.2.3.1 using the scheme specified in figure A.3.

Connect the pulse-noise generator to the connecting terminal (capacity clamp) in compliance with GOST 29157.

Put the wire cords connecting the IVS with the adjustment (control) bench and discrete inputs of the connecting terminal (capacity clamp) in compliance with GOST 29157 (Section 2). Connect the load (or its equivalent) to the end of the wire cord using the discrete inputs.

Apply test impulses of the types 1, 2, 3a, and 3b to the IVS. Parameters of the test impulses shall comply with rigidity degree IV established in GOST 28751 for 12 V (24 V) onboard networks.

During the test impulses, the IVS workability is checked periodically in compliance with clause 5.2.3.2.

During all the test impulses, error messages shall not be available in the "Report" window of the test program. It corresponds to the functional class A and rigidity degree IV requirements established in GOST 29157.

The IVS specimen is considered to stand the check, if it complies with clause 5.2.3.2.

#### **5.2.10 Check of the IVS workability under noise generated by electrostatic discharges**

5.2.10.1 Resistance to noise generated by electrostatic discharges is checked in compliance with GOST R 50607 (Section 5).

5.2.10.2 The test is carried out using a test generator of electrostatic discharges with the characteristics specified in GOST R 50607.

5.2.10.3 The IVS specimen shall be resistant to test impulses generated by electrostatic discharges with rigidity degree IV. The required test voltage is:

- $\pm 4$ ;  $\pm 6$ ;  $\pm 7$  kV – for contact discharges;
- $\pm 4$ ;  $\pm 8$ ;  $\pm 14$ ;  $\pm 15$  kV – for air discharges.

5.2.10.4 Minimum number of discharges for each voltage is 3. Minimum time interval between the discharges is 5 s.

5.2.10.5 During the test, the IVS is arranged in the centre of the grounding plane. The check is carried out using an insulation support for the IVS specimen.

5.2.10.6 Prepare a CWP in compliance with clause 5.2.3.1 using the connection scheme specified in figure A.2.

5.2.10.7 Set the «Cyclic mode» in the test program.

5.2.10.8 Press the button "Start" to actuate the selected test sequence (the button name changes to "Stop" at once).

5.2.10.9 Check the IVS workability under contact discharges using the following procedure:

- provide a direct contact of the discharge probe of the test generator and the IVS case;
- each discharge point (three discharge points shall be available in different parts of the IVS case)

shall be tested using all voltage levels specified in clause 5.2.10.3 for contact discharges.

5.2.10.10 Check the IVS workability under air discharges using the following procedure:

- arrange a discharge probe perpendicularly (with  $\pm 15^\circ$  tolerance) to the discharge segment;
- move the discharge probe slowly (at speed of no more than 5 mm/c) towards the IVS discharge point till the first discharge is available;
- each discharge point is tested using all voltage levels specified in clause 5.2.9.3 for air discharges.

**Note** — If a discharge is not available, then keep moving the discharge probe towards the discharge point. If nevertheless a discharge is not available, then stop the check for the given voltage level and the given probe arrangement.

5.2.10.11 The IVS specimen is considered to stand the check, if the checks carried out in compliance with clause 5.2.3.2 (after removing the discharge load) are successful.

#### **5.2.11 Check of radio-noise voltage generated by the IVS**

Radio-noise voltage generated by the IVS is measured in compliance with GOST 30429.

Prepare a CWP in compliance with clause 5.2.3.1 using the connection scheme specified in figure A.5. In this case, the CWP shall be arranged in a screened compartment. Test devices shall comply with GOST 30429 (Section 3).

Radio-noise voltage is measured in the frequency range from 0.009 to 100 MHz only on the terminals of the IVS power circuits.

During the measurements, use the network equivalent A3 of type 5 in compliance with GOST R 51319.

The IVS specimen is considered to stand the check, if radio-noise voltage generated by the IVS does not exceed the norms established in GOST 30429 (Section 2) for the 1.1.1 group of devices.

#### **5.2.12 Check of electromagnetic-field strength generated by the IVS**

Electromagnetic-field strength generated by the IVS is measured in the frequency range from 30 to 1000 MHz in compliance with [1, clauses 6.5, 6.7].

Prepare a CWP in compliance with clause 5.2.3.1 using the connection scheme specified in figure A.5. In this case, the CWP shall be arranged in an echo-free screened compartment or on the open certified platform. Test devices and equipment shall comply with [1].

Measurements are carried out using the network equivalent A3 of type 5 in compliance with GOST R 51319.

The IVS specimen is considered to stand the check, if level of the electromagnetic-field strength generated by the IVS does not exceed the norms established in [1] for broadband (narrow-band) noise generated by the available electric/electronic assembly units.

### **5.2.13 Check of the IVS workability under electromagnetic radiation**

5.2.13.1 The test is carried out in compliance with one of the selected test methods specified in [1, clause 6.7 and Appendix 9].

5.2.13.2 Prepare a CWP in compliance with clause 5.2.3.1 using the connection schemes specified in figure A.5. The IVS workability is checked in compliance with clause 5.2.3.2. The test procedure is specified in [1].

5.2.13.3 Switch-on «Cyclic mode» in the insert "Test" of the test program.

5.2.13.4 Press the button "Start" to actuate the selected test sequence.

5.2.13.5 Apply electromagnetic radiation to the IVS in its switched-on state. Radiation frequency is changed from 20 MHz to 2000 MHz.

Duration of the test load (for each of the discrete frequency) shall be no less than 2 s. So, it is possible to take the IVS response time into account.

5.2.13.6 The IVS specimen is considered to stand the check, if error messages are not available during the test carried out in compliance with clause 5.2.13.5.

## **6 Testing the in-vehicle emergency call system/device for compliance with the established requirements for resistance to climatic loads**

### **6.1 Test volume and test conditions**

6.1.1 Test of the IVS for compliance with the established requirements for resistance to climatic loads includes the test for workability and strength under the applied climatic loads.

6.1.2 The list and the sequence of the IVS test for compliance with the established requirements for resistance to the climatic loads, established in [3 (Appendix 10, clause 118)] GOST R 54620 (clause 13.2), are specified in table 3.

**(Amended Wording, Amendment No. 1).**

Table 3

Test (check) name	Clause No., figure No.
OD completeness check	5.2.1
IVS completeness check	5.2.2
IVS marking check	6.2.1
Test for resistance to low ambient temperature	6.2.2, figure A.2
Test for resistance to high ambient temperature	6.2.3, figure A.2
Test for resistance to ambient-temperature change	6.2.4, figure A.2
Test under high humidity and high temperature using a constant test mode	6.2.5, figure A.2
Test for resistance to dust providing evaluation of the IVS protection degree in compliance with GOST 14254	6.2.6, figure A.2
Water-resistance test providing evaluation of the IVS protection degree in compliance with GOST 14254	6.2.7, figure A.2
<p><b>Notes</b></p> <p>1 The test (check) sequence specified in table 3 may be changed.</p> <p>2 The IVS marking check for compliance with the established requirements is carried out after each test type specified in table 3.</p>	

6.1.3 Structure of the test equipment and the test auxiliaries are specified in table 4.

Table 4

Equipment name	Required equipment characteristics
Humidity chamber	Temperature — from 25 °C to 40 °C; relative humidity — from 80 % to 95 %
Heat chamber*	Temperature — up to 90 °C; temperature tolerance in the working volume of the chamber is 3 °C
Cold chamber*	Temperature — from +5 °C to -70 °C; temperature tolerance in the working volume of the chamber is 3 °C
Dust chamber	In compliance with GOST 14254 (Section 13, figure 2)
Capacity providing water drops	In compliance with GOST 14254 (Section 14, figure 3)
Water tank	In compliance with GOST 14254 (Section 14, table 8)
The IVS adjustment and control bench	Figure A. 1
* Double-section heat (cold) chambers may be used, if they provide the specified high (low) temperature range with the required tolerances.	

6.1.4 Test equipment shall provide the required IVS control (switching-on/switching-off, changing the operating modes, etc.) and reading indications of the tested IVS under corresponding climatic loads, if these operations are stipulated by the test sequence.

## 6.2 Test procedure

### 6.2.1 The IVS marking check

The IVS marking is checked after carrying out each type of the system test for resistance to climatic loads specified in table 3.

The IVS specimen is considered to stand the check, if after the carrying out each type of the system test specified in table 3 its marking comply with GOST R 54620 (Section 19).

### 6.2.2 Test for resistance to low ambient temperature

6.2.2.1 The IVS workability check under low working ambient temperature equal to -40 °C is:

- connect the IVS workability-check scheme specified in figure A.2.
- put the IVS into the cold chamber.
- switch-on the IVS and check the system workability in compliance with clause 5.2.3.
- switch-off the IVS power-supply device.
- set temperature in the cold chamber down to -40 °C.
- switch-on the IVS power-supply device and check the system workability in compliance with clause 5.2.3.
- keep the IVS live for 3 hours, check the system workability periodically (each hour).
- after the last IVS workability check (in three hours) switch-off the power-supply device.
- raise temperature in the cold chamber up to its normal value (see clause 4.2) and hold the IVS in its off mode for 1 hour at this temperature.
- switch-on the IVS power-supply device and carry out the workability check in compliance with clause 5.2.3.
- take the IVS specimen from out the cold chamber and make is visual inspection.

The IVS is considered to stand the test for resistance to low working ambient temperature equal to -40 °C, if mechanical defects of the IVS case (cases of the IVS components), sockets and connecting cables are not available, and the IVS workability checks carried out during the test and after it are successful.

### 6.2.2.2 Check of the IVS resistance to low working ambient temperature equal to -40 °C

- connect the IVS workability-check scheme specified in figure A.2.
- put the IVS into the cold chamber.
- switch-on the IVS and check the system workability in compliance with clause 5.2.3.
- switch-off the IVS power-supply device.
- set temperature in the cold chamber down to -40 °C and hold the IVS under test in its off mode for 3 hours.
- raise temperature in the cold chamber up to its normal value (see clause 4.2), open the chamber and hold the IVS specimen under normal temperature for 1 hour.
- switch-on the IVS power-supply device and carry out the workability check in compliance with clause 5.2.3.

- take the IVS specimen from out the cold chamber and carry out its visual inspection.

The IVS is considered to stand the test for resistance to low temperature, if mechanical defects of the IVS case (cases of the IVS components), sockets and connecting cables are not available, and the IVS workability check (carried out after the test) is successful.

6.2.2.2a When the IVS is powered from a backup battery, the tests as per 6.2.2.1 and 6.2.2.2 should be carried out at a decreased ambient operating temperature equal to minus 20 °C, and the minimum ambient operating temperature that ensures the operational condition of the IVS should be recorded after evaluating it using the test technique specified in 5.2.3.

**(Amended Wording, Amendment No. 1).**

6.2.2.3 The IVS is considered to stand the test for resistance to low ambient temperature, if the tests carried out in compliance with clauses 6.2.2.2 and 6.2.2.1 are successful.

**6.2.3 Test for resistance to high ambient temperature**

6.2.3.1 Check of the IVS workability under high working ambient temperature equal to 85 °C:

- connect the scheme of the IVS workability check specified in figure A.2.
- put the IVS into the heat chamber.
- switch-on the IVS and check the system workability in compliance with clause 5.2.3.
- switch-off the IVS power-supply device.
- set temperature in the heat chamber up to 85 °C.
- switch-on the IVS power-supply device the IVS and check the system workability in compliance with clause 5.2.3.
- hold the IVS live for 3 hours, check the system workability periodically (every hour).
- after the last IVS workability check (in three hours) switch-off the IVS power-supply device.
- lower temperature in the heat chamber down to its normal value (see clause 4.2) and hold the IVS in its off mode for 1 hour at this temperature.
- switch-on the IVS power-supply device and carry out workability check in compliance with clause 5.2.3.

- take the IVS specimen out of the heat chamber and carry out its visual inspection.

The IVS is considered to stand the test for resistance under high working ambient temperature equal to 85 °C, if mechanical defects of the IVS case (cases of the IVS components), sockets and connecting cables are not available, and IVS workability check carried out during the test and after the test is successful.

6.2.3.2 Check of the IVS resistance to high working ambient temperature equal to 85 °C:

- connect the scheme of the IVS workability check specified in figure A.2.
- put the IVS into the heat chamber.
- switch-on the IVS and check the system workability in compliance with clause 5.2.3.
- switch-off the IVS power-supply device.
- set temperature in the heat chamber equal to 85 °C and hold the IVS in its off mode for 3 hours.
- lower temperature in the heat chamber down to 50 °C and temper the IVS for 2 hours.
- switch-on the IVS power-supply device. Carry out workability check of the IVS specimen in compliance with clause 5.2.3.
- switch-off the IVS power-supply device.
- lower temperature in the heat chamber down to its normal value (see clause 4.2), open the chamber, temper the IVS under normal temperature for 1 hour.
- switch-on the power-supply device. Carry out the IVS workability check in compliance with clause 5.2.3.

- take the IVS from out the heat chamber and carry out its visual inspection.

The IVS is considered to stand the test for resistance under high working ambient temperature equal to 85 °C, if mechanical defects of the IVS case (cases of the IVS components), sockets and connecting cables are not available, and if the IVS workability check is successful.

6.2.3.3 The IVS is considered to stand the test for resistance to high ambient temperature, if the test carried out in compliance with clauses 6.2.3.2 and 6.2.3.1 is successful.

**6.2.4 Test for resistance to changes of ambient temperature**

6.2.4.1 The test is carried out to check the IVS resistance to cyclic change of ambient temperature in the given range of working temperatures established by GOST R 54620 (clause 13.2):

- from maximum low temperature equal to -40 °C;
- up to maximum high temperature equal to +85 °C.

6.2.4.2 The test for resistance to cyclic temperature change is carried out using double-section climatic (temperature-cycling) chambers. These chambers are made of cold-sections, heat-sections, and transportation devices transporting the specimens under test from one section to another.

*Note* — The test may be carried out using separate heat chambers and cold chambers. In this case, time of transporting the specimen from one climatic chamber to another shall not exceed 5 minutes.

6.2.4.3 Three cycles of temperature change shall be available during the test. Each cycle consists of two stages. At first, the IVS specimen is put into the cold climatic section and after that – into the heat climatic section. In each climatic chamber, the IVS specimen is tempered for 3 hours under maximum working temperature established in clause 6.2.4.1 for the considered section.

The chamber tempering time is counted from the moment of obtaining the required air temperature after putting the specimen into the chamber.

Time of transporting the IVS specimen from one climatic section into another shall not exceed 5 minutes.

6.2.4.4 Before the test:

- connect the scheme of the IVS workability check specified in figure A.2;
- switch-on the IVS and check the system workability in compliance with clause 5.2.3.

6.2.4.5 Check of the IVS resistance to changes of ambient temperature

- set the section environment-parameter values specified in clause 4.2 and corresponding to normal test conditions.

- put the IVS (in its off mode) into the cold section.
- lower the section temperature down to  $-40\text{ }^{\circ}\text{C}$  and hold it for 3 hours.
- move the IVS specimen to the heat section.
- raise the section temperature up to  $+85\text{ }^{\circ}\text{C}$  and hold the IVS for 3 hours.
- move the IVS specimen back to the cold section.

*Note* — Recommended rate of temperature change shall be no less than:

- $1\text{ }^{\circ}\text{C}/\text{min}$  — in the normal-temperature range specified in clause 4.2 down to  $-40\text{ }^{\circ}\text{C}$ ;
- $2\text{ }^{\circ}\text{C}/\text{min}$  — in the normal-temperature range specified in clause 4.2 up to  $+85\text{ }^{\circ}\text{C}$ .

6.2.4.6 The test procedure specified in clause 6.2.4.5 is repeated 3 times.

6.2.4.7 After carrying out the 3 test cycles specified in clauses 6.2.4.5 and 6.2.4.6, hold the IVS specimen under normal conditions (specified in clause 4.2) for 2 hours.

6.2.4.8 Take the IVS from out the chamber. Carry out its visual inspection and workability check in compliance with clause 5.2.3.

6.2.4.9 IVS is considered to stand the test for resistance to cyclic temperature change, if mechanical defects of the IVS case (cases of the IVS components), sockets and connecting cables are not available, and the IVS workability check is successful.

### **6.2.5 Test for resistance to humidity under high temperature during a constant mode**

6.2.5.1 The test is carried out to check compliance of the IVS with requirements for workability and resistance to air humidity. It is carried out under high ambient temperature established by GOST R 54620 (clause 13.2):

- relative air humidity is 95 %;
- ambient temperature is  $+40\text{ }^{\circ}\text{C}$ ;
- tempering time is 144 hours.

6.2.5.2 Check of the IVS workability and resistance to air humidity under high ambient temperature

- put the IVS into the humidity chamber.  
- check the IVS workability using the connection schemes (see figure A.2) and the check procedure specified in clause 5.2.3.

- switch-off the IVS power-supply device.

- raise temperature in the humidity chamber up to  $+40\text{ }^{\circ}\text{C}$  under relative air humidity equal to 95 %.

Tempering time of the IVS specimen under the specified conditions is 144 hours (6 days).

The IVS is switched-on periodically to provide its workability check in compliance with clause 5.2.3.

At the end of the last test cycle (equal to the established tempering time), switch-on the IVS power-supply device and carry out workability check in compliance with the product OD. After that, switch-off the IVS power-supply device.

Take the IVS from out the humidity chamber. Temper the IVS for no less than 2 hours under normal climatic conditions specified in clause 4.2. Check up the IVS specimen workability in compliance with check procedure specified in clause 5.2.3.

6.2.5.3 Evaluate corrosion defects of the IVS parts in compliance with GOST 9.311.

6.2.5.4 The IVS specimen is considered to stand the test, if its rating point evaluated in compliance with GOST 9.311 is no less than 8 and all the IVS workability checks are successful.

#### **6.2.6 Test for resistance to dust providing evaluation of the IVS protection degree in compliance with GOST 14254**

6.2.6.1 Test for resistance to dust is carried out to check compliance of the degree of protection (of the IVS from penetration of foreign bodies) with GOST R 54620, clause 13.2.3. This protection degree is characterized by the 1<sup>st</sup> figure of the IP code in compliance with GOST 14254:

- IP 52 – for all the components of the case modification of the IVS;
- IP 67 — only for gauges (of automatic identification of the traffic accidents) manufactured as the IVS independent component included in the IVS complete set in auxiliary equipment configuration of vehicles of M1 category.

6.2.6.2 Configuration of the test equipment, its characteristics and the main test conditions established by GOST 14254 (clause 14.2 and table 8) provide compliance check of the IVS protection degree specified in clause 6.2.7.1.

6.2.6.3 Before the test, carry out visual inspection of all the IVS components (blocks) and the IVS workability check in compliance with clause 5.2.3.

6.2.6.4 Put the IVS (in its off mode) into the dust chamber. Distance between the blocks and the chamber walls and between the neighboring blocks (when several blocks are tested simultaneously) shall be no less than 10 cm.

6.2.6.5 The test is carried out in compliance with GOST 14254 (clause 13.4). Pressure within the IVS components (shells of the 2<sup>nd</sup> category specified in GOST 14254) shall be no less than pressure of the environment containing abrasive non-conductive dust under the following conditions:

- air temperature is 35 °C ( $\pm 2$ );
- relative air humidity is no more than 60 %;
- air-dust concentration is 1.4 g/m<sup>3</sup> ( $\pm 1$ ) (or 0.1 % of the working volume of the chamber);
- air circulation speed is from 10 to 15 m/s.

6.2.6.6 After the test, temper the IVS within the chamber for 1 hour to provide dust deposition without air circulation. After that, take the IVS from out the chamber, remove the dust deposit, and carry out the IVS visual inspection. Damage of the IVS paint-and-varnish coating shall not be available.

Check the IVS workability in compliance with clause 5.2.3.

6.2.6.7 Evaluate the test results obtained for the IVS blocks with IP 52 protection degree in compliance with GOST 14254. The IVS blocks (components) are considered to stand test, if:

- after the test, damages of the paint-and-varnish coating are not available;
- after opening the IVS, dust deposit on internal surfaces of cases and printed-circuit boards is negligible;

- all the IVS workability checks carried out in compliance with 6.2.6.6 are successful.

6.2.6.8 Evaluate the test results obtained for the IVS blocks with IP 67 protection degree in compliance with GOST 14254. The IVS blocks (components) are considered to stand test, if:

- after the test, damages of the IVS paint-and-varnish coating are not available;
- after opening the IVS blocks, traces of dust penetration on internal surfaces of cases and printed-circuit boards are not available;

- all the IVS workability checks carried out in compliance with clause 6.2.6.5 are successful.

#### **6.2.7 Water-resistance test providing evaluation of the IVS protection degree in compliance with GOST 14254**

6.2.7.1 Water-resistance test is carried out to check compliance of the IVS degree of protection (established by GOST R 54620, clause 13.2.3) from penetration of foreign bodies (characterized the 2<sup>nd</sup> figure of the IP code) with GOST 14254:

- IP 52 — for all components of the IVS in its case modification;
- IP 67 — only for gauges (of automatic identification of traffic accidents) manufactured as independent IVS components and included in the auxiliary equipment configuration of vehicles of M1 category.

6.2.7.2 Configuration of test equipment, its characteristics and the main test conditions providing check of the IVS protection degree specified in clause 6.2.7.1 shall comply with GOST 14254 (clause 14.2 and table 8).

6.2.7.3 Before the test, carry out visual inspection of all the IVS components (blocks) and the IVS workability check in compliance with clause 5.2.3.

6.2.7.4 The IVS water resistance is checked using its off mode.

6.2.7.5 Water-resistance test is carried out to check the IVS protection degree:

- for IVS components with IP 52 protection code – in compliance with GOST 14254 (clause 14.2.2);
- for IVS components with IP 67 protection code — in compliance with GOST 14254 (clause

14.2.7).

6.2.7.6 After the test, check the IVS workability in compliance with clause 5.2.3. Then open the IVS blocks under test and check them for water resistance.

**Note** — During the test, water vapors (available within the IVS blocks under test) may partially condense into water. The accumulating condensate shall not be considered as water infiltrating into the shell from outside during the test.

6.2.7.7 The IVS blocks (components) are considered to stand test, if the water infiltrated from the outside into the shell does not lead to the IVS failure.

**Note** — If drainage holes (stipulated by the manufacturer and specified in the OD) are available in separate blocks (components) of the IVS, then it shall be checked (by visual inspection) that infiltrating water does not accumulate inside and it may be drained without delay through the specified holes without damaging the specified IVS blocks (components).

## 7 Testing the in-vehicle emergency call system/device for compliance with the established requirements for resistance to mechanical loads

### 7.1 Test volume and test conditions

7.1.1 The test of the IVS for compliance with the established requirements for resistance to mechanical loads includes the test for the IVS workability and resistance to corresponding mechanical loads.

7.1.2 The list and order of tests aimed to verify that the in-vehicle emergency call system/device complies with the requirements of mechanical strength under exposures established in [3 (Appendix 10, clause 118)] and GOST R 54620 (clause 13.3.1) are specified in Table 5.

**(Amended Wording, Amendment No. 1).**

Table 5

Check name	Clause No., figure No.
OD completeness check	5.2.1
IVS completeness check	5.2.2
IVS marking check	7.2.1
Check of the IVS workability under sinusoidal vibration	7.2.2, figure A.2
Check of the IVS resistance to sinusoidal vibration	7.2.3, figure A.2
Check of the IVS workability under multiple mechanical shocks	7.2.4, figure A.2
Check of the IVS resistance to multiple mechanical shocks	7.2.5, figure A.2
Check of the IVS workability under single mechanical shocks* (acceleration is 75g)	7.2.6, figure A.2
Check of the IVS resistance to mechanical shocks during transportation	7.2.7, figure A.2
Check of the IVD resistance to overloads in front collision of vehicle	7.2.8
<p>* The tests are carried out for in-vehicles emergency call systems manufactured in auxiliary equipment configuration.</p> <p><b>Notes</b></p> <p>1 The test (check) sequence specified in table 5 may be changed.</p> <p>2 The IVS marking check for compliance with the established requirements is carried out after each type of the test specified in table 5.</p>	

**(Amended Wording, Amendment No. 1).**

7.1.3 The test climatic conditions are specified in clause 4.2.

7.1.4 Configuration of the test equipment and the test auxiliaries is specified in table 6.

Table 6

Equipment name	Required specifications of devices and the equipment
Shaker	Frequency range is from 10 to 100 Hz; Maximum vibration-acceleration amplitude is no less than $98 \text{ m/s}^2$ (10g); Tolerance of vibration-acceleration amplitude is no more than $\pm 2 \text{ m/s}^2$ (0.2g)
Multiple-shock installation	Shock-impulse duration is no less than 5 ms; Number of shocks per minute is from 40 to 80; Peak shock acceleration is from $49 \text{ m/s}^2$ (5g) to $250 \text{ m/s}^2$ (25g)
Shock installation	Single shocks; peak shock acceleration is up to 100g
The IVS adjustment and control bench	See figure A. 1
<p>Note — The list and specifications of test equipment used to test the resistance of the in-vehicle emergency call device to overloads taking place in front collisions of the vehicles (see 7.2.8) shall correspond to GOST R 55530 (clause 5.4.2) and UNECE Regulation [5 (Section 6)]</p>	

7.1.5 The IVS specimens shall be installed on the shock platform (vibration bench) in accordance with the instructions included in the vibration bench documentation and in the IVS installation and setup guide taking into account the requirements of GOST 30630.0.0 (section 5).

As a rule, the IVS is secured on the shock platform (vibration bench) using fastenings from the IVS delivery set. Given this, the methods used IVS to secure the abovementioned test equipment on the platform shall not result in a stronger fastening compared to the one when the IVS is installed on the vehicle.

Note – If technically feasible, a mounting plate as per GOST R 55532 (clause 3.1.7 and table 3) is recommended for the IVS mounting on the shock platform (vibration bench).

**(Amended Wording, Amendment No. 1).**

**7.2 Test procedure**

**7.2.1 The IVS marking check**

The IVS marking is checked after carrying out each type of the system test for resistance to the mechanical loads specified in table 5.

The IVS specimen is considered to stand the check, if after carrying out each type of the test specified in table 5 its marking comply with GOST R 54620 (Section 19).

**7.2.2 Check of the IVS workability under sinusoidal vibration**

7.2.2.1 The test is carried out using 3 mutually perpendicular positions.

7.2.2.2 Carry out visual inspection and to fix the IVS specimen on the shaker platform using one of the 3 mutually perpendicular positions.

7.2.2.3 Using the specified connection schemes (see figure A.2), check the system workability in compliance with clause 5.2.3.

Load the IVS (in its switch-on condition) with vibration using the following parameters:

- frequency range is from 10 to 70 Hz;
- acceleration amplitude,  $\text{m/s}^2$  —  $39.2$  (4g);
- load duration is 30 minutes.

Sweep vibration frequency smoothly in the given range and expose the structure resonances.

During the test, check the IVS workability periodically in compliance with clause 5.2.3.

The IVS shall be efficient. Error messages shall not be available.

**(Amended Wording, Amendment No. 1).**

7.2.2.4 After the test, check the IVS workability in compliance with clause 5.2.3.

Switch-off the IVS power-supply device.

7.2.2.5 Change the IVS position on the shaker platform. Repeat the procedure specified in clauses 7.2.2.3 and 7.2.2.4 for the remained 2 mutually perpendicular positions.

7.2.2.6 The IVS is considered to stand the test for resistance to sinusoidal vibration, if mechanical defects of the IVS case (cases of components, sockets and connecting cables) are not available, and the IVS workability checks carried out during the test and after the test are successful.

**7.2.3 Check of the IVS resistance to sinusoidal vibration**

7.2.3.1 The test is carried out using 3 mutually perpendicular positions.

7.2.3.2 Carry out the IVS visual inspection and fix the specimen on the shaker platform in one of the 3 mutually perpendicular positions.

7.2.3.3 Using the connection schemes (see figure A.2), check the system workability in compliance with clause 5.2.3.

7.2.3.4 The IVS vibration strength is checked using a switched-off power-supply device and the following vibration parameters:

- frequency range, Hz, is from 10 to 70;
- acceleration amplitude,  $m/s^2$ , is 49 (4g);
- load duration is 160 minutes.

During the test, sweep oscillation frequency periodically up and down the established range.

**(Amended Wording, Amendment No. 1).**

7.2.3.5 Remove the IVS from the shaker platform. Carry out its visual inspection. Carry out the IVS workability check in compliance with clause 5.2.3.

7.2.3.6 Change the IVS position on the shaker platform and repeat the test procedure specified in clauses 7.2.3.4 and 7.2.2.5 for the 2 remained mutually perpendicular positions.

7.2.3.7 The IVS is considered to stand the test for resistance to sinusoidal vibration, if mechanical defects of the IVS case (cases of the IVS components), sockets and connecting cables are not available, and the IVS workability check carried out after the test is successful.

**7.2.4 Check of the IVS workability under multiple mechanical shocks**

7.2.4.1 The IVS workability under multiple mechanical shocks is checked using its switched-on condition.

The shocks are applied to the IVS in each of the 3 mutually perpendicular positions. The shock parameters are:

- peak shock acceleration is  $98 m/s^2$  (10g);
- shock frequency is no more than 80 shocks/minute;
- shock duration is from 5 to 15 ms (10 ms is preferable);
- number of shocks in each direction is 333 (total number of shocks is 1000).

7.2.4.2 Carry out the IVS visual inspection and fix the IVS in a special device on the shaker platform in one the remained positions.

7.2.4.3 Using the connection schemes (see figure A.2), check the IVS workability in compliance with clause 5.2.3.

7.2.4.4 Apply mechanical shocks to the IVS. The shock parameters are specified in clause 7.2.4.1.

7.2.4.5 During the test, check the IVS periodically in compliance with clause 5.2.3.

The IVS shall remain efficient. Error messages shall not be available.

7.2.4.6 After the test, check the IVS workability in compliance with clause 5.2.3.

Switch-off the IVS power-supply device.

7.2.4.7 Change position of the IVS on the shock platform. Repeat the test procedure specified in clauses from 7.2.4.3 to 7.2.4.5 for the remained 2 mutually perpendicular positions.

7.2.4.8 Remove the IVS from shock platform. Carry out its visual inspection and workability check in compliance with clause 5.2.3.

7.2.4.9 The IVS is considered to stand the check for resistance to multiple mechanical shocks, if after the test mechanical damages, damages of paint-and-varnish coating, loosening of fixed IVS components are not available and all the workability checks are successful.

**7.2.5 Check of the IVS resistance to multiple mechanical shocks**

7.2.5.1 The IVS test is carried out using 3 mutually perpendicular positions.

7.2.5.2 Carry out the IVS visual inspection and fix the specimen on the platform of the mechanical shock installation in one the 3 mutually perpendicular positions.

7.2.5.3 Using the connection schemes (see figure A.2), check the system workability in compliance with clause 5.2.3.

7.2.5.4 The IVS resistance to multiple mechanical shocks is checked in its off mode using the following shock parameters:

- peak shock acceleration is  $98 \text{ m/s}^2$  (10g);
- shock frequency is no more than 80 shocks/minute;
- shock duration is from 5 to 15 ms (10 ms is preferable);
- number of shocks in each direction is 3333 (total number of shocks is 10000).

7.2.5.5 Remove the IVS from the mechanical shock installation, carry out its visual inspection and workability check in compliance with clause 5.2.3.

7.2.5.6 to Change the position of the IVS mounted on the mechanical shock installation and repeat the test procedure specified in clauses from 7.2.5.3 to 7.2.5.5 for the remained 2 mutually perpendicular positions.

7.2.5.7 The IVS is considered to stand the check for resistance to multiple mechanical shocks, if after the test the IVS mechanical damages, damages of its paint-and-varnish coating, and loosening of the IVS components is not available, and all the workability checks are successful.

#### **7.2.6 Check of the IVS workability under single mechanical shocks with acceleration equal to 75g**

7.2.6.1 Carry out the IVS visual inspection and fix it on the platform of mechanical shock installation using a special fixing device simulating real fastening conditions of the vehicle.

7.2.6.2 Using the connection schemes (see figure A.2), check the IVS workability in compliance with clause 5.2.3.

7.2.6.3 Load the IVS (in its switched-on condition) using 3 mechanical single shocks with peak shock acceleration equal to  $735 \text{ m/s}^2$  (75g). Duration of the shock with the given acceleration is from 1 to 5 ms (3 ms is preferable).

7.2.6.4 Remove the IVS from the mechanical shock installation, carry out visual inspection of its fixing device and workability check in compliance with the established acceleration-gauge check procedure.

7.2.6.5 The IVS is considered to stand the test for resistance to single mechanical shocks with acceleration equal to 75g, if after the check the IVS mechanical damages, loosening of fixing devices of the IVS components are not available and all the workability checks are successful.

#### **7.2.7 Check of the IVS resistance to mechanical shocks during transportation**

7.2.7.1 The test is carried out to check compliance of the IVS with GOST R 54620 (clause 13.3.1, table 12) and GOST 16019 (table 2, clause 8) that establish requirements for resistance to mechanical shocks of transported packed products.

7.2.7.2 The test is carried out using 3 mutually perpendicular positions of the IVS.

7.2.7.3 Carry out the IVS visual inspection and fix the packed IVS on the platform of the mechanical shock installation.

Load the IVS with mechanical shocks in each of the 3 mutually perpendicular positions with peak shock acceleration equal to  $250 \text{ m/s}^2$  (25g). Duration of shock acceleration is from 5 to 10 ms (6 ms is preferable). Number of shocks in each position is 4000. Shock frequency is no more than 80 shocks per minute.

7.2.7.4 Remove the packed IVS from the platform of the mechanical shock installation and check the packing. The packing shall not be damaged.

7.2.7.5 Remove the IVS from out its packing and carry out the IVS visual inspection. Damages of the IVS cases and external connectors shall not be available.

7.2.7.6 Check the IVS workability in compliance with clause 5.2.3.

7.2.7.7 The IVS is considered to stand the test for resistance to mechanical shocks during transportation, if after the test mechanical damages of the packing box (storage container) and the IVS itself are not available and the system workability check is successful.

#### **7.2.8 Check of the IVD resistance to overloads in frontal collision of vehicle**

7.2.8.1 The test is carried out to check compliance of the IVD with the requirements established in the Technical Regulation [3 (Appendix 10, clause 118)] and GOST R 54620 (clause 13.3.2a) in regard to capability of the device and its anchorage on the vehicle to withstand the loads taking place in frontal vehicle collisions, to be verified in accordance with the UNECE Regulation [5].

During the said tests, the IVD installation on the vehicle is also checked against the requirements of [3 (Appendix 3, clause 1b)] and of [3 (Appendix 10, clause 118)] in part of requirements related to the device functioning after an RTA.

7.2.8.2 The IVD tests are carried out in accordance with the procedure described in UNECE Regulation [5 (section 6)], subject to the following conditions:

- a) test method: bench tests involving the simulation of impact action taking place in front collisions of vehicles, in accordance with [5 (Annex 7, clause 1)];
- b) impact action characteristics:
  - 1) impact direction - horizontal longitudinal;
  - 2) acceleration profile - as per [5 (Addendum to Annex 9)];
- c) testing facilities – test truck with the vehicle body affixed on it, in accordance with the requirements of [5 (Annex 7, clause 1)].

*Note* — The test truck as per UNECE Regulation [6 (clause 2.16)] is testing equipment manufactured and used in order to reproduce RTA dynamics in case of frontal collisions;

- d) instruments for measurements of impact action properties – in accordance with the requirements of [5 (Annex 7, clause 1)];
- e) mandatory availability of electric power supplied to the vehicle body, of a voltage corresponding to the rated voltage of the vehicle intended for equipping with the IVD under test;
- f) IVD activation upon the impact action shall be initiated by pressing the "Emergency call" button.

7.2.8.3 Prior to the bench tests as per 7.2.8.4 — 7.2.8.15, the checks described in 5.2.1 and 5.2.2 shall be completed successfully.

7.2.8.4 Carry out the external examination and secure the IVD on the vehicle body (see 7.2.8.2, item c) taking into account the requirements of 7.1.5.

7.2.8.5 Assemble the IVD test circuit based on the connection diagram for IVD components given in GOST R 55530 (Appendix A).

7.2.8.6 After power is provided and the ignition is turned on, check that the IVD self-diagnostic procedure completed successfully in accordance with GOST R 54620 (clause 6.17).

*Note* — The scope of and requirements for IVD diagnostics are defined in GOST R 54620 (subsection 7.6).

7.2.8.7 Switch the IVD to Test Mode in accordance with instructions of the operating documents for the device under test, and test the IVD functioning in accordance with GOST R 55530 (subsection 6.9).

7.2.8.8 Following instructions of the operating documents for the IVD, make sure that the device under test is in ERA Mode after the IVD functional test is complete (see GOST R 54620 (section 7)).

7.2.8.9 Turn on the vehicle audio system simulator included in the bench which is described in GOST R 55530 (Appendix A) and configure it for playback of the sound program.

*Note* — Depending on technical capabilities, the sound program may be reproduced either using the radio module, or from an optical medium used for storage of digital audio recordings.

7.2.8.10 Check that the interface for viewing the received RTA results is configured on the side of the ERA-GLONASS System emulator.

7.2.8.11 Using the test truck, expose the IVD secured on the vehicle body to a single mechanical shock of parameters corresponding to 7.2.8.2, item b).

*Note* — The IVD shall be on during the tests.

7.2.8.12 Carry out the external examination of all IVD components installed on the vehicle body and of their fastenings, checking them for any mechanical damages or breakage (loosening) of the fastenings. Include the inspection results in the test report.

7.2.8.13 Initiate the emergency call by pressing the "Emergency call" button and using the techniques described in GOST R 55530 (clauses 6.19 and 6.20), then check the IVD functioning after the RTA in regard to possible transmission of MSD packets and provision of duplex voice communication.

7.2.8.14 During the checks as per 7.2.8.13, make sure that the following holds true:

a) sound reproducing devices included in the standard vehicle configuration switch off during the emergency call;

b) while transferring the MSD message in "Emergency call" mode, the IVD has notified the persons occupying the vehicle compartment (cabin) on the MSD transfer, using the optical IVD status indicator or by playback of a relevant sound signal or voice message, as required in GOST R 54620 (subsection 7.5.3.6);

c) after the MSD transfer and prior to connecting the voice channel, the IVD has notified the persons in the vehicle compartment (cabin) that the connection of the voice channel is to be established, by playback of a relevant sound signal or voice message, as required in GOST R 54620 (subsection 7.5.3.7);

d) after connecting the voice channel, the IVD has reported that to the persons present in the vehicle compartment (cabin) using the optical IVS status indicator, in accordance with the requirements of GOST R 54620 (subsection 7.5.3.8);

e) during the dial-up initiated using the ERA-GLONASS emulator UI (within the communication session established upon manual actuation of the device under test), the IVD has notified the persons present in the vehicle cabin on such dialling, either using the optical IVD status indicator, or by playback of a relevant sound signal or voice message, as required in GOST R 54620 (subsection 7.5.3.5).

7.2.8.15 After the check as per item d) of 7.2.8.14, one of the testers shall occupy a place in the vehicle compartment, and perform a duplex voice communication with the other tester who is located next to the ERA-GLONASS emulator and is simulating actions of the emergency service operator in order to check that the vehicle (in regard to the IVD installation) and the IVD conform to the requirements of the Technical Regulation [3 (Appendix 3, clause 1b and Appendix 10, clause 118)].

7.2.8.16 Include the results of the tests as per 7.2.8.4 — 7.2.8.15 in the test report.

7.2.8.17 The in-vehicle emergency call device shall be deemed to have passed the tests for stability to overloads in vehicle collisions if no mechanical damages of the IVD and no loosening (breakage) of fastenings securing IVD components to the vehicle body have been observed, and all functional tests have completed successfully.

7.2.8.18 The recommended practice is to combine the IVD tests against the requirements of 7.2.8.1 with the tests of vehicle conformity to the requirements of UNECE Regulation [5] carried out during the type approval of the vehicle category intended for installation of the IVD, in accordance with [3].

*Note* — The decision on possible completion of the above tests in combination shall be agreed with the vehicle manufacturer and the certification body responsible for vehicle type approval activities.

7.2.8.19 If the combined tests described in 7.2.8.18 are carried out, and the vehicle manufacturer, following [5 (clause 6.3.5)], takes a decision that the vehicle is to be tested against the requirements of UNECE Regulation [5] using the in-situ test method (collision of the whole vehicle in service order with an immobile obstacle) as detailed in [5 (Annex 7, clause 2)], then the IVD conformity to the requirements listed in 7.8.2.1 may be verified during the said in-situ tests of the vehicle.

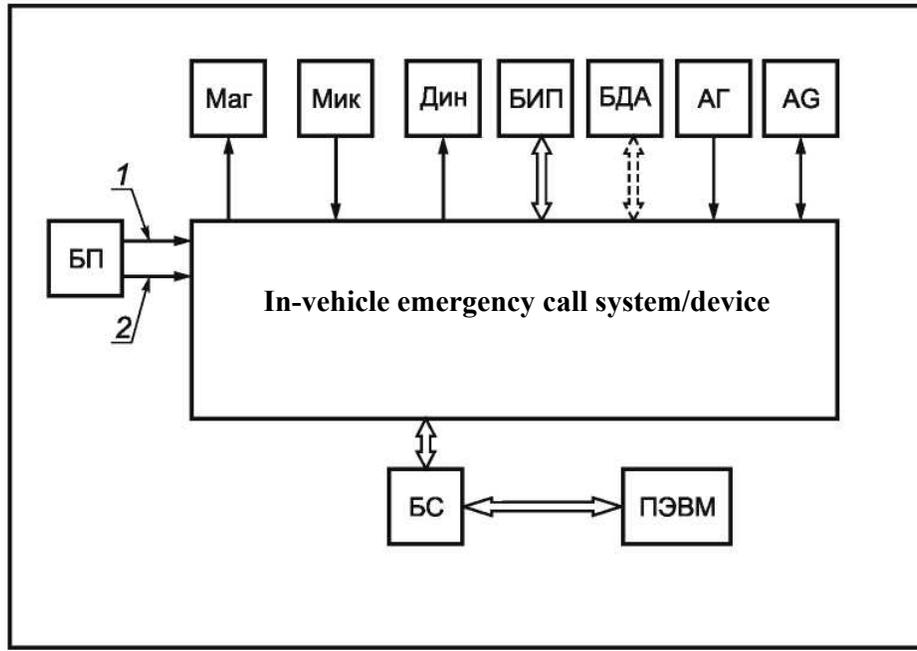
7.2.8.20 The inspection procedures during the in-situ tests of 7.2.8.19 shall meet to the requirements of 7.2.8.4 — 7.2.8.15.

7.2.8.21 The IVD test method (bench tests or in-situ tests) shall be reflected in the test report.

7.2.8 to 7.2.8.21 (**Subsequently Inserted, Amendment No. 1**).

**Appendix A**  
(*Obligatory*)

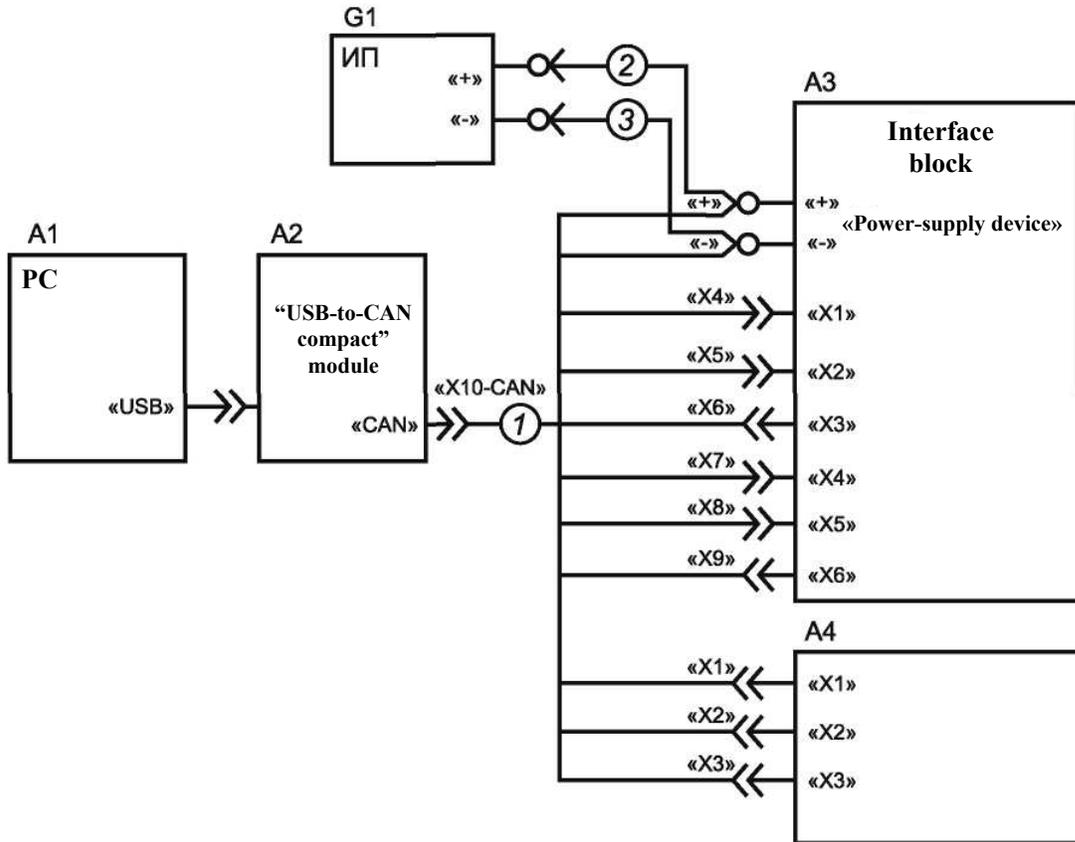
**Block diagrams of test benches and connection units  
for testing the in-vehicle emergency call system/device**



Маг — radio-recorder; Мик — microphone; Дин — dynamic speaker; БИП — user-interface block;  
БДА — failure-gauge block; АГ — *GLONASS* antenna; АГ — GSM antenna; БП — power unit (12/24 V);  
БС — interface block; ПЭВМ — test PC; 1 — power-supply cable; 2 — ignition circuit

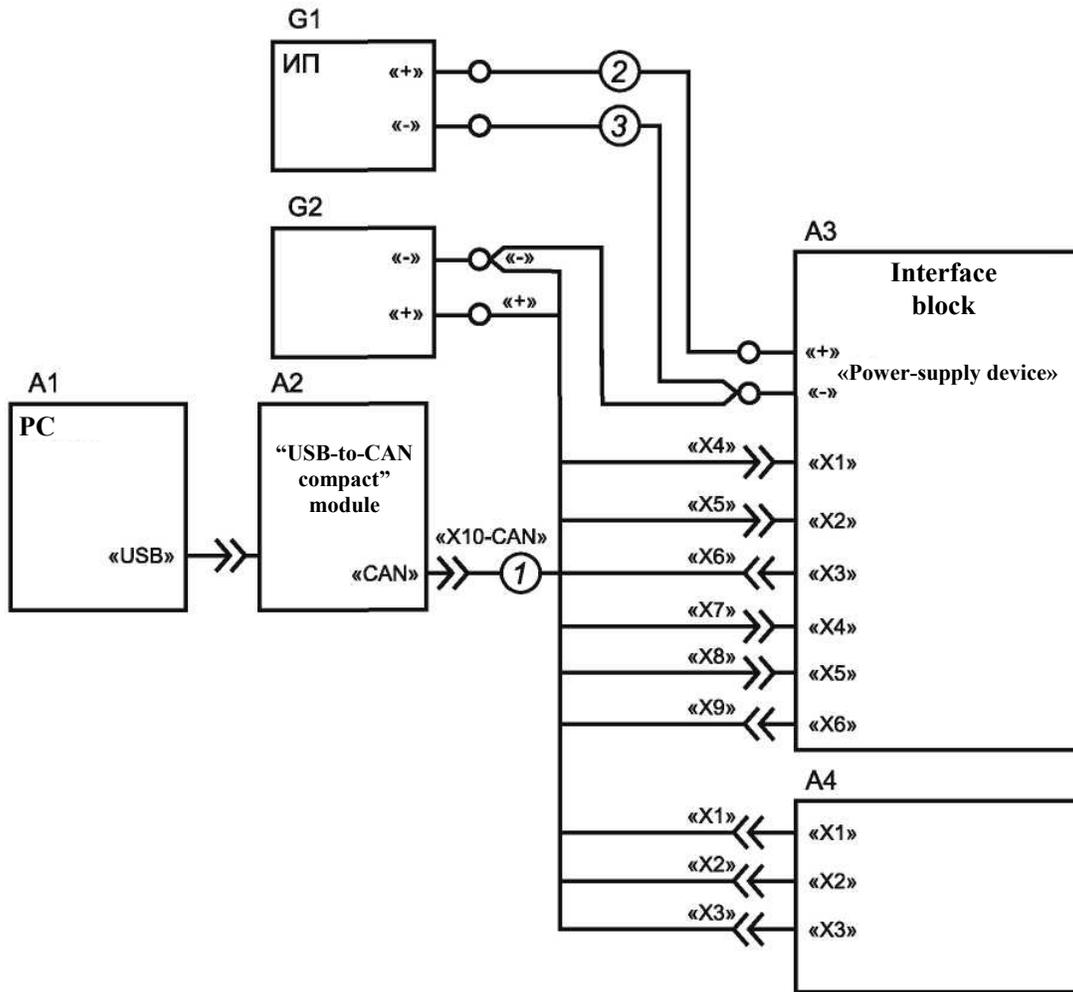
Fig. A.1 — General scheme of the IVS connection

**(Amended Wording, Amendment No. 1).**



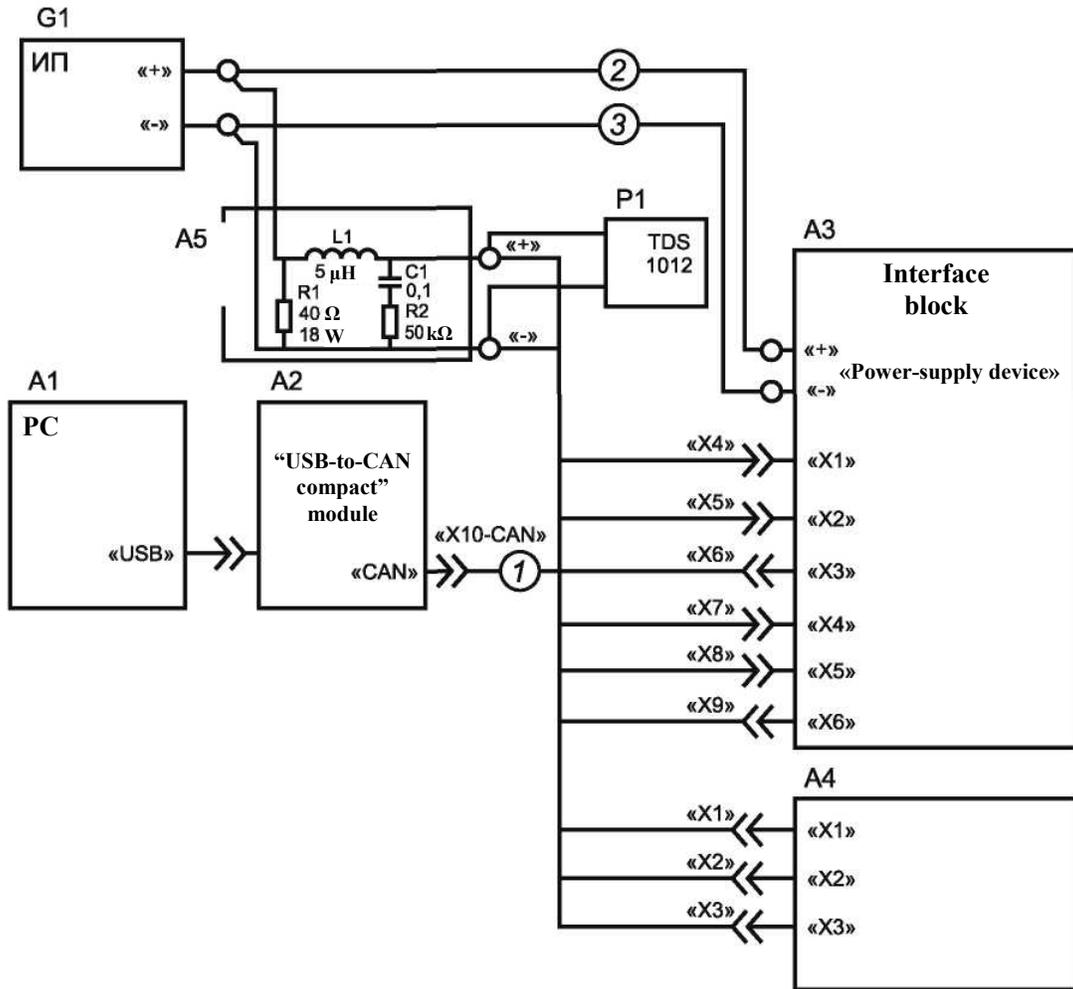
A1 — PC; A2 — “USB-to-CAN” module; A3 — interface block; A4 — the IVS under test;  
 G1 — power-supply device; 1 — cable; 2, 3 — ML-4G wire

Fig. A.2 — Connection scheme of the IVS workability check



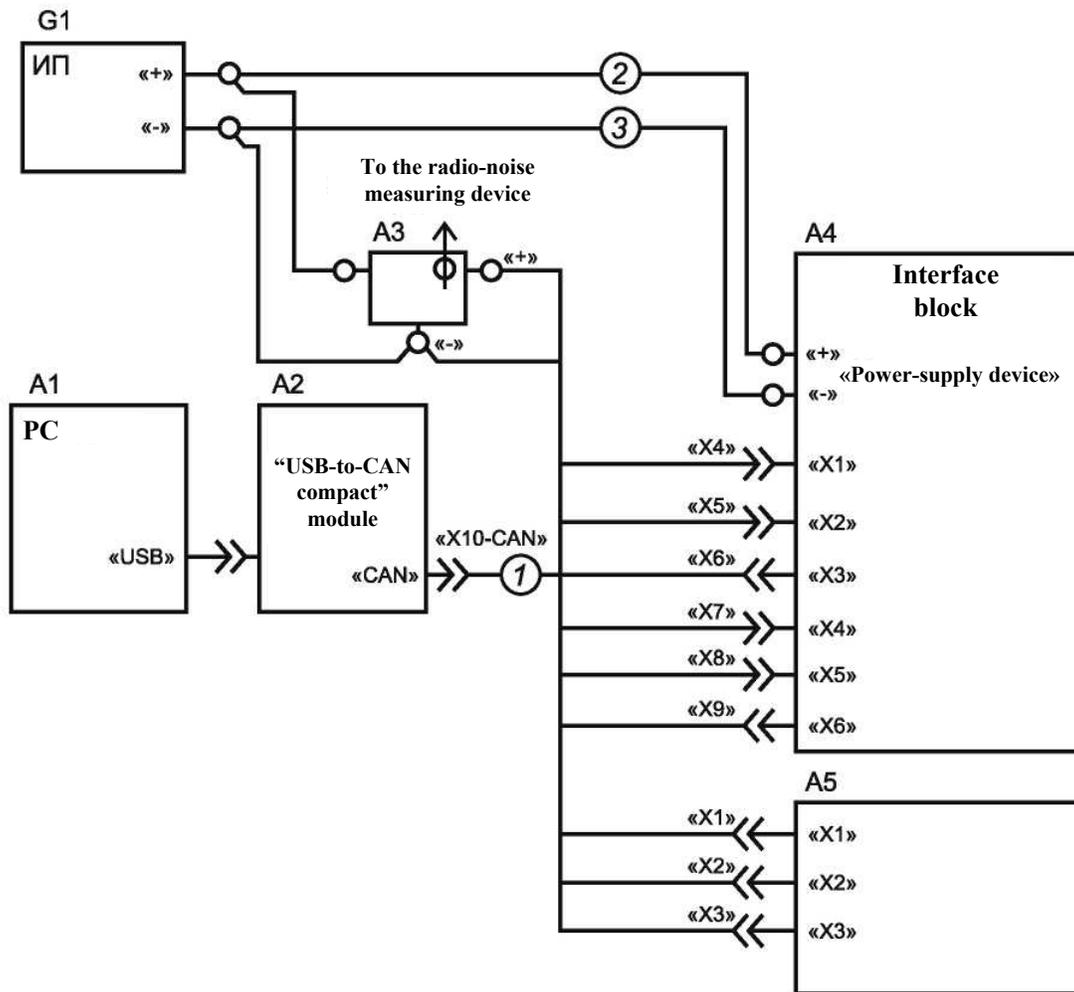
A1 — PC; A2 — “USB-to-CAN” module; A3 — interface block; A4 — the IVS under test;  
 G1 — power-supply device; G2 — test generator of pulse noise in the onboard network of the vehicle;  
 1 — cable; 2, 3 — ML-4G wire

Fig. A.3 — Connection scheme of the IVS test for resistance to conductive noise of power circuits



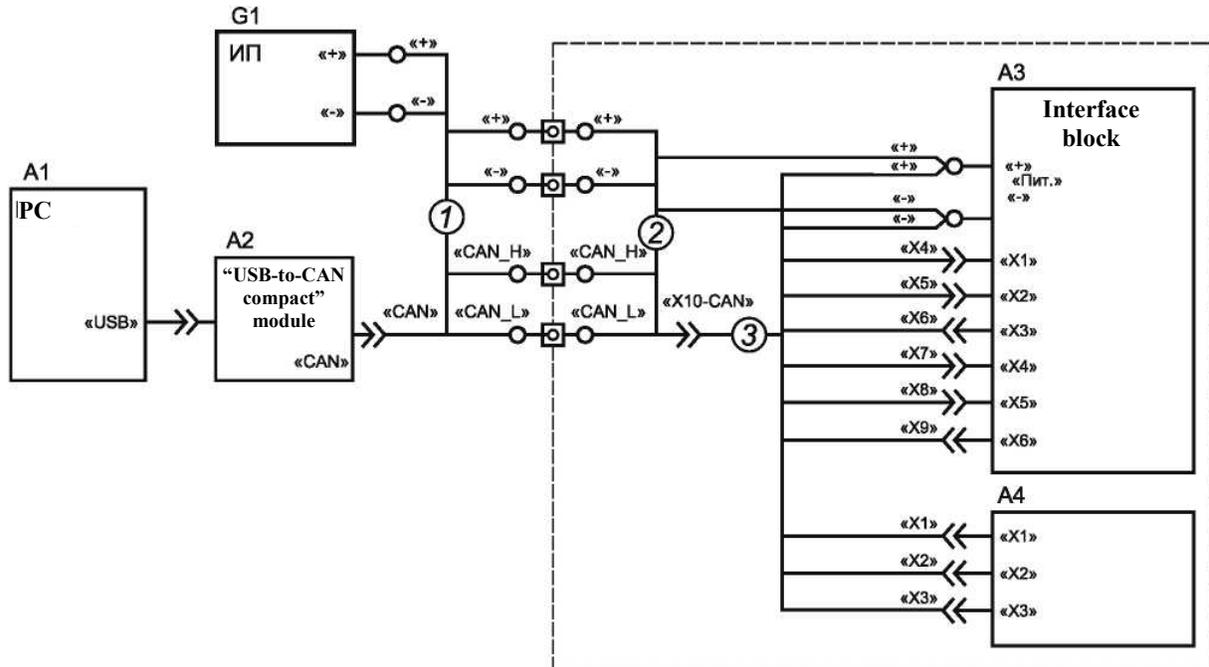
A1 — PC; A2 — «USB-to-CAN» module; A3 — interface block; A4 — the IVS under test; A5 — the onboard-network equivalent; G1 — power-supply device; L1 — 5-A air-core inductance coil; P1 — oscilloscope; 1 — cable; 2, 3 — ML-4G wire

Fig. A.4 — Connection scheme of the IVS check for self-generated noise level in power circuits



A1 — PC; A2 — USB-to-CAN module; A3 — V-type network equivalent specified by GOST R 51319;  
 A4 — interface block; A5 — the IVS under test; G1 — power-supply device; 1 — cable; 2, 3 — ML-4G wire

Fig. A.5 — Connection scheme for measuring voltage and intensity of radio noise generated by the IVS



A1 — PC; A2 — “USB-to-CAN” module; A3 — interface block; A4 — the IVS under test;  
 G1 — power-supply device; 1 — CAN-OUT cable; 2 — CAN-IN cable; 3 — cable

Fig. A.6 — Connection scheme for check of the IVS resistance to electromagnetic radiation

**Bibliography**

- [1] Rule of the UN Economic Commission for Europe No. 10 “Uniform instructions for official approval of vehicles regarding their electromagnetic compatibility
- [2] Inter-industrial occupational-safety rules for operating electric installations [*ИОТПМ-016—2001 (ПД 153-34.0-03.150—00)*], approved by Decree No. 3, dated 05.01.2001, of the Ministry of Labor of the Russian Federation, and by Order No. 163, dated 27.12.2002, of the Ministry of Energy of the Russian Federation.
- [3] Technical Regulation of the Customs Union "On Safety of Wheeled Vehicles" (TR CU 018/2011), approved by Decision No. 877 dated December 9, 2011 (in edition of the Council Decision No. 6 dated 30.01.2013, of the Eurasian Economic Commission)
- [4] UNECE Regulation No. 10-03 Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility
- [5] UNECE Regulation No. 17 Uniform provisions concerning the approval of vehicles with regard to the seats, their anchorages and any head restraints
- [6] UNECE Regulation No. 80 Uniform provisions concerning the approval of seats of large passenger vehicles and of these vehicles with regard to the strength of the seats and their anchorages
- [7] UNECE Regulation No. 94-01 Uniform provisions concerning the approval of vehicles with regard to the protection of the occupants in the event of a frontal collision, including Addenda 1-3
- [8] UNECE Regulation No. 95-02 Uniform provisions concerning the approval of vehicles with regard to the protection of the occupants in the event of a lateral collision, including Addendum 1

**(Amended Wording, Amendment No. 1).**

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UDC 621.396.931:006.354

ACS 33.020

Keywords: in-vehicle emergency call system/device, test, climatic loads, test methods, mechanical loads, test conditions, electromagnetic compatibility

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