



STANDARD OF KAZAKHTELECOM JSC

**RULES ON OCCUPATIONAL SAFETY AND HEALTH ON RADIO RELAY
COMMUNICATION LINES OF KAZAKHTELECOM JSC**

ST JSC 80429 - 1/035 – 2019

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Preface

- 1 ACTUALLY APPROVED** by the Department for Development of Regulatory and Technical Documents of the Administration of the Academy of Infocommunication Technologies, a branch of Kazakhtelecom JSC, jointly with the Operations Department
- 2 INTRODUCED** by the Operations Department
- 3 APPROVED AND PUT INTO EFFECT** by the Order of Kazakhtelecom JSC dated January 21, 2020 No. 12
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RULES ON OCCUPATIONAL SAFETY AND HEALTH ON RADIO RELAY COMMUNICATION LINES OF KAZAKHTELECOM JSC

1 Area of application

- 1.1 These Rules on occupational safety and health on radio relay communication lines (hereinafter - Rules) establish labor protection requirements obligatory for execution during design, organization and implementation of production processes, certain types of works, operation of production equipment of radio relay lines (hereinafter - RRL) and apply to equipment and personnel of operating, reconstructed and newly constructed radio relay stations (hereinafter - RRS), constituting radio relay communication lines.
- 1.2 Special work not stipulated in these Rules shall be conducted in accordance with the requirements of the applicable Occupational Safety and Health Rules relating to this work.
- 1.3 On the basis of these Rules and existing regulatory-legal acts on labor protection, taking into account specific conditions and specifics of production processes, heads of structural subdivisions of radio relay communication lines shall develop instructions on labor protection for employees for specific types of works. These instructions shall not contradict these Rules.

2 Regulatory references

In addition to this SO, the following regulatory documents are required in the work:

- 1) Labor Code of the Republic of Kazakhstan;
- 2) Collective agreement of Kazakhtelecom JSC;
- 3) Law of the Republic of Kazakhstan "On civil protection";
- 4) Interstate Standard GOST IES 60745-1-2011 "Electric hand-held machines. Safety and test methods. Part 1. General requirements";
- 5) GOST 12.4.011-89 (ST CMEA 1086-88) Occupational safety standards system. Means of protection of working people. General requirements and classification;
- 6) ST RK GOST R 12.4.026-2002 Safety colours, safety signs and signal marking. General technical conditions and order of application;
- 7) SNiP II-4-79 "Manual for calculation and design of natural, artificial and combined lighting";
- 8) SNiP RK 1.03.05-2001 "Occupational safety and health in construction";
- 9) Occupational Safety and Health Rules of Kazakhtelecom ST JSC 80429-1/008-2018;
- 10) Safety rules for working with tools and appliances;
- 11) Safety Rules for Operation of Consumers' Electrical Installations;
- 12) Rules on Technical Operation of Consumers' Electrical Installations;
- 13) Fire safety rules;
- 14) Rules and terms of training, briefing and knowledge tests on occupational safety and health of employees, Rules of training, briefing and knowledge tests of employees of Kazakhtelecom JSC on safety and health issues ST JSC 80429-1/009-2018;
- 15) Unified Tariff and Qualification Reference Book of Works and Professions of the Republic of Kazakhstan;
- 16) Rules for providing industrial safety in the operation of pressure equipment;
- 17) List of harmful production factors, occupations for which compulsory medical examinations are conducted;

- 18) Requirements to the premises and buildings of Kazakhtelecom JSC for placement of technological telecommunications equipment.

3 Terms and definitions

The following terms with their respective definitions shall be used in these Rules:

- 3.1 **Occupational safety:** State of employees' protection provided by a set of measures eliminating the impact of harmful and (or) hazardous production factors on employees in the course of their work activities.
- 3.2 **Earth electrode:** Conductor or a set of metallically connected conductors in contact with earth or its equivalent.
- 3.3 **Earthing device:** Collective of structurally connected earthing conductors and an earth electrode.
- 3.4 **Earthing conductor:** Conductor that connects the parts to be grounded to an earth electrode.
- 3.5 **Work Order:** A written task for work in an electrical installation, issued on a prescribed form and defining the content, place, time of start and end of work, conditions for its safe conduct, composition of the team and persons responsible for the safety of work and others.
- 3.6 **Work-related accident:** Exposure of an employee to a harmful and/or hazardous production factor in the performance of work (job) duties or tasks of the employer, resulting in an occupational injury, sudden deterioration of health or poisoning of the employee, resulting in temporary or permanent disability or death.
- 3.7 **Terminal radio relay station:** A radio relay station installed at the terminals of a radio relay communication line and designed to inject and isolate messages transmitted over the line. [GOST 24375-80].
- 3.8 **Occupational safety and health:** System for providing safety of life and health of employees during work activities, including legal, socio-economic, organizational and technical, sanitary and epidemiological, therapeutic and preventive, rehabilitation and other measures and means.
- 3.9 **Occupational sanitation:** A system of sanitary and hygienic, organisational measures and technical means preventing or reducing the impact of harmful production factors on employees.
- 3.10 **Intermediate radio relay station:** A radio relay station designed for retransmission of a radio signal transmitted over a radio relay communication line. [GOST 24375-80].
- 3.11 **Radio Relay Communication Line (Radio Relay Line):** A set of technical means and medium of radio signal propagation for the regulation of radio relay communication. [GOST 24375-80].
- 3.12 **Radio relay station:** A radio station used for radio relay communication. [GOST 24375-80]
- 3.13 **Order:** An order to conduct work in an electrical installation drawn up in the operating log by the person who gave the order or by the person who received the order verbally directly or by means of communication from the person who gave the order. The order shall specify: who issued the order, the place, content and time of the work, the category of work with respect to safety measures, a list of organizational and technical measures to provide the safety of the work, names and initials of the work head and team members and their qualification groups for electrical safety. In the operating log, the time when the order was given and the start and end of the work shall be noted.

- 3.14 **Routine operation:** The conducting of work by operational (operational and repair) personnel in the area assigned to them during a single shift.
- 3.15 **Technical inspector for labor protection:** An employee representative who exercises internal safety and health control.
- 3.16 **Nodal radio relay station:** A radio relay station designed to retransmit radio signals transmitted over a radio relay communication line, to branch off a radio relay communication line and isolate a portion of a transmitted message and introduce a new message. [GOST 24375-80].
- 3.17 **Electrical installation:** A set of machines, device, lines and auxiliary equipment (together with the structures and premises in which they are installed) designed for the production, conversion, transformation, transmission, distribution of electrical energy and its conversion into another form of energy.

4 Designations and abbreviations

AMS - antenna and mast structures;
JSC - Joint Stock Company;
EPG - Emergency Prevention Group;
EPS - Emergency Prevention Service;
DPS - diesel power plants;
NAS - Non-maintained amplifier station;
TRS - Terminal radio relay station;
EFD - energy flux density;
IRS - intermediate radio relay station;
TOR - technical operating rules;
RK - Republic of Kazakhstan;
RRS - radio relay station;
RRW - Radio Relay Workshop;
SG - switchgear;
UHF - ultra-high frequencies;
PPE - personal protective equipment;
SO - the standard of the organisation;
TNLN - technical node of the local network;
NRS - nodal radio relay station;
EMF - electromagnetic field.

5 General regulations

- 5.1 The organization work on safety and health on radio relay communication lines is assigned to employees and the head of the responsible department, who are responsible for compliance with current legislation on labor protection, compliance with rules, norms, instructions. The organization of current work on safety and health on radio relay communication lines is conducted in accordance with the current legislation.
- 5.2 Duties of persons responsible for safety and health at work shall be defined in accordance with the current SO "Rules on organization of work safety and labor protection in Kazakhtelecom JSC" ST JSC 80429-1/008-2018.
- 5.3 Employees guilty of violating/failure to comply with these Rules shall be subject to disciplinary action in accordance with the current legislation of the Republic of Kazakhstan.

- 5.4 Any employee who discovers a breach of these Rules or notices a fault in the equipment which poses a hazard to persons, or a defect or insufficient amount of protective equipment, shall immediately report it to their line head, and in their absence, to their head. If a fault is detected which poses a clear hazard to persons or equipment, the employee who detected the fault shall take measures to switch off the faulty equipment immediately and report this to their direct head. The fault shall be corrected in strict compliance with these Rules.
- 5.5 It is forbidden to conduct instructions of the head that are contrary to the Rules and that pose a clear hazard to people. An employee who has received such an order shall draw the attention of the head issuing the order to its contradiction to these Rules and, if the head fails to revoke the order, bring it to the attention of his/her head.
- 5.6 Responsibility for accidents occurring at work shall be borne both by persons responsible for the state of occupational safety and who have failed to provide occupational safety, who have failed to implement organisational and technical measures to prevent accidents, and by persons who have directly violated these Rules or occupational safety instructions.
- 5.7 In the event of accidents, the direct head shall be notified, a doctor shall be called and measures shall be taken to provide pre-medical assistance to the injured person.
- 5.8 Accidents occurring to employees at work shall be investigated, registered and recorded in accordance with applicable SO "Procedure for Work-related accidents to Labor Activities and Subject to Investigation at Kazakhtelecom JSC" ST JSC 80429-1/031-2018.
- 5.9 Employees of radio relay communication lines shall be provided with special clothing, special footwear and other personal protective equipment in accordance with the current SO "Regulations on providing special clothing, special footwear and personal protective equipment for employees of Kazakhtelecom JSC" ST JSC 80429-1/016-2018.

6 Requirements for technical personnel

- 6.1 Persons at least 18 years of age, who have passed a medical examination, have been trained in safe work methods, have checked their knowledge of labor safety requirements, have electrical safety group III or higher and have relevant qualification according to the current Uniform Wage Rate and Qualification Reference Book for Employees and Professions are allowed to conduct maintenance, installation and repair of RRL equipment.
- Work on AMS shall be conducted by employees at least 18 years old, trained in climbing techniques by a specialised organisation, the procedure and form of training shall be established by the competent authority in the field of industrial safety.
- The vertical climber works are the works of increased hazard and shall be performed by the team of at least 2 persons with execution of work permit (Annex G to ST JSC 80429 - 1/022 - 2018 Rules of works in conditions of increased hazard by work permits of Kazakhtelecom JSC) and conducting of target briefing.
- 6.2 The procedure and types of training and knowledge tests shall comply with the requirements of the current SO "Rules for training, briefing and knowledge tests of Kazakhtelecom JSC's employees in occupational safety and health" ST JSC 80429-1/009-2018.
- 6.3 All operating and administrative and technical personnel of structural subdivisions of enterprises shall be trained in practical techniques of releasing a person caught by electric current and rendering first aid to an injured person in case of accidents.
- 6.4 The training program with indication of necessary sections of rules and instructions shall be compiled taking into account the requirements of the current SO "Rules of

training, briefing and knowledge tests of Kazakhtelecom JSC employees on safety and health protection" ST JSC 80429-1/009-2018 and approved by the head of structural subdivision responsible for radio relay communication lines in coordination with the Operations Department (Chief Head of OSH).

- 6.5 Upon completion of the training, the qualification committee conducts a knowledge test on occupational safety and at the same time a knowledge test of occupational safety rules, regulations and instructions in accordance with the procedure established by the head and inspection authorities. An employee who has successfully passed the knowledge test shall be assigned an appropriate electrical safety group. Electrical Safety Groups for personnel operating electrical installations shall be assigned in accordance with Table G.1 in Annex G of these Rules.
- 6.6 The following types of knowledge tests shall be conducted in accordance with the current SO "Rules for training, briefing and knowledge tests of Kazakhtelecom JSC employees on occupational safety and health" ST JSC 80429-1/009-2018:
- a) initial - prior to admission to independent work;
 - b) periodical (repeated) - within the period specified in the regulation specified in Clause 6.2 of these Rules;
 - c) unscheduled - when new Rules are put into effect, at the request of state supervision authorities, when an employee violates the rules and instructions, when new equipment is put into operation, when he/she is transferred to another job related to the operation of electrical installations.
- 6.7 Trainees from educational institutions shall not be allowed to work independently and trainees under the age of 18 shall not be allowed to stay in active electrical installations.
- 6.8 Employees who meet the requirements of Clause 6.8 shall be allowed to work in high altitude and hard-to-reach stations. 6.8 Employees who have been trained and tested on occupational safety during maintenance of all types of station equipment, and who have been trained on first aid shall be allowed to work at high-mountainous stations.
- 6.9 At RRS located in high-mountainous and hard-to-reach areas, due to the necessity to perform routine repair works, maintenance of RRS is conducted by technical personnel with electrical safety group not lower than III.
- 6.10 Seconded persons shall have a certificate of knowledge of occupational safety and electrical safety group assigned to them. Verification of knowledge of the RK Rules of Technical Operation of Consumers' Electrical Installations, Safety Rules for Operation of Electrical Installations, Fire Safety Rules, Rules for Electrical Installations, as well as these Rules shall be performed at the place of permanent employment.
- 6.11 Upon arrival at the place of assignment, seconded persons shall be instructed in occupational safety, taking into account the characteristics of the equipment of the RRS in which they are to work. Persons entrusted with the duty of issuing work orders, responsible heads and work heads shall be instructed on the arrangements of the RRS equipment.
- 6.12 The procedure and types of training and testing of knowledge of the rules shall comply with the requirements of current regulatory and technical documents (standards of organisations) of Kazakhtelecom JSC on occupational safety and health.

7 Classification of production premises and their requirements

7.1 Production facilities

- 7.1.1 In terms of the risk of electric shock to persons, there are differences:

- a) Hazardous premises characterised by the presence of one of the following conditions that create an increased hazard:
 - Dampness (relative humidity greater than 75%) or conductive dust;
 - Conductive floors (metal, earth, reinforced concrete, brick, etc.);
 - High temperature permanently or periodically (more than 1 day) above +35°C;
 - Possibility of simultaneous human contact with metal building structures, technological devices, mechanisms, etc. and with metal housings of electrical equipment, on the one side and on the other side;
- b) Particularly hazardous premises characterised by the presence of one of the following conditions which create a particular hazard:
 - Particular dampness (relative humidity of the air is close to 100% - the ceiling, walls, floor and objects in the room are covered with moisture);
 - A chemically active or organic environment (aggressive vapours, gases, liquids, deposits or moulds are present continuously or for long periods which can damage the insulation and current-carrying parts of the equipment);
 - Two or more hazardous conditions are present at the same time;
- c) premises without increased hazard, in which there are no conditions posing increased or special hazard;
- d) areas of outdoor electrical installations which are equivalent to particularly hazardous premises.

7.1.2 The following hazardous and harmful workplace factors are characteristic of the production processes at the RRS:

- a) hazardous voltage level in an electrical circuit that can be shorted through the human body;
- b) increased noise level in the workplace;
- c) Increased air temperature in the work area.

7.1.3 The head of the structural unit shall classify the premises in terms of electrical safety and have them approved by the Technical Director of the branch office. A sign shall be posted at the entrance to the room indicating the category of the room according to the degree of electric shock hazard and the name of the person responsible for occupational safety and health.

Doors to the control rooms and the RRS diesel room shall always be locked and marked with a warning "No Trespassing".

7.1.4 The regulation of sanitary and hygienic premises is conducted in accordance with the current SO "Regulation of sanitary and hygienic premises for employees of Kazakhtelecom JSC's branches" ST JSC 80429-1/019-2018.

7.2 Requirements for production facilities

7.2.1 The RRS production facilities shall comply with the requirements of applicable construction standards and rules, departmental technological design standards, Rules for Electrical Installations, Rules for Technical Operation of Consumers' Electrical Installations, Safety Rules for Operation of Electrical Installations, Law of RK "On Civil Protection".

7.2.2 Installation and location of equipment shall be conducted in compliance with norms and requirements in accordance with the current SO "Requirements to premises and buildings of Kazakhtelecom JSC when locating technological telecommunication equipment".

7.2.3 Temperature, relative humidity and air speed in the working area of production facilities shall meet the requirements of GOST 12.1.005-88 stipulated in Annex B to these Rules.

7.2.4 Natural and artificial lighting of premises shall comply with the requirements of SNiP II.4-79 On calculation and design of natural, artificial and combined lighting and DBC 45.122-77 Instruction on design of artificial lighting of communication enterprises.

7.2.5 Standardized values of the coefficient of natural illumination under natural and combined lighting and illumination on working surfaces under artificial lighting for production facilities are given in Annex A to this Rule.

7.2.6 Production premises shall be equipped with heating, ventilation and air conditioning systems in accordance with the requirements of SNiP 2.04.05-91.

7.2.7 Noise levels in the production areas shall meet the requirements of the permissible noise standards in Annex C to this Rule.

7.2.8 To reduce noise levels in the production rooms, the walls and ceilings of these rooms shall be covered with noise abatement material.

7.2.9 Interfloor ceilings above the battery room, acid room, electrolyte room and vestibules to them shall be gas-tight.

Openings in floor or attic ceilings through which telephone or other cables pass shall be sealed tightly with asbestos and sealed with cement mortar, alabaster or other non-combustible material. If holes have been opened during work on the cables, they shall be resealed at the end of the work.

7.2.10 In accordance with the requirements of process engineering standards, to prevent the spread of fire from room to room, the free space remaining after the laying of cables and wires in openings or pipes between rooms, including between floors, shall be filled with easily removable non-combustible materials.

7.2.11 Production rooms shall be separated from other rooms by non-combustible walls or partitions with a fire resistance rating of at least 0.75 h.

7.2.12 Communication, alarm and power supply cables (wires) may not be installed together with fire-extinguishing agent distribution pipes and ducts, or communication cables (wires) with power supply cables in communication shafts in accordance with building regulations.

7.2.13 In production rooms, if it is possible for personnel to touch metal housings of equipment and pipelines of heating, water and sewage systems at the same time, the latter shall be enclosed with conductive grids.

7.2.14 To combat excessive insolation, i.e. exposure to direct sunlight, sun protection devices shall be used: curtains, blinds, sunshades.

7.2.15 The rooms shall be stocked with the required quantity of dielectric protective equipment. Special cabinets, shelves, racks, etc. shall be used for their storage.

7.2.16 Dielectric mats with a width of at least 0.7 m and a length equal to the length of the equipment shall be laid around equipment with retractable units and opening doors at power panels, cabinets, electrical units and power machines.

7.2.17 In electrical rooms with installations up to 1 kV, uninsulated and insulated live parts may be used without contact protection if, under local conditions, such protection is not necessary for any other purpose (e.g. protection against mechanical influences). In this case, accessible parts shall be arranged so that normal maintenance will not involve a risk of touching them.

If necessary, barriers shall be designed so that they can only be removed or opened with keys or tools. Enclosures may be solid, mesh or perforated.

All barriers and closures shall be of sufficient mechanical strength in accordance with local conditions.

7.2.18 In hazardous and particularly hazardous production areas, there shall be a self-contained mains supply with a nominal voltage not exceeding 42V for the connection of electric tools and hand-held electric lights.

Socket outlets up to 42 V shall be designed in such a way that the plugs intended for them cannot be connected to 220 V outlets. 220 V sockets shall be fitted with a third grounding contact.

7.2.19 In hazardous and high-hazard occupancies, floor and wall covering materials shall not emit any harmful substances or accumulate static electricity.

7.2.20 In hazardous and high-hazard production areas with chemically active environments, equipment shall be coated to protect it from the effects of the environment. Methods of protecting equipment against corrosion shall be selected with due regard to the properties of the environment.

7.2.21 In particularly hazardous rooms in the presence of chemically active environment, walls and ceilings shall be painted with chemically resistant paint (acid resistant, alkaline resistant, etc.).

7.2.22 First aid kits shall be located in prominent places in the premises. The first aid kit shall contain a list of medicines and supplies contained therein and brief instructions for their use.

7.2.23 Keys to the RRS offices shall be kept by the personnel and handed over with a note in the logbook.

Keys are kept with the personnel of the RRS assigned to the station in question. Keys for automated RRSs are kept in the Emergency Prevention Service (EPS) and are handed over to the EPG personnel when travelling to the RRS.

7.2.24 The RRS premises are cleaned by the employees of the structural unit assigned to the RRS.

8 Protective earthing

8.1 Protective earthing or grounding shall provide that persons are protected against electric shock when touching non-current-carrying metal parts which may become live due to an insulation fault.

8.2 Protective earthing shall be performed by deliberate electrical connection of metal non-current-carrying parts of electrical and process equipment which can be energised to earth (earthing device).

8.3 The equipment shall be earthed or grounded:

- a) at 380 V and above AC and 440 V and above DC in all RRS equipment;
- b) at nominal voltages above 42 V but below 380 V AC and above 110 V but below 440 V DC only in hazardous areas, particularly hazardous areas and outdoor installations;
- c) at all AC and DC voltages in hazardous areas.

8.4 Earthing device shall be installed in the production premises of the RRS to provide the safety of people. The metal structures of buildings, structures, equipment and measuring instruments shall be connected to them.

8.5 For the earthing of equipment of different purposes and different voltages, territorially close to each other, one common earthing device shall be used. All available natural earthing conductors, especially long ones, shall be used to combine the earthing devices of different equipment into one common earthing device.

An earthing device used for earthing equipment of one of the various purposes and voltages shall fulfil all the requirements for earthing these electrical installations: protection of persons against electric shocks in case of damage to insulation, conditions of network operation, protection of electrical equipment against overvoltages, etc.

8.6 As a basic or supplementary protective measure, if safety cannot be provided by means of earthing or grounding or if earthing or grounding is difficult to fulfil or economic considerations make it advisable to use protective disconnection. Protective disconnection

shall be conducted by means of devices (devices) which fulfil the special technical requirements with regard to operational reliability.

8.7 Every earthing device that is in operation shall have a certificate containing the earthing diagram, earthing resistance value and other necessary technical data, as well as data on the results of inspections of the earthing device, the nature of repairs made and changes made to the earthing switch.

To monitor the resistance of the protective earthing device, it is permissible to equip two stationary measurement earthing devices or to use temporary earthing devices. In working condition, the protective earthing device and the measuring earthing device shall be connected in parallel on the earthing switchboard.

8.8 The neutral of the winding of the transformers of the power transformer station and of the own power station supplying the RRS shall be connected to a protective or operationally protective earthing device. At the same time, the earthing device for the RRS and for the transformer station may be common, if the transformer station is located on the site of the Company.

The impedance of the earthing device to which the neutral of the windings of generators and transformers is connected at ground resistivity up to 100 Ohm m shall not exceed, Ohm:

- a) 2 - 660/380 V installations;
- b) 4 - 380/220V installations;
- c) 8 - 220/127 V installations.

This resistance shall be provided taking into account the use of natural earth electrodes (underground metal pipes, metal structures, building fittings, etc., except for pipes of combustible and explosive mixtures, sewers, central heating and domestic water pipes located outside the plant building).

If the ground resistivity ρ exceeds 100 Ohm m it is allowed to increase the earthing device $\rho/100$ times, but not more than 10 times.

8.9 Earthing or grounding lines and branches in enclosed spaces and in outdoor installations shall be accessible for inspection.

The requirement for inspection access does not apply to neutral conductors and cable sheaths, to reinforcements of reinforced concrete structures or to grounding and neutral protection conductors laid in pipes and ducts as well as directly in the body of building structures (embedded).

Branches from mains to electrical consumers up to 1 kV may be laid concealed directly in the wall, under a clean floor, etc. with protection against corrosive media. Such branches shall not have any connections.

In outdoor installations, earthing and neutral protection conductors are permitted to be laid in the ground, in the floor or on the edge of platforms, foundations of process plants, etc.

The use of uninsulated aluminium conductors for laying in the ground as earthing or neutral protection conductors is not permitted.

8.10 The connection of earthing and neutral protection conductors to earth electrodes, earthing circuits and earthing structures shall be made by welding, and to bodies of device, machines and overhead transmission line towers by welding or reliable bolted connection.

Each piece of equipment to be earthed or grounded shall be connected to the earthing or grounding network with a separate conductor. No part of the equipment to be earthed or grounded shall be connected in series to the earthing or neutral protective conductor.

8.11 Earthing and neutral protective conductors shall be coated to protect against corrosion.

Openly laid steel earthing conductors shall be painted black.

8.12 Earthing and neutral protection conductors shall generally be terminated directly at wall and floor penetrations. At these points, the conductors shall not have any connections or branches.

8.13 Identification signs shall be provided at the points where earthing conductors enter buildings (see Figure 1).



Figure 1 - Earth electrode identification mark

9 Requirements for the layout of production equipment and the organisation of workplaces

9.1 The placement of equipment and device shall comply with the standards given in Table 2.

Table 2

№	Passage	Dimensions, m	
		NRS, RTS	IRS
1	When servicing rows of equipment on one side	1,0 – 1,2	1,0
2	When servicing rows of equipment on both sides	1,2 – 1,4	1,0
3	Between the equipment and the wall, between the ends of a row of racks and the wall if the equipment has doors or drawers that open from the wall or racks that require rear access	Door width and drawer size plus 0,5, but not less than 1	

Note - The data given in the table does not apply to the design of IRS containers where the aisles shall be of minimum dimensions to provide compliance with safety and health rules and the possibility of servicing the device, taking into account its maintainability.

9.2 The placement of equipment in the diesel compartment shall comply with the standards in Table 3.

Table 3

№	Passage	Dimensions, m
1	Between the diesel generator on the control side and the adjacent diesel generator or wall	1,0
2	Between the diesel generator on the opposite control side and the wall	0,6
3	Between the end of a diesel generator on the radiator side and the wall.	0,6
4	Between the end of the diesel generator on the radiator side and the wall.	0,4

Note - The data given in the table does not apply to the development of the containerised DPS. In containerised DPSs, the aisles shall be of a minimum size to provide compliance with safety and health rules and to allow maintenance of equipment based on a reduced volume of preventive maintenance.

10 Requirements when maintaining the RRS

10.1 Maintenance of RRS equipment is conducted by the employees trained in safe work methods, familiarized with job and operational instructions, features of RRS equipment and trained and tested knowledge on safety and health protection in accordance with the requirements of the present Rules.

10.2 Personnel engaged in RRS maintenance include those engaged in operational and technical maintenance of the equipment. Each employee is assigned to a certain part of the station equipment. The employee is responsible for the operation and technical condition of the RRS equipment in accordance with the requirements of technical specifications and TOR.

Maintenance personnel for RRS equipment shall be trained and prepared to conduct preventive maintenance and repair work on the equipment.

Operational and technical maintenance can be conducted by one or more persons. The type of maintenance is determined by the TOR and the relevant documents.

10.3 All works on maintenance of RRS shall be conducted under work orders in accordance with the current SO "Rules for conducting works in conditions of increased hazard by work permits of Kazakhtelecom JSC" ST JSC 80429-1/022-2018.

10.4 Single-person maintenance of RRS equipment is allowed under the following conditions:

- a) availability of back-up equipment to replace faulty equipment;
- b) the availability of telephone and other emergency communications and fire alarms in the rooms where the technical facilities are located.

10.5 Electrical engineers or electricians with at least 3 years' practical experience in a similar job shall be allowed to conduct maintenance work alone.

Persons operating the equipment alone shall have an electrical safety group of at least IV.

10.6 The list of work to be performed by a single person on duty shall be determined by the head of the structural unit (head).

When the equipment is operated alone, only the outside of the equipment cabinets may be operated.

10.7 Persons who are not involved in the maintenance of the RRS equipment and who do not conduct work orders or instructions may be admitted to the technical rooms of the station under escort and supervision of the workshop head or the antenna-mastmaster. The escort shall remain at all times with the persons admitted to the technical rooms and provide their safety. On entering the premises, the escort shall warn that no one is permitted to approach the equipment. If the head is absent, the employee has the right to allow inspection and travelling personnel to enter the technical premises of the plant, provided they have the appropriate documents.

10.8 The inspection of the equipment can be conducted by a single person, the employee assigned to the equipment with the electrical safety group IV (voltage up to 1000 V) or higher.

10.9 If during the inspection a fault is detected which shall not be rectified by a single person in accordance with these Rules, the person who detected the fault shall immediately notify the shift head and make an appropriate entry in the technical faults detected log.

10.10 Fuses shall be installed and removed with the voltage disconnected. Under voltage, but without load, it is permissible to remove and install fuses in areas of equipment which do not have switchgear in their circuitry.

Under voltage and under load, it is permitted to remove and install voltage transformer fuses and enclosed type fuses in electrical installations up to 1000 V.

10.11 When removing and installing fuses under voltage (above and up to 1000 V), PPE shall be used: insulating pliers or dielectric gloves, and if exposed fuses are present, protective goggles (mask).

10.12 Employees shall be aware that when there is no voltage, it may be applied to the equipment without warning, both under normal operating conditions and in cases of emergency.

10.13 Work on the equipment with regard to safety measures is subdivided into

- a) with de-energisation;
- b) without removing voltage from live parts and in the vicinity of live parts;
- c) without removing the voltage away from live parts under voltage.

For simultaneous work on equipment up to and above 1000 V, the work categories are defined for equipment with voltages above 1000 V.

10.14 Voltage disconnected work includes work conducted on equipment (or parts of it) where live parts have been de-energised.

Works performed with voltage removal include: maintenance and overhaul of equipment, cleaning of stabilisers, cleaning and inspection of contacts and installation of power boards, cleaning of cable ducts of low voltage cables, etc. works.

10.15 Work conducted on or near live parts without removing the voltage includes work conducted directly on these parts.

Table 4

Equipment voltage	Distance to live parts, m	
	From people and the tools and appliances they use, from temporary barriers	From machinery and lifting machines in working and transport position, from slings of load-carrying equipment and loads
Up to 1000 V	In a non-touch switchgear not regulated	1,0
3-35 kV	0,6	1,0

Work shall be conducted by at least 2 persons on and near live parts without removing the voltage. The person performing the work shall have an electrical safety group of at least IV, the others at least III.

10.16 When working on equipment with voltages of up to 1000 V without removing the voltage on and near live parts:

- a) shield other live parts in the vicinity of the workplace which may be touched accidentally;
- b) wear dielectric gloves or stand on an insulated footplate or a dielectric mat;
- c) use tools with insulated handles (screwdrivers shall also have an insulated stem); use dielectric gloves if no such tools are available.

10.17 Work conducted on or near live parts without removing the voltage is considered to be e.g. external inspection of electric power installations, etc.

10.18 When conducting work on live parts without undervoltage by means of insulating equipment, it is necessary to

- a) hold the insulating protective equipment by the handles up to the limiting ring;
- b) to position the insulating parts of the protective equipment so that there is no risk of overlapping on the insulating surface between the current-carrying parts of two phases or of an earth fault;
- c) use protective equipment with a dry and clean insulating and undamaged lacquer coating.

Protective equipment shall be immediately discontinued if any damage to the lacquer coating or other defects of the insulating parts are detected. Employees shall keep a record of protective equipment in the Register of Record and Maintenance of Protective Equipment (Annex D). Norms and terms of mechanical and electrical operational tests of protective equipment shall be conducted in accordance with Annex E, Tables E.1 and E.2 of these Rules.

When working with electrical protection equipment (insulating rods and pliers, electrical measuring pliers, voltage indicators), it is allowed for a person to approach live parts for a distance determined by the length of the insulating part of these equipment.

10.19 It is prohibited to work in a bent position in the equipment if, when straightened, the distance to live parts is less than that specified in Table 4 of this Rule. When working near unconfined live parts, the parts shall not be positioned so that they are behind or on either side.

10.20 Long objects (pipes, ladders, etc.) shall be brought in and handled with special care by two persons under the constant supervision of the work head when not all live parts are covered with guards that exclude the possibility of accidental contact.

10.21 Working without removing the voltage away from live parts is considered work where it is impossible for persons working and the repair equipment and tools they use to approach live parts accidentally at a distance shorter than that specified in Table 4 of these Rules and where no technical or organisational measures (e.g. continuous supervision) are required to prevent such approach.

10.22 Work conducted without removing voltage away from live parts includes, for example: external inspection of the equipment, checking the presence of mains voltage by means of fixed instruments, channel quality checks, channel measurements, external inspection, cleaning the premises, etc. work.

10.23 The order of the branch shall approve:

- a) a list of works with the removal of voltage;
- b) list of non-volt-free works on and near live parts;
- c) list of non-volt-free works away from live parts under voltage.

10.24 Preventive inspection, cleaning and repair of RRS equipment shall only be conducted after the power switchboard has been de-energised from this equipment. Insulating pads shall be used in circuit breakers, circuit breakers, etc. to prevent accidental energisation. Posters shall be posted on the handles of switched off devices with the inscription "Do not switch on. People working." (Annex E).

It is forbidden to repair or clean energised equipment.

Note - Exceptions to this are RRS equipment racks supplied with up to 42 V, provided no higher voltages are applied to the rack components.

10.25 If the equipment is built in units, remove the units, connect them with extension hoses and connect portable measuring instruments to the units only when the supply voltage is switched off, except for units with a supply voltage not exceeding 42 V. Extension hoses shall have male and female connectors made in such a way that once connected, there is no possibility of touching exposed live parts.

10.26 It shall be provide d that personnel cannot come into contact with live parts when measuring the operation of the device or when taking readings from devices. The metal housings of instruments used for measurements shall be earthed.

10.27 When adjusting and measuring equipment, the measuring instruments shall be arranged so as not to obstruct access to the equipment to be measured.

10.28 Measurement circuits shall be assembled with the voltage disconnected.

10.29 Work with ladders shall be conducted by two persons, one of whom is below (see section 13.10 Working at height).

Bases of ladders mounted on smooth surfaces shall be padded with rubber, and bases of ladders mounted on the ground shall have sharp metal tips. Ladders shall be supported at their upper end on a firm footing. If necessary, the upper ends of ladders shall have special hooks.

It is forbidden:

- use metal ladders when maintaining or repairing electrical installations;
- work from crates and other foreign objects;
- work in pairs on a ladder or stepladder;
- use tied ladders.

11 Organisational measures to provide the safety of work conducted with and without the removal of voltage on and near live parts

1) Voltage disconnected work is work conducted on equipment (or parts thereof) in which the live parts have been de-energised.

2) Work performed without removing voltage from live parts and in the vicinity of live parts includes work performed directly on these parts.

Work on and near live parts shall be conducted by at least two persons, of whom the person conducting the work shall have an electrical safety group of at least IV and the others at least III.

3) A work area away from live parts is a work area in which the personnel and the repair equipment and tools they use do not accidentally approach live parts within the required distances and where no technical or organisational measures (e.g. continuous supervision) are required to prevent such approach.

All work on work orders for maintenance of electrical installations shall be conducted in accordance with the "Rules of work in hazardous conditions by work permits of Kazakhtelecom JSC" ST JSC 80429-1/022-2018.

11.1 Measures to provide safe work on and near live parts without removing the voltage

11.1.1 When isolating a person from the ground, work shall be conducted in accordance with special instructions and technological maps, which provide for the necessary safety measures.

11.1.2 When working in an electrical installation with a voltage of up to 1000 V without removing the voltage on and near the live parts, it is necessary:

- a) keep other live parts in the vicinity of the workplace away from live parts which may be touched unintentionally;
- b) wear dielectric gloves or stand on an insulated footplate or a dielectric mat;
- c) use tools with insulated handles (screwdrivers shall also have an insulated stem) and use dielectric gloves if such tools are not available.

11.1.3 When performing work without removing voltage on current-carrying parts with the help of insulating means of protection, it is necessary:

- a) hold the insulating parts of the protective equipment by the handles up to the limiting ring;
- b) position the insulating parts of the protective equipment so that there is no risk of overlapping the insulating surface between the current-carrying parts of two phases or of a ground fault;
- c) to use protective equipment with dry and clean insulating parts with undamaged lacquer coating.

11.1.4 When working with electrical protection equipment (insulating rods and pliers, electrical measuring sticks, voltage indicators), it is permitted to approach live parts within a distance determined by the length of the insulating part of the equipment.

11.2 Measures to provide the safety of work conducted with the voltage removed

11.2.1 Preparing the workplace

The following technical measures shall be conducted in the specified order in order to prepare the workplace for de-energising work:

- a) necessary disconnections have been made and measures taken to prevent voltage from being applied to the place of work due to erroneous or spontaneous activation of the switchgear;
- b) Prohibitory placards (Annex F) have been displayed on the manual actuators and on the remote control keys of the switchgear;
- c) the absence of voltage on live parts that shall be earthed to protect people from electric shocks was checked;
- d) warning and caution notices shall be displayed, workplaces and live parts left energised shall be fenced if necessary. Depending on local conditions, live parts shall be shielded before or after earthing (Annex F).

When two or more persons per shift are operating an electrical installation, two persons shall conduct the measures listed in this clause.

11.2.2 Making shutdowns

11.2.2.1 At the site of work involving the removal of voltage on equipment with a voltage of up to 1000 V shall be disconnected:

- a) live parts on which work is to be conducted;
- b) Unfenced live parts to which persons, the repair equipment and tools, machinery and hoisting machines used by them may approach at a distance shorter than that specified in clause 10.14 of these Rules.

11.2.2.2 If the current-carrying parts specified in section 11.2.1 cannot be disconnected, they shall be enclosed.

11.2.2.3 Voltage transformers and power transformers connected to the section of equipment allocated to the work shall also be disconnected on the up to 1000 V side to prevent back-transformation.

11.2.2.4 On equipment with voltages up to 1000 V, the current-carrying parts on which work is to be conducted shall be de-energised on all sides by switching off the manually-operated switchgear and, if fuses are present in the circuit, by removing the latter.

If there are no fuses in the circuitry, measures such as locking the handles or cabinet doors, covering the buttons, installing insulating covers between the contacts, etc., shall be taken to prevent the switching devices from being switched on by mistake. It is also permissible to de-energise with a remote-controlled switchgear, provided the ends are disconnected from the switching coil.

If the design of the device and the nature of the work permit, the above measures can be replaced by stripping or disconnecting the cable or wire ends from the switching device or from the equipment in which the work is to be conducted.

Live parts that are accessible to unintentional contact shall be de-energised or secured in the vicinity of the workplace.

11.2.3 Checking for lack of voltage

11.2.3.1 Before commencing all work on a disconnected part of the installation, the area to be worked on shall be checked to provide that it is de-energised. The absence of voltage between all phases and between each phase and the earth or neutral conductor on the part of the installation disconnected for work shall be checked by the permittee after displaying prohibition placards (Annex F).

11.2.3.2 In electrical installations, the absence of voltage shall be checked with a factory-made voltage indicator, the serviceability of which shall be established before use by means of special instruments designed for this purpose or by approaching live parts located nearby and known to be energised.

In installations with voltages up to 1000 V, the absence of voltage shall be checked both between phases and between each phase and the earthed equipment enclosure or earthing (neutral) conductor. It is allowed to use a previously tested voltmeter. It is forbidden to use test lamps.

If there are no live parts known to be energised nearby, or if there is no other way to check the voltage indicator at the workplace, it can be tested in another electrical installation beforehand.

If the voltage indicator checked in this way has been dropped or has been subjected to shocks, it shall not be used without a second check to provide that all phases of the disconnected equipment are de-energised and all six bushings and terminals of the switch and disconnect are de-energised.

If there is a circuit break at the place of work, the absence of voltage is checked on live parts on both sides of the break.

Permanent barriers are removed or opened just before the no-voltage check.

11.2.3.3 Stationary devices signalling that the appliances are switched off (permanently switched on voltmeters, etc.) are only auxiliary devices, on the basis of the reading or action of which no conclusion can be drawn about the absence of voltage.

The indication of voltage signalling devices is an unequivocal indication that this electrical installation shall not be approached.

11.2.3.4 The absence of voltage in electrical installations may be checked by one person from the operating or maintenance personnel with electrical safety group III - in installations up to 1000 V.

11.2.4 Earthing of live parts. General requirements

11.2.4.1 Earthing of live parts shall be conducted immediately after checking that they are de-energised. Earthing shall be additionally applied to current-carrying parts directly at the workplace in case these parts can be under induced voltage (potential) which can cause electric shock, or they can be supplied with voltage exceeding 42 V AC and 110 V DC from an external source (welding machine, lighting network, etc.).

11.2.4.2 Portable earthing points attached to live parts. Shall be separated from live parts by a visible break. Earthing shall be applied in special places, cleaned from paint, bordered with black strips and provided with fixtures for fixing.

11.2.4.3 Portable earthing switches shall first be connected to earth and then, after checking that no voltage is present, applied to live parts.

Remove portable earthing switches in reverse order of application: first remove them from the live parts and then disconnect them from the ground.

11.2.4.4 Handheld earthing and removal operations shall be performed with dielectric gloves. The clamps of applied portable earthing shall be secured with the same bar or directly with hands wearing dielectric gloves.

Do not use conductors for earthing that are not designed for this purpose and do not connect the earthing by means of twisting.

11.2.4.5 In equipment with voltage up to 1000 V, all earthing and removal operations shall be performed by one person with electrical safety group III or higher.

11.2.4.6 Temporary removal of earthing applied during preparation of the workplace is allowed, if it is required by the nature of the work to be performed (measuring insulation resistance, etc.). In this case the workplace shall be prepared in full accordance with the requirements of these Rules, and only for the duration of the work the earthing where the work cannot be performed shall be removed.

Temporary removal and reapplication of earthing is conducted by shift personnel or under their supervision by a member of the team with an electrical safety group of at least III.

When a work order is issued, permission to temporarily remove earthing shall be entered in the "Separate Instructions" line with a record of where and for what purpose the operation is required.

Storage and recording of earthing

11.2.4.7 Portable earthing sets shall be numbered and stored in designated areas. Special places for hanging and laying portable earthings shall be numbered in accordance with the numbers on these sets.

11.2.4.8 The application and removal of portable earthing and the connection and disconnection of earthing switches shall be recorded in the operating log and in the work order.

All portable earthing units shall be accounted for by numbers indicating their locations.

11.2.5 Posting of posters, fencing of the workplace

11.2.5.1 Immediately after the necessary disconnections have been conducted, "Do not switch on" posters shall be displayed on the keys and remote control buttons, on switchgear with voltage up to 1000 V (circuit breakers, switches, circuit breakers), which were disconnected during the preparation of the workplace. People are working" in accordance with Table F.1 of Annex F of these Rules.

In areas of electrical installations up to 1000 V without fuses, circuit breakers and circuit breakers, posters shall be displayed at removed fuses where voltage can be applied to the workplace when installed.

11.2.5.2 Unconnected live parts which are accessible to unintentional contact shall be fenced off during operation. Shields, screens or similar made of wood or other insulating materials may be used as temporary barriers.

The distance from the temporary fence to live parts shall be at least the distance indicated in Table 4 of these Rules. In 6-15 kV installations, this distance may be reduced to 0.35 m if necessary.

The need for temporary barriers, their type and manner of installation shall be determined according to local conditions and the nature of the work by the person preparing the workplace and the person in charge of the work.

Installation of guardrails shall be conducted with particular care in the presence of the person in charge of the work.

Temporary barriers shall be equipped with "Stop Voltage" posters.

11.2.5.3 It is allowed to use special mobile fencing: cages, inclined shields, etc., if their design provides safety during installation, is stable and provides safe fixation.

11.2.5.4 If an electrical installation is of the enclosed type, "Stop Voltage" placards shall be posted on the mesh or solid fence of the cells adjacent to and opposite the workplace. If these cells are not fenced and there are no personnel passages near them, the cells shall be fenced by portable shields (screens) with warning placards on them. The portable shields shall not prevent the personnel from leaving the room in case of hazard.

11.2.5.5 If open switchgear as well as open oil-filled equipment is operated from the ground, and if the equipment is installed on foundations and structures, the place of work

shall be fenced with a rope with posters "Stop. Voltage" posted on it. The placards shall face inwards into the enclosed space.

A passage to the enclosed space shall be left for the employees.

If all equipment and busbars of the switchgear are de-energised, except the line-disconnectors, the latter shall be fenced with a rope with "Stop. Voltage" placards posted on it. The placards shall face outwards into the enclosed space.

11.2.5.6 In areas of common open switchgear structures (e.g. gantry type) or the open installation of oil-filled equipment, through which it is possible to walk from the workplace to adjacent live cells, "Stop. Voltage" posters shall be placed in prominent places. These posters can be installed by persons with electrical safety group III or higher from the operating and maintenance personnel under the direction of the permittee.

A "Do Not Climb Here" sign shall be displayed on structures adjacent to the one to which personnel are permitted to climb.

On the structure or fixed ladder that is used to climb up to the workplace, a "Climb here" sign shall be displayed.

11.2.5.7 A "Work Here" poster shall be posted at all prepared work areas after the workplace has been earthed and fenced.

11.2.5.8 During work, personnel are not allowed to move or remove the posters and temporary fencing installed, nor trespass into the fenced areas.

All placards shall be displayed and removed only by order of the operating personnel.

12 Conducting tests and measurements in electrical installations

12.1 The tests shall be conducted by teams of at least two persons, of whom the person conducting the tests shall have an electrical safety group of at least IV and the others at least III.

Tests may only be conducted by personnel who have undergone special training and a test of their knowledge of the test plans and safety rules and who have practical experience in conducting tests under operating electrical installations, obtained during the 1-month training period.

The mentioned test shall be conducted simultaneously with the general knowledge test of these Rules at the same time and in the same commission with the inclusion in its composition of an equipment testing specialist having an electrical safety group not lower than V.

Persons authorised to conduct the test shall have a mark of this in their certificate.

12.2 All necessary organisational and technical measures shall be taken in accordance with the requirements of section 11 of these rules.

12.3 When assembling the test circuit, the protective and operational earthing of the test setup and, if necessary, the protective earthing of the enclosure of the equipment under test shall first be conducted. Before connecting the test set to the 380/220 V mains the high voltage output of the system shall be earthed. The cross-section of the copper conductor with which the output is earthed shall be at least 4 sq.mm.

The test circuit is assembled by the personnel of the team conducting the test.

The work head shall check that the circuit is correctly assembled and that the working and protective earthing are secure before starting the test.

12.4 Earthing that has been impeded in the installation may only be removed and reapplied by the person in charge of the test.

12.5 The test site as well as the connection cables which are under test voltage during the test shall be cordoned off and an observer shall be stationed at the test site. The person who has connected the measuring circuit to the equipment under test may act as an observer.

The fencing shall be conducted by the personnel of the testing team. The barriers can be shields, barriers, ropes with signs hanging from them saying "Test. Hazard to life".

12.6 During cable testing, if the opposite end of the cable is located in a locked room, the placard "Test. Hazard to life".

12.7 The test installation is connected to the 380/220 V mains via a switchgear with a visible circuit breaker or via a plug and socket outlet located at the installation control point.

The switchgear is equipped with locking devices or an insulating plate is fitted between the moving and fixed contacts of the device.

12.8 Before applying test voltage to the test device, the person conducting the work is obliged to do so:

a) check that all members of the team are at their designated locations and that unauthorised persons have been removed;

b) warn the team about applying voltage and, after making sure that the warning is heard by all members of the team, remove the earthing from the test rig output and then apply voltage from the test rig output, then apply 380/220V to the test rig output.

As soon as the earthing has been removed, the entire test installation, including the equipment under test and the connecting cables, is deemed to be live and no connections may be made to the test circuit and the equipment under test.

12.9 After completing the test, the test engineer shall de-energise the test installation, disconnect it from the 380/220V network, ground (or give an order for grounding) the installation outlet and notify the team of this. Only then can the conductors be reconnected from the test installation or, if the test is complete, disconnected and the barriers removed. Before and after the insulation test of a cable line, the cable shall be discharged to earth via an additional resistor, grounded and checked to provide that it is completely free of charge. Only then may the placards be removed. The person conducting the discharge shall wear dielectric gloves, safety goggles and stand on an insulating base.

12.10 Measurements with a megohmmeter may be conducted by trained electricians. In installations with voltages up to 1000 V, measurements shall comply with order of two persons, one of whom shall have at least group III.

12.11 Insulation tests on a line which can receive voltage from both sides may only be conducted if the person in charge of the installation, which is connected to the other end of the line, has been informed by telephone, by hand, etc. (by return check). (back-checked) that the line disconnectors and the circuit breaker have been switched off and a placard "Do not switch on. People working".

12.12 Before starting the test, make sure that there are no persons working on the part of the installation to which the testing device is connected, forbid persons in the vicinity to touch live parts and, if necessary, post a guard.

12.13 To monitor the insulation condition of electrical machines in accordance with the guidelines and programs megohmmeter measurements at a stopped or rotating, but not excited machine can be conducted by operating personnel or by his order in the routine operation by employees of the electrical laboratory. Under the supervision of the operating personnel, these measurements can also be conducted by maintenance personnel. Tests of insulation of rotors, armatures and excitation circuits can be conducted by one person with at least electrical safety group III, tests of stator insulation by at least two persons, one of whom shall have at least group IV and the other at least group III.

12.14 When working with the megohmmeter, touching the live parts to which it is connected is prohibited. After completing the work the residual charge of the tested equipment shall be removed by means of a short-term earthing of the equipment.

12.15 Measurements with the megohmmeter shall not be conducted:

a) on one circuit of double-circuit lines above 1000 V, while the other circuit is energised;

- b) on a single-circuit line if it runs in parallel with an operating line with voltage above 1000 V;
- c) during a thunderstorm or when a thunderstorm is approaching.

13 Safety requirements for individual works

Work with power tools, hand-held electric machines and hand-held electric lights shall be conducted in accordance with the current SO "Rules of safety and health protection on cable communication lines of Kazakhtelecom JSC" ST JSC 80429-1/026-2017.

13.1 Maintenance of diesel generators and generating sets

13.1.1 When servicing electrical machines, panels and automatics, starting devices, etc. the requirements of Sections 10 and 11 of these Rules shall be followed in addition to the requirements of this chapter.

13.1.2 Only specially trained personnel with an electrical safety group of at least III shall be allowed to service diesel generators, thermoelectric generators and turbo generators.

Persons not related to the operation of the diesel room equipment shall be allowed into the diesel room in accordance with the requirements of clause 105 of this Rule.

13.1.3 In the diesel compartment (power room) the equipment operating instructions and the occupational health and fire safety instructions, drawn up on the basis of the factory documentation for the equipment and these Rules, shall be posted in a visible place.

13.1.4 The layout of the diesel power plant equipment shall allow for transportation of any unit during installation and dismantling.

Lifting of heavy equipment shall be conducted with a permanent or temporary lifting device.

13.1.5 The fuel tanks of the DGS on the RRS are filled from the fuel tank by an electric pump which is switched on manually or automatically as required for filling. If the pump is switched on manually, the fuel tank shall be equipped with a transparent level tube. If the pump is switched on automatically, the operation of the fuel line check valve shall be strictly monitored to avoid overfilling of the fuel tank.

When fuel is supplied to the DGS at the RRS by gravity, the installation of a solenoid valve on the fuel line outside the RRS room is mandatory.

Maintenance personnel shall be familiar with the structure and operation of the diesel engine room, including the emergency fuel overflow prevention system.

13.1.6 During the operation of diesel units a typical malfunction is the high pressure fuel pump regulator rail jamming (in the single plunger pump - regulator rail jamming). In this case the diesel engine rpm increases, the fuel supply increases, the rpm rises and the process becomes avalanche-like (the diesel engine runs amok). For an emergency stop of the engine it is necessary to cut off the air inflow into the cylinders (the simple cutting off of the fuel supply does not give a proper result, as the feeding continues from filters and the sump).

13.1.7 No smoking is permitted in the diesel room. Prohibitory signs "No Smoking", "No Use of Open Fire" shall be posted on the diesel room door.

13.1.8 Dielectric carpets shall be laid around the generators and control panels. The area of the carpets shall be such that the operating personnel shall be sure to stay on the carpet when working with the equipment.

13.1.9 The diesel room shall have a direct telephone connection or alarm to the control room.

13.1.10 All piping trenches, manholes, cable ducts etc. in rooms shall have corrugated sheet iron or reinforced concrete covers at level with the floor of the room.

13.1.11 All rotating parts of the engines and auxiliary machinery shall be enclosed. The strength and dimensions of the barriers shall be such as to prevent accidents or incidents.

13.1.12 The housings of diesel equipment (generators, power panels, automation panels) shall be earthed.

13.1.13 Piping and other equipment which may cause burns and fires shall be insulated throughout the interior of the diesel compartment.

13.1.14 Engine exhaust gases shall be vented to atmosphere via silencers and exhaust pipework. All engine and pipework connections shall be sufficiently tight.

The exhaust pipe shall be as short as possible with as few bends and curves as possible and no local constrictions of the pipes are allowed.

The exhaust pipe shall be at least 750 mm above the roof of the power station building.

13.1.15 Each engine shall have its own muffler. It is forbidden to connect the exhaust pipes of several engines.

13.1.16 It is forbidden to heat fuel lines, fittings and tanks with open flame.

13.1.17 Operation of the starting rheostat circuit of a rotating electric motor is permitted only when the brushes are raised and the rotor is short-circuited.

Work on the rheostat circuits of a rotating electric motor shall be regarded as live work on circuits up to 1000 V and shall be conducted with appropriate safety measures.

Rotor rings shall only be ground on a rotating motor using insulating blocks.

13.1.18 Prohibitory signs "No Smoking", "No Use of Open Fire" shall be posted on the doors of the fuel and lubricant depot.

If the fuel depot is an open-air fuel tanker, the tanker shall be fenced off from unauthorised persons by means of a fence with a lockable gate.

13.1.19 Fuel and lubricants spilt on the floor shall be wiped up immediately. Wiping materials shall be stored in closed metal boxes placed away from engines, generators, shields and heaters.

On RRSs operating in automated mode, diesel generators and fuel assemblies shall be equipped with drip trays to collect accidental effluents and divert them by drainage pipelines outside the DPS building into a special tank.

At least twice a month, remove the cleaning materials irrespective of their quantity to the waste collection box.

The exceptions are the stations operating without permanent attendants and container-type stations, where it is unacceptable to leave used cleaning materials after work at the station.

13.2 Servicing of battery installations

13.2.1 Stationary batteries shall be installed in rooms designated for them. It is permissible to install more than one acid battery in the same room.

Portable batteries of the closed type (e.g. starter batteries) used to power stationary electrical installations and open batteries up to 60 V with a total capacity not exceeding 72 Ampere-hours may be installed either in a separate room with naturally induced ventilation or in a general industrial non-explosive and non-fire area, in ventilated metal cabinets with outdoor air discharge. Metal enclosed portable batteries which are in a discharging or permanently discharged state and which are recharged outside the installation site may also be installed in metal enclosures with louvers without outdoor air discharge.

The explosion and fire hazard class of the premises does not change if the above conditions are observed.

13.2.2 The entrance to the battery room is through a vestibule. An entrance from the domestic premises is not permitted.

The vestibule shall be of such dimensions that the door from the battery room to the vestibule can be opened and closed when the door from the vestibule to the adjacent room is closed; the area of the vestibule shall be at least 1.5 m². The doors of the vestibule shall open outwards and shall be fitted with self-locking locks allowing them to be opened without a key from the inside.

13.2.3 The doors shall carry the following signs: "Battery room", "Fire hazard", "Do not enter with fire", "No smoking".

A water tap and sink shall be installed near the battery room. The sign above the sink shall read: "Acid and electrolyte shall not be discharged" (except containerised RRS).

13.2.4 The installation of acid and alkaline batteries in the same room is prohibited.

13.2.5 The walls and ceiling of the battery room, doors and window bindings, metal structures, racks and other parts shall be painted with an acid (alkali) resistant, alcohol-free paint. Ventilation boxes and ventilation cabinets shall be painted on the outside and inside.

13.2.6 Incandescent lamps fitted in explosion-proof fittings shall be used for lighting the battery rooms.

Switches, sockets, fuses and circuit breakers shall be located outside the battery room. Lighting wiring shall be made with acid (alkali-resistant) wire sheathing.

13.2.7 The temperature in the battery rooms shall be at least 5 °C during cold periods at the battery location level.

In substations without permanent on-duty personnel, if the battery is selected for automatic switching on and off operation only, it is permissible to accept a specified temperature of at least 0°C.

It is not permitted to install electric ovens in the battery room. It is recommended that the battery room be heated with a heater located outside the battery room and supplied with warm air through a ventilation duct. When electric heating is used, measures shall be taken to prevent sparks from entering through the duct (guidelines for all IRSs other than containerised ones).

If steam or water heating is used, it shall be conducted within the battery room with smooth pipes connected by welding. Flange connections and installation of valves are prohibited.

13.2.8 Supply and exhaust ventilation of the battery room shall be switched on before starting the battery charge and switched off when the battery is completely gassed, but not earlier than 1.5 hours after the end of the charge, and when working by the continuous recharge method, as required by local instructions.

13.2.9 Servicing of battery installations shall be the responsibility of a specialist specially trained in the operation of batteries.

13.2.10 When working with acid and alkali, a suit (coarse wool for acid and cotton for alkali), rubber boots (under trousers) or galoshes, rubber apron, safety glasses and rubber gloves shall be worn.

13.2.11 In the battery room (near the sink), you shall have soap, cotton wool in a package, a towel and a closed container with 5 - 10% neutralising solution of washing soda (one teaspoon per glass of water) if using acid batteries and 5 - 10% solution of boric acid (one teaspoon per glass of water) or vinegar essence (one part per eight parts of water) if using alkaline batteries. If acid or electrolyte comes into contact with exposed parts of the body, first flush the area immediately with water and then with a neutralising solution.

13.2.12 All vessels containing electrolyte, distilled water and neutralising solutions shall be marked with the appropriate inscriptions (names of substances).

13.2.13 No food or drinking water shall be stored or consumed in the battery rooms.

13.2.14 Electrolyte spilt on the racks shall be wiped off with a cloth soaked in neutralising solution. Electrolyte spilled on the floor shall first be collected using sawdust, then the area shall be moistened with neutralizing solution and wiped with dry cloths.

13.2.15 Acid shall be stored in glass bottles with sealed corks and labelled with its name. Bottles of acid in the quantities required for battery operation and empty bottles shall be kept in a separate room at the battery. Bottles are placed on the floor in baskets or wooden crates.

13.2.16 Glass bottles of acids and alkalis shall be carried by two employees. The bottle together with the basket shall be placed in a special wooden box with handles or carried on a special stretcher with a hole in the middle and a crate into which the bottle and the basket shall fit 2/3 of the height. The condition of the stretcher shall be checked beforehand. The bottles shall not be carried on the arms or back.

13.2.17 When preparing the electrolyte, the acid is poured slowly, in a thin stream from the mug into a porcelain or other heat-resistant vessel with distilled water, in order to avoid the intense heating of the solution. The electrolyte is stirred continuously with a glass rod or tube or an acid-proof plastic stirrer.

Do not prepare the electrolyte by pouring water into the acid.

Water may be added to the prepared electrolyte.

13.2.18 Wash your face and hands thoroughly with soap and water at the end of your work in the battery room.

13.2.19 The following measures shall be observed when servicing the rectifiers:

- a) the rectifiers shall not be accessed by persons not related to their maintenance;
- b) all works in the rectifier cabinet shall be performed only after disconnecting DC and AC voltages from the rectifier and discharging the filter capacitors;
- c) keep the enclosure of the rectifier closed when it is in operation;
- d) when removing the load from the rectifier, disconnect the AC mains voltage from the rectifier at the same time.

13.2.20 After stopping the electric motor, switching off the rectifier or other charging equipment for maintenance or servicing, the voltage shall be removed from the specified equipment and a placard "Do not switch on" shall be displayed on the switch actuator. People are working". This placard may only be removed by the employee who put it up (or a person in loco parentis) after work is completed.

13.3 Antenna mast structures and antenna-wave paths

13.3.1 Maintenance and repair of antenna-mast structures and antenna-wave paths shall be performed in accordance with ST JSC 80429 - 4/019-2017 "Instructions for operation and maintenance of antenna-mast structures".

13.3.2 Work on AMS shall be conducted by employees at least 18 years old who have been trained in climbing techniques by a specialised organisation, the procedure and form of training shall be established by an authorised body in the field of industrial safety.

Climbing works are works of increased hazard and shall be conducted by a team of at least two persons, with execution of a work permit (Annex G to ST JSC 80429 - 1/022 - 2018 Rules for works in conditions of increased hazard by work permits of Kazakhtelecom JSC) and targeted briefing.

13.3.3 The painting of masts and towers shall be conducted by specially trained persons with mandatory compliance with safety requirements in accordance with the Company's regulatory and technical documentation (for work at height).

13.3.4 The hazardous area around masts and towers during their operation is the area, the border of which is 1/3 of its height from the centre of the base of the support. When working in the hazard zone, only the persons directly involved in the work are allowed to stay there and shall wear safety helmets. Protective helmets shall also be worn during all work on supports.

The protection of operating personnel in the hazard zone in the event of possible ice and

snow falling from the AMS shall, in addition, be provide d:

- a) marking the hazard zone with warning signs;
- b) instructions and training on ice hazards;
- c) protection of passageways located in the hazard zone with canopies or structures of permanent or removable construction (for the RRS operating in service mode).

13.3.5 The right to issue an work permit and conduct a briefing before starting work on the AMS shall be given to the persons specified in the order for the enterprise.

13.3.6 The person who combines the duties of the responsible head, work head and permittee may only participate in the work of one team, not having the right to supervise the work of other teams.

13.3.7 Work on the installation and maintenance of external AWP on masts and towers shall be conducted by at least two persons, one of whom works on the mast and the other continuously observes the employees from the ground to provide immediate assistance if necessary. The observer shall carry a harness.

13.3.8 It is forbidden to remain in the open areas of masts and towers during thunderstorms or when thunderstorms are approaching, as well as when wind force exceeds 12 m/s, ice, rain or snowfall.

13.3.9 No persons are allowed near earth electrode during thunderstorms or when thunderstorms are approaching. "Caution!" signs shall be posted at the place where the earth electrode are installed. Electric Voltage" signs shall be posted at the place where the earthing switches are installed.

13.3.10 Working on masts and towers in the dark is permitted during emergencies and outages for maintenance work on the power lines. In this case, the workplace shall be illuminated with a battery lantern attached to the mastmaster's cradle and providing sufficient illumination of the workplace. The lifting mechanism shall also be illuminated.

13.3.11 When climbing up masts and towers using ladders, the following requirements shall be observed:

- a) the antenna-mast employee shall have a working harness and be chained to the mast or tower structure while working;
- b) climbing ladders without safety guards meeting the requirements of these Rules may only be done in emergencies and each time on the written order of the technical head or chief engineer of the Company operating the radar, or under the direct supervision of one of them;
- c) when one person is climbing the mast, the section hatches shall be closed as one ascends;
- d) only shoes with non-slip soles and leather gloves may be worn when climbing the vertical ladder. The climber's clothing shall be tightly fitted;
- e) if a group of persons is ascending a vertical ladder, the next person may only be ascended when the hatch of the platform above is closed;
- f) if several persons climb the lattice tower, only one person per ladder span shall be climbed in turn;
- g) it is forbidden to climb a round mast trunk using a lift or an emergency ladder if the mast is not internally illuminated (except in the case of a mast internal lighting failure).

13.3.12 Wires for overhead power lines, alarm and communication lines, etc. may only be suspended from mast and tower structures in accordance with EIR requirements.

13.3.13 When climbing or descending a tower, the antenna-mastmaster shall keep his tools and small parts in a bag with a lock to prevent them from opening spontaneously. When climbing a ladder, the bag shall be strapped to the mastmaster, and when climbing in a cradle, it shall be fastened to the latter. It is prohibited to place tools, nuts or other objects on the mast structures.

13.3.14 The antenna mastmaster may only be lifted or lowered at the antenna

mastmaster's command. When working at great heights, the mastmaster shall be equipped with a megaphone or a portable radio station. Only one person in charge shall give the command to lift the mastmaster and lower the loads and structures.

13.3.15 When hoisting the mastmaster to the mast or tower, the cradle rope shall not touch the mast structure.

13.3.16 Lifting loads shall be secured in accordance with the work draft. Staying under the load to be lifted is prohibited.

13.3.17 Winches without safety handles shall not be used for lowering antennas or other loads (with the winch shaft rotating freely) and the use of a belt brake alone is insufficient. Climbing the mast or tower while the antenna is being raised or lowered is prohibited.

13.3.18 Inspection of suspenders and mechanical components from the cradle is only permitted by means of specially designed and approved maintenance systems.

13.3.19 Suspension ropes consisting of steel ropes shall be replaced if a violation of the steel rope rejection standards is detected. The replacement shall be conducted by a specialised organisation according to an approved plan.

13.3.20 When replacing the straps, follow the specific instructions or the draft. It is only after installing the temporary straps that the permanent straps may be removed. It is forbidden to remain on the mast while loads are being transferred from the temporary to the replaced one, while loads are being transferred from the temporary to the newly installed one, or during the adjustment of the suspenders.

13.3.21 The roofs of RRS buildings used for checking the condition of the antenna-waveguide tract shall be fenced along the perimeter with a metal fence at least 1.0 m high.

13.4 Lifting devices

13.4.1 Requirements for design, construction, installation and operation of winches for lifting loads and people are established by the Rules for Design and Safe Operation of Lifting Cranes RS 10-382-00.

13.4.2 The hoisting devices use manually or electrically operated winches. The winch shall be mounted on a horizontal surface and secured to a force not less than double the maximum working load. Winches and diverter blocks shall be fixed to permanent (operational) or installation anchors. The use of old anchors with rope pulls is prohibited. Mobile winches mounted on skids or wheels with appropriate anchorage to the pile anchor may be used to service several closely spaced supports.

13.4.3 Hand-operated winches intended for hoisting people shall be equipped with safety handles whose design allows lifting or lowering only by continuous rotation of the handle, whereby the lowering speed shall not exceed 0.33 m/s.

13.4.4 The motor shaft of the electric winch shall be connected to the drum shaft by means of a gear or worm gear. The use of winches with belt and friction gears, friction and cam clutches is not allowed. The permissible wear of the winch parts is determined by the data sheet and the installation and operating instructions for the winch.

13.4.5 The winch control box shall be installed no more than 3 m away from the winch. Connection to the power supply line shall be made through a connector which shall be fixed to the outside of the unit, in an accessible location for emergency de-energizing of the electric motor in the event of a "sticking" control button.

13.4.6 All non-current carrying parts of the electric winches shall be earthed.

13.4.7 The cradle used for hoisting and lowering the mast climbers shall not touch the protruding parts of the aerial structure. This shall be achieved by the installation of a strain-relief rope or guides (flexible or rigid) and by taking measures to protect persons being lifted against possible entanglement with the protruding parts of the structure. Flexible rails may be

installed horizontally, inclined or vertically and the ends shall be securely fastened to the structure.

13.4.8 A cradle designed for hoisting and lowering masts on AMS RRS shall be inspected.

13.4.9 Prohibited:

- a) use sleeve mounting blocks in an electromechanically driven system;
- b) use timber cradles for lifting and lowering masts with an electric winch;
- c) hang cables, hoses or other objects other than tools and spare parts from the cradle;
- d) to install machinery and other objects not directly connected to the hoisting winches.

13.4.10 The carriage shall be secured to the cradle in such a way that it cannot disengage automatically.

Cross stranded ropes may be used.

13.4.11 The fixing of the rope to the winch drum shall be secure, accessible for inspection and conducted in accordance with the factory instructions. When multiple layers of rope are spooled onto the drum, proper laying of each layer is required. The end of the rope shall be attached to the winch drum in such a way that it does not tear out, rub or jam.

13.4.12 Only the horizontally carrying rope may be blown at the attachment point of the carriage during ring stocking. It is permissible to inspect the carrying rope from the cradle. Splicing of the haul rope and the safety rope is not allowed.

13.4.13 Ropes for hoisting people not currently in use shall be greased, carefully coiled on drums, and stored indoors. A non-operational rope shall be passed through the unit.

13.4.14 When the rope is completely wound on the drum, the flanges shall rise above the top layer of the rope by at least one rope diameter.

13.4.15 The winch shall be at a distance of at least 20 drum lengths from the nearest take-off block to provide that each layer of rope is placed correctly on the drum.

13.4.16 Lifting blocks with a load capacity of at least 1 tonne shall be used for lifting people on AMS. Loading brackets or hooks shall be made by forging or stamping. The use of cast or welded brackets or hooks is not permitted. Blocks shall be designed to prevent the rope from falling off the pulley and the pulley from jamming. The width of the roller groove shall be at least 1 - 1,5 mm larger than the rope diameter.

When hoisting the cradle with a hand winch, load blocks may be used provided safety devices in the form of a double rope loop or steel brace are fitted.

13.4.17 Each pulley, brace or hook used for lifting persons shall be provided with a manufacturer's certificate or a test report in accordance with established procedures.

13.4.18 The lower tipping block shall be secured to a special anchor or to the support structures in such a way as to prevent it from tipping over or coming loose when the rope tension is loosened.

13.4.19 Lifting devices and their accessories designed to lift people and cargo on AMS shall be subjected to technical inspection by the commission of the organisation operating these devices, consisting of the head of the antenna group, public inspector for labor protection and antenna-mastmaster before commissioning as well as periodically every 12 months (in spring).

If hazardous defects are detected during the inspection, the lifting mechanism or ancillary equipment shall not be operated.

In the autumn, the hoists and accessories are inspected (without testing) by the same committee.

The results of the inspection and examination shall be recorded in a report approved by the technical head of the radio company.

The lifting device may only be approved for operation after testing for 60 minutes with a static load 1.5 times the lifting capacity of the device and a dynamic load by 10%.

13.4.20 Lifting gear shall have:

- a) periodic inspection log;
- b) winch data sheet indicating winch type, purpose, manufacturer, year of manufacture, serial number, lifting capacity, brake type, electric motor data, drum diameters, electric drive circuit diagram (for winches with electric drive), etc;
- c) data sheets of the units;
- d) installation drawing indicating the location of the ropes, hoist and guide ropes, as well as the drawings of the pulley mountings.

13.4.21 A manually operated winch shall be operated by two trained and instructed persons when hoisting the antenna mastmaster on the AMS. An electrically driven winch can be operated by one person with electrical safety group II. No person operating the winch shall be allowed to leave the winch when the antenna mastmaster is on the mast.

13.4.22 When the rope approaches the winch horizontally, it shall be wound on the drum of the electric winch from above and the manual winch from below.

13.4.23 The electric winch drive shall be controlled by continuously pressing one of the two push-buttons "lifting" or "lowering" without locking. When the button is released the actuator shall switch off.

13.4.24 Lifting or lowering shall be halted at the signal of any workman who notices the hazard.

13.4.25 It is forbidden:

- a) to lift and lower people without commands from the cradle (only one person in charge shall command to lift and lower loads and structures);
- b) repair or disconnect the control panel while people are in the cradle;
- c) direct the rope by hand;
- d) stand over the rope going to the drum;
- e) clean, lubricate or repair the winch while it is in operation;
- f) lift more than 2 persons in the cradle;
- g) remove the ratchet wheel latch of the hand winch.

13.4.26 The winch shall be positioned at least one third of the height of the support from the centre of the support base to avoid injury to the operator in the event of objects falling from the cradle. If this is not possible, the working area at the winch shall be protected from falling objects from above.

13.4.27 Before each lift on the AMS:

- a) inspect the hoisting winch by checking the condition of the ratchet mechanism, gears, latch, winch to frame and frame to anchor;
- b) inspect the hoisting rope while it is being stocked.

When inspecting, pay particular attention to the condition of the hoisting ropes, which can be damaged not only by corrosion and broken wires, but also by spark discharges.

13.5 Safety requirements for rotational RRS maintenance

13.5.1 The categories of high-mountain and hard-to-reach RRS for maintenance include stations located in mountainous areas, deserts and steppe regions of the country, remote from the nearest settlements, highways, railways and water supply sources for more than 10 km, or separated from the communication company by water or other barriers that prevent daily shift changes of communication facilities.

13.5.2 Maintenance of high altitude and hard-to-reach RRSs shall be conducted on a rotational basis.

13.5.3 Service personnel of remote and hard-to-reach communication objects is established in accordance with the current standards of production personnel, but not less than 2 people.

13.5.4 Actions of the technical personnel of the stations during their shifts are determined by special instructions developed by the operating company and agreed with the elected trade union bodies with regard to the conditions of each station or series of stations of the same type.

13.5.5 The shift leader of a high altitude or inaccessible RRS is responsible for the preparation of the shift, safety when moving in the mountains and while on the RRS.

13.5.6 In the case of high altitude RRS without an access road, at the beginning of each shift, before the start of the ascent, the shift members shall be instructed about the forthcoming route, the methods of overcoming obstacles and hazards (rockfalls, avalanches, rockslides, mountain rivers, etc.). The briefing shall be conducted by a person appointed by the order of the head of the structural subdivision. The results of the briefing and inspection shall be recorded in a special log.

13.5.7 Each station shall be equipped with first-aid kits, the nomenclature of which shall be agreed with the territorial health authorities at the location of the structural subdivision (unit).

13.5.8 Stations shall be equipped with rooms for cooking, showers, warm sanitary facilities, equipped with sets of bedding, kitchen utensils, household and cultural equipment in accordance with the established need.

13.5.9 A stock (taking into account emergency reserve) of basic foodstuffs shall be established at the station in accordance with the assortment approved by the operating company on the recommendation of the medical establishment,

13.5.10 A securely enclosed potable water storage tank shall be provided at the RRS site. Tanks may be installed separately on the site or inside the technical building or accommodation hut.

It is forbidden to refill water from an accidental source.

13.5.11 Climbing (ascent) of the employees to the stations shall be conducted in accordance with the Instruction on safety measures when moving in mountains and desert areas, developed by the telecommunication company on the basis of the industry regulation on the rotational method of work organization.

13.5.12 Employees shall be provided with special clothing, special footwear and other personal protective equipment in accordance with the applicable SO "Regulation on regulation of special clothing, special footwear and personal protective equipment to employees of Kazakhtelecom JSC" ST JSC 80429-1/016-2018.

13.5.13 In order to provide the safety of movement of personnel on shifts of high-mountain RRS, the head of the enterprise operating the RRS shall make, for each high-mountain RRS that does not have an access road, a description of the path (trail) to the RRS site with reference to clearly visible landmarks and, if necessary, fix this route with clearly visible beacons stacked from stones in the form of a pyramid or other means.

13.5.14 The ascent route with reference points, lighthouse locations and boundaries of high-risk sites (rockfalls, avalanches, rockslides, rockslides, mountain rivers) is transferred to a topographical map.

An excerpt from this map showing the route shall be available at both TNLN, at the RRW and at the RRS.

13.5.15 The route description may recommend the most favourable time of day (according to local conditions), taking into account seasonality, for ascending and descending groups of people. The ascent route of a group shall be divided into stages, taking into account the need for overnight and rest periods. When breaking up the stages, the most favourable time for overcoming high hazard areas (mainly early morning hours) shall be taken into account.

13.5.16 During ascending (descending) of a group, the Chief of RRW organizes radio communication with the group at pre-determined time specified in the route sheet. At the end

of the ascent (descent) of the shifts, the Chief of RRW will make a note of this in the logbook. The Chief of RRW will remain at the home base until the descending of the completed shift is completed.

13.5.17 Before ascending and descending, it is necessary to check the weather forecast. In case of unfavourable forecasts it is forbidden to start ascent or descent.

13.5.18 Before beginning ascent to high-mountainous RRS, head of RRW checks people's preparation, readiness of portable radio, group uniforms, loads, their packing, climbing equipment, availability of personal protective equipment against mountain sun and dust storms; checking it is issued a route list. Head of RRS gives permission to start climbing.

13.5.19 Moving in the mountains is allowed in a group of at least 2 people. The movement is by foot, running is forbidden. It is strictly forbidden to travel alone.

13.5.20 It is forbidden to use wire rope hoists to lift people to high mountain RRS.

13.5.21 Movement along the route shall be halted in case of a sudden sudden change in weather conditions resulting in increased hazard (dense fog with visibility loss of up to 50 m, rain, thunderstorm, blizzard). In this case a temporary camp will be set up before the end of bad weather. The conduct mode of the group shall be established by the guide.

13.5.22 In case of an accident during ascent, movement along the route is stopped. The starting base is notified by radio communication about the accident. A temporary camp is set up until a rescue team arrives.

13.5.23 The transportation of the RRS shift personnel located in inaccessible areas is provided by cross-country vehicles. Walking is prohibited. In case of vehicle failure or any other reason of stoppage, it is prohibited to continue the route on foot.

13.5.24 The employee responsible for delivery of shift personnel, who has no confirmation of shift arrival at RRS via service communication channel, is obliged to send a vehicle with a mechanic along the route of the first vehicle.

13.5.25 Persons with at least three years of continuous work experience in their specialty, with a certificate for the right to drive this machine, trained and certified in labor safety rules for working in mining conditions are allowed to drive mechanical transport vehicles, including self-propelled machines and mechanisms.

Before being allowed to work independently, vehicle drivers shall be trained in the conditions served by the RRS under the supervision of an experienced mentor.

13.5.26 Before travelling to the high mountain RRS, drivers shall be familiarised in advance with the route of the transport and the traffic conditions on the route (road surface, steep climbs, descents and curves, water obstacles, weather forecast, etc.).

The access route to the RRS (if there is no constructed road) is marked by clearly visible beacons or towers not subject to meteorological changes.

13.5.27 Each vehicle shall be assigned to a specific driver, which shall be documented by an order.

13.5.28 Immediately before leaving for a high altitude RRS or RRS located in inaccessible areas, the vehicles shall be subjected to a special technical inspection. Particular attention shall be paid to the serviceability of brakes, steering, clutch, horn, lights, hydraulic hoses.

13.5.29 Each vehicle shall be equipped with a first aid kit, a drinking tank, a fire extinguisher, an emergency stop sign (or a flashing red light). In addition, the cars shall be provided with at least two wheel chocks and a rigid hitch for towing as well as snow chains and tire iron.

13.5.30 When driving in the mountains, drivers of vehicles are prohibited:

- a) driving with the clutch or gear disengaged on descents marked with a "steep downhill" sign or with a gradient of more than 10°;
- b) towing with a flexible coupling;

- c) all towing in icy conditions;
- d) parking in places where the road cannot be seen for 100 metres in any direction.

13.5.31 On mountain roads where oncoming traffic is difficult, the driver of the vehicle travelling downhill shall give way to vehicles travelling uphill.

13.5.32 On long uphill gradients with steep bends, driving shall be done in the same downhill gear.

13.5.33 When driving on slippery and icy roads, vehicles shall be equipped with a fine mesh anti-slip chain. It is recommended to drive as non-stop as possible, without sudden acceleration and braking.

13.5.34 When stopping on slopes to prevent the vehicle from rolling or sliding, chocks shall be placed under the tracks or wheels. For prolonged stops, use horizontal pads.

13.5.35 Refueling vehicles with fuel and lubricants shall be conducted on a level surface with the engine switched off. It is forbidden to smoke and use open fire when refuelling.

13.5.36 Drive in a straight line at an even speed without changing gears on sandy road sections. If the vehicle is stopped, clear the sand in front of the wheels at a distance of 1-2 m; move off in one of the lower gears without slipping.

13.5.37 Use off-road tyres with cleats to drive in the sand. The use of snow chains is prohibited as they cause the wheels to dig into the sand.

13.5.38 Wading vehicles and people across rivers and streams shall only be done after thorough preparations, including

- a) selecting and studying the crossing place;
- b) developing a crossing plan;
- c) preparing the vehicles.

13.5.39 All participants of the crossing shall be familiarised in detail with the place of crossing and safety measures for crossing.

13.5.40 Crossing over water barriers of any width during heavy rain, snow, fog, ice drift, floods, strong wind is prohibited.

13.5.41 The ford shall be marked on both sides of the axis of the planned crossing lane. The drawn width of the ford lane shall be not less than 3 m.

13.5.42 The bottom of the river or stream at the crossing point shall be hard and flat. There shall be no snags, large stones, pits and other obstacles on the ford route.

The depth of water at which wading is possible shall not exceed (depending on the speed of flow) the values given in Table 5.

Table 5

Water velocity, m/s	Permissible ford depth, m		
	people	cars	tractors
До 1,5	1,0	0,6	
До 3,0	0,8	0,3	0,9-1,0

13.5.43 Before crossing the ford, vehicles shall be specially prepared to prevent water from entering the engine and power train units (remove the fan drive belt, close the fan louvers, place a sheet of plywood in front of the radiator, if necessary temporarily raise the batteries above the water level, etc.).

13.5.44 Drive over the ford at a slight incline to the river (stream) bank downstream in first gear at high engine crankshaft revolutions, do not stop, change gears, reduce revolutions or turn off the engine.

13.5.45 After overcoming the ford, replace the fan belt and batteries, dry the clutch (by not engaging it fully) and the brakes (by periodically braking while driving), check the oil level and make sure that there is no water in the engine crankcase.

13.5.46 The useful life of motor vehicles and tractors of high altitude TRS and RRS located in hard-to-reach areas of the RRS is determined by actual wear and tear and is set before the initial overhaul.

13.6 Radio relay stations located near main gas pipeline routes

13.6.1 Depending on local conditions, safety and health instructions shall be developed for individual specific RRSs located near trunkline routes to provide the safety of employees. The instructions shall be coordinated with the territorial bodies of Gosgortekhnadzor and approved by the management of the organization operating the RRL.

13.6.2 Technical heads shall arrange instructions for RRS operating personnel and monitor their compliance with occupational safety rules.

13.6.3 Briefing shall be conducted periodically at least once a quarter. The record about the briefing shall be made in the briefing log with the obligatory signature of the employees who conducted and received the briefing.

13.6.4 Each accident at RRL related to the damage of the main gas pipeline is reported by the RRL management to their head management and together with the representatives of the Gas Service they investigate it accordingly.

13.6.5 The shift personnel of the RRS located near the main gas pipelines shall know:

- a) typical signs of gas leakage from the gas pipeline;
- b) measures to be taken in case of gas in the premises of the RRS;
- c) ways to provide first aid to gas and fire victims;
- d) rules of conduct in emergency conditions.

13.6.6 In case of accidents at gas pipelines, personnel shall be evacuated in case of an immediate threat to the RRS operating personnel. The evacuation route is developed in the field taking into account the location of the RRS in relation to the gas pipeline and the prevailing wind direction in the area.

13.6.7 In order to detect the presence of gas in the RRS premises, gas alarms are installed, which automatically activate light and sound alarms when the gas concentration in the room reaches a certain level.

13.6.8 When the gas alarm is activated, the personnel in charge of the RRS will report the alarm to a node or terminal station by intercom.

13.6.9 The node or terminal station immediately reports to the management of the TNLN about the appearance of gas on the RRS and notifies the local gas services about it.

13.6.10 The degree of hazard to the RRS personnel is determined by the TNLN management together with the Gas Service and the order is given by the RRL. In case of gas pipeline accidents in the vicinity of RRS and immediate threat to life of the station personnel, the decision on evacuation is made by the direct management.

13.6.11 Permanent routes of vehicles operating at the RRS. Shall be coordinated with the local gas service.

13.6.12 Vehicles for transportation of service personnel to remote and hard-to-reach RRS following highways and roads laid along the routes of main gas pipelines are equipped with gas alarms. Before sending vehicles to a node (terminal) station, the head of the station ascertains the condition of the gas pipeline in the local gas service to select a safe route. The emergency sections of the gas pipeline are noted in the driver's trip sheet.

13.6.13 In the event of activation of the gas alarm installed on the vehicle, the team leader orders the vehicle to return to the starting point of the route, after which he reports the location of the alarm to the TNLN management. In all cases it is prohibited to drive vehicles

along the main gas pipelines closer than 200 m from the gas pipeline. Crossing of the main gas pipelines is allowed only in specially designated places.

13.7 Safety requirements for the maintenance of containerised radio relay stations

13.7.1 On radio relay communication lines, ground-mounted containers and buried containers are used to house the equipment.

Depending on the type of container station and taking into account local conditions, the specialists of the given operating company shall draw up occupational safety instructions which shall be approved by the management of the Company.

13.7.2 Containerised underground RRSs are subject to general safety requirements for work on NAS cable lines.

13.7.3 The following requirements are mandatory for all container-type RRSs:

a) On arrival at the unattended RRS by any means of transport (helicopter, vehicle, all-terrain vehicle), the specialists shall open the container and make sure that life support is assured. Only then will the vehicle continue along the route;

b) only preventive maintenance of batteries (measuring of electrolyte density, treatment of terminals and distilled water) may be conducted at the containerised RRS.

All other work shall be conducted in stationary conditions.

13.8 Loading and unloading work

13.8.1 Loading and unloading operations shall be conducted in a designated area with a hard and level surface, under the supervision of a designated engineer who is directly responsible for compliance with occupational safety and health rules when conducting the work.

13.8.2 It is recommended to conduct handling operations by mechanized means with the help of lifting and handling equipment (cranes, loaders, etc.) and small mechanization means (blocks, hoists, etc.).

13.8.3 The mechanised method of loading and unloading is mandatory for loads weighing more than 20 kg, as well as for lifting loads to a height of more than 3 m.

13.8.4 The limit for carrying loads manually on a flat and horizontal surface per person shall not exceed 20 kg for men over 18 years of age.

The maximum permissible loads for women over 18 years of age when lifting and carrying loads by hand shall comply with the data given in Table 7.

Table 7

Nature of work	Maximum permissible load weight
Lifting and moving weights alternating with other work (up to 2 times per hour)	10 kg
Lifting and moving weights continuously during a work shift	7 kg
The amount of dynamic work performed during each hour of a work shift shall not exceed	
from the working surface	1750 kg
on the floor	875 kg

Notes

1. The weight of the load to be lifted and moved includes the weight of the packaging and tare.

2. When moving loads on trolleys or in containers, the applied force shall not exceed 10 kg.

13.8.5 When lifting transformers, machines and other heavy equipment, a slinging scheme shall be devised. The wire rope shall be secured to frames, frames or to parts (rings, brackets, etc.) specially designed for this purpose.

13.8.6 Heavy loads may be moved by means of rollers on a horizontal surface.

13.8.7 When transporting loads on rollers, all foreign bodies shall be cleared from the path. The ends of the rollers shall not protrude from under the loads by more than 0.5 m. To drive the rollers under the load, use crowbars or jacks. Additional rollers shall be placed under the front part of the load to prevent the load from tipping over.

13.8.8 When lowering the load on an inclined plane, the load shall be secured with the use of restraining devices preventing the load from rolling or slipping under its own gravity or from toppling over.

13.8.9 It is forbidden to stand under a load that is being moved, lifted or lowered.

13.8.10 Wear gloves for all loading and unloading work and helmets when working with hoisting equipment.

13.9 Working at height

13.9.1 Special devices are used for working at heights: scaffolding, ladders, portable ladders, etc. These or other devices are used depending on the conditions and nature of the work to be performed. Temporary planking on random supports (boxes, bricks, etc.) is prohibited.

13.9.2 Wooden scaffolding shall be made of dry coniferous or hardwood, free of slants, cracks and knots. The planks used shall be not less than 50 mm thick.

13.9.3 The decking of the scaffolding shall have an even surface with a width of at least 1 m, the gaps between the decking boards shall not exceed 5 mm. The deflection of the planking at the maximum design load shall not exceed 20 mm. The distance from the edge of the decking to the structures to be installed shall not exceed 50 mm. For finishing work, a gap of 150 mm (however, when the work is not in progress, this gap between the building and the scaffolding shall be closed).

13.9.4 The scaffolding shall have handrails, fences (edge boards) and one intermediate horizontal member. The height of the handrails shall be 1 m, the fringes not less than 0.15 m. The distance between the handrail posts shall not exceed 2 m.

The boarding boards shall be installed on the decking and the handrails shall be attached to the posts on the inside. Wooden handrails shall be free of burrs.

13.9.5 Metal ladders and step ladders shall not be used when servicing or repairing electrical installations. Portable ladders and step ladders shall be made of seasoned, dry, knot-free softwood lumber. All parts of ladders and stepladders shall have a smooth, planed surface.

13.9.6 The steps of ladders and stepladders shall be cut into the struts. The distance between the steps shall be no less than 0.25 m and no more than 0.4 m.

13.9.7 The struts of ladders and stepladders shall be fastened with tie bolts of at least 8 mm diameter every 2 m, and under the top and bottom rungs.

13.9.8 It is recommended that wooden ladders be painted with clear lacquers that cannot hide the damage to the wood.

13.9.9 The length of a lean-to ladder shall enable work to be conducted when an employee stands on a step that is at least 1 m from the top end of the ladder. The length of the ladder shall not exceed 5 m.

If the length of the ladder is insufficient, support structures made of crates, drums, etc. shall not be constructed. Lean-to ladders shall be installed at an angle of 70-75° to the ground

plane. Do not install them at an angle of more than 75° without additional securing of the top of the ladder.

13.9.10 The bottom ends of portable ladders to be placed on the ground shall have sharps or, when used on smooth or rough floors (parquet, tile, concrete, etc.), rubber or other non-slip shoes. If necessary, the upper ends of ladders shall be fitted with special hooks. When working from a lean-to ladder at heights greater than 1.3 m, a safety belt attached to the structures of the structure or to the ladder shall be used provided it is attached to the structure.

13.9.11 Ladders with platforms shall be pyramidal, stable and easily movable.

A ladder with wheels shall be equipped with a locking device to prevent the wheels from moving while working on it.

Ladder platforms of 1.0 m or more in height shall have a guardrail (stop, handrail).

13.9.12 Extendable step ladders shall have a locking device to prevent them from extending by themselves while working on them.

13.9.13 No person is allowed to work from the top two steps of ladders or step ladders that do not have a handrail or handrail stops, or to stand on the steps for more than one person.

Do not move from a ladder or stepladder to another ladder or stepladder at height.

13.9.14 It is forbidden to work on ladders:

- a) near and over running machines, shafts and pulleys, conveyors etc;
- b) when using mechanised tools (e.g. pneumatic or electric hammer for piercing holes), when pulling wires and for supporting heavy parts at height, etc.;
- c) with portable electric tools.

Special scaffolding or ladders with handrails shall be used for such work.

13.9.15 Before working on a ladder, provide that it is stable and then inspect and test it to provide that it cannot slip or be accidentally dislodged.

13.9.16 If the top of the ladder cannot be securely fastened, or when working in a busy area, the ladder shall be held by another person to prevent it from falling from accidental shocks, regardless of whether it has metal tips or rubber shoes at its ends.

13.9.17 If it is necessary to install the ladder against the entrance doors, an employee shall be assigned to guard the ladder against shocks.

13.9.18 For working at height, special planking shall be provided on stairwell flights of stairs.

13.9.19 When inspecting wooden ladders and step ladders, pay attention to the condition of the wood and its conformity with technical requirements.

Longitudinal cracks in the steps and stringer are permissible up to a length of 100 mm and a depth of 5 mm. The location and direction of the cracks shall not be such as to weaken the bowstrings and steps. No cracks or fractures may be repaired by caulking, gluing or any other means.

Cross cracks are not permitted.

Metal parts of ladders and step ladders shall not have cracks, burrs or sharp edges.

The bottom of the stringer and the end stops on the stringer shall be carefully inspected. The stops shall be firmly fixed to the bowstring and shall be free of play. If the rubber parts are worn, they shall be replaced and the blunt spikes sharpened.

13.9.20 Ladders and stepladders shall be tested with a static load of 120 kgf after manufacture or overhaul and with a load of 120 kgf during use. This load shall be applied for 20 minutes to one unreinforced step in the middle of the ladder (stepladder) span, set against a wall or structure at an angle of 75° to the horizontal plane. After the weight has been removed, no damage shall be detected on the steps or where they are cut into the stringer.

Steps that are in doubt during the inspection shall be tested additionally by suspending a load on them. Faults detected during the test shall be eliminated, after which the test shall be repeated again in its entirety.

13.9.21 If a step ladder has steps on both adjacent legs, the second leg shall be tested in the same manner after the first leg has been tested.

13.9.22 The periodic testing of wooden ladders and stepladders shall be specified by the management depending on the conditions of use, but not less than once every 6 months.

13.9.23 The tests shall be documented by an act and recorded in a special logbook. The ladder strings shall be marked with the date of the next test.

13.9.24 Each ladder and stepladder in use shall be assigned an inventory number. This number, as well as the affiliation (centre, workshop, section, etc.) is marked on the stringer.

Annex A*(informational)***Workplace illumination standards****Table A.1**

Name of production premises and workplaces	Surfaces to which light standards apply	Work surface layout and height above the floor	Grade and subgrade of visual work according to SNiP II A-4 -79 (1,2)	Standard illuminance, lx				Emergency lighting levels for continued operation, lx (6)	Further information
				General lighting system at		Combination lighting system with			
				discharge lamps	incandescent bulbs	discharge lamps	incandescent bulbs		
1	2	3	4	5	6	7	8	9	10
Hardware room (serviced) (3.5) a) equipment racks b) control desk	For the room as a whole	D 0,8	-	200	150	-	-	-	
	Rack surface, instrument scale	C 0,2 – 1,8	III d	200	150	-	-	$\frac{10}{10}$	
	Console surface, instrument scale Tabletop	C 0,2 – 1,5 D 0,8	III d III d	200 200	150 150	- -	- -	$\frac{10}{10}$ $\frac{10}{10}$	
Hardware automated without permanent maintenance : (5) device rack	For the room as a whole	D 0,8	-	150	100	-	-	-	
	Surface of counters, instrument scales	C 0,2 – 1,8	III d – 1	150	100	-	-	-	

Charging station for automatic fire extinguisher installation	For the room as a whole	D 0,8	-	150	100	-	-	-	It is permissible to design incandescent lamps
	Installation surface, instrument scale	D 0,5 – 1,0	IV d	150	100	-	-	-	

Continued Table A.1

Diesel run- in rooms	For the room as a whole	D 0,8	-	150	100	-	-	-	It is allowed to design incandes cent lamps
	Diesel surface, instrument ation scale	D 0,6 – 1,0	IV r	150	100	-	-	-	

1, 2 - The lighting standards are reduced by one increment on the lighting scale due to the short duration of the work to be performed.

3 - Emergency lighting for evacuation is compulsory.

5 - Plug sockets for portable lights shall be provided.

6 - The numerator is the light level with fluorescent lamps and the denominator is the light level with incandescent lamps.

Annex B*(informational)***The rated values of temperature, humidity and air velocity in the working area of industrial premises (extract from GOST 12.1.005-88)****Table B.1**

Period of the year	Work category	Temperature, °C.					Optimum humidity, %		Travel speed, m/s	
		optimum	admissible				optimum	admissible	optimum	admissible
			upper boundary		lower boundary					
			In the workplace				At permanent and non-permanent workplaces, not more than		At workplaces - permanent and non-permanent	
permanent	non-permanent	permanent	non-permanent							
Cold period of the year	Light - I a	22-24	25	26	21	18	40-60	75	0,1	Not more than 0.1 Not more than 0.1 Not more than 0.3 Not more than 0.4
	Light - I b	21-23	24	25	20	17	40-60	75	0,1	
	Moderate - II a	18-20	23	24	17	15	40-60	75	0,2	
	Moderate - II b	17-19	21	23	15	13	40-60	75	0,2	
Warm period of the year	Light - I a	23-25	28	30	22	20	40-60	55 at 28° C	0,1	0,1-0,2
	Light - I b	22-24	28	30	21	19	40-60	60 at 27° C	0,2	0,1-0,3
	Moderate - II a	21-23	27	29	18	17	40-60	65 at 26° C	0,3	0,2-0,4
	Moderate - II b	20-22	27	29	16	15	40-60	70 at 25° C	0,3	0,2-0,5

Category Ia includes work performed while seated and without physical exertion.

Category Ib includes work performed sitting, standing or walking and involving some physical exertion.

Category IIa includes work involving walking, moving small items (up to 1 kg) or objects while standing or sitting and requiring some physical exertion.

Category II b includes standing work involving walking, carrying small (up to 10 kg) weights and with moderate physical exertion.

Annex C
(informational)
Allowable noise levels in the workplace (DBC 601-92)

Table C.1

Workplaces and premises	Sound pressure levels in dB in octave bands with geometric mean frequencies, Hz									Sound levels and equivalent sound levels in dB
	31,5	63	125	250	500	1000	2000	4000	8000	
Radio relay equipment rooms	96	83	74	68	63	60	57	55	54	65

The regulations do not apply to sound loads in the form of acoustic signals (speech, music, sound effects, etc.).

Annex D
(informational)
Logbook for the recording and maintenance of protective equipment

Table D.1

_(name of protective equipment, type)

Inv. no.	Test date	Date of the next test	Date of periodic inspection	The result of the periodic inspection	Signature of the person who conducted the inspection	Location	Date of issue for individual use	Signature of the person who received PPE for individual use	Note
1	2	3	4	5	6	7	8	9	10

Notes:

1. Periodic inspections shall be conducted at least once every 6 months.
2. When test reports are issued to third parties, the number of the report shall be indicated in the "Notes" column.

Annex E
(informational)

Norms and deadlines for in-service mechanical testing of protective equipment

Table E.1

Name of protective equipment	Static load test	Test duration, min	Load, N (kGs)	Frequency of tests
Safety harnesses and safety ropes	On the break	5	4000 (400)	once every 6 months

Table E.2 - Norms and deadlines for operational electrical tests of protective equipment

Name of protective equipment	Voltage of electrical installations, kV	Test voltage	Test duration, min	Current flowing through the product, mA max.	Frequency of tests
1	2	3	4	5	6
Insulating clamps	Up to 1	2	5	-	1 every 24 months.
	6-10	3 times linear, but not less than 40	5	-	
	35	3 times linear	5	-	
Voltage indicators above 1000 V with a gas-discharge lamp: working part (longitudinal part)	Up to 10	12	1	-	1 every 12 months
	15	17	1	-	
	20	24	1	-	
insulating part indication voltage	Up to 10	Not less than 40	1	-	1 every 12 months
	2 - 10	Not more than 0.55	-	-	
	6 - 10	Not more than 1.5	-	-	
Voltage indicators up to 1000 V: - display voltage - check that the circuit is functioning correctly: single pole signs	Up to 1	Not more than 0, 09	-	-	1 every 12 months
	Up to 1	Not more than 1, 1	1	0, 6	
	Up to 1	max per oper voltage			
two-pole signs			1	10	
insulating part	Up to 0, 5	Not less than 1, 1	1	-	
	St. 0, 5 to 1	max per oper voltage 1	1	-	

Continued Table E.2

Electro-measuring pliers		2	5	-	1 every 24 months.
Rubber dielectric gloves	Up to 1	2	5	-	
Dielectric boots	St. 1 to 10	40	1	6	
	All voltages	6			1 every 6 months
Dielectric shoes	All voltages		1	7, 5	
Insulating pads:	Up to 1	15			1 every 36 months
Tough			1	2	
	Up to 0, 5	3, 5			1 time in 12 months
	St. 0, 5 to 1		1	-	
	St. 1 to 10	1	1	-	1 every 24 months
	15	2	5	-	
	20	20	5	-	
			5	-	
Rubber	Up to 0, 5	30	1	6	
	St. 0, 5 to 1	40	1	6	
Insulating covers for disconnected cable cores	Up to 10	1	1	-	once every 12 months
		2			
Insulating tool with single ply insulation	Up to 1	20	1	-	once every 12 months
Flexible insulating covers	Up to 1	2	1	-	once every 12 months
		6			

Notes:



1. All protective equipment shall be inspected before use, regardless of the periodicity of the periodic inspections.
2. Dielectric carpets shall be inspected once every 6 months, insulating stands once every 36 months, insulating caps on disconnecter blades shall be inspected once every 12 months.

Annex F
(informational)



Safety posters and safety signs

(Extract from the Rules for the Application and Testing of Protective Equipment Used in Electrical Installations, Technical Requirements)


Table F.1

№	Purpose and name	Design, dimensions, mm
1	2	3
Posters banning		
1	To prohibit voltage from being applied to the workplace: "Do not switch on! People are working!"	<p>Red letters on white background. Red border 13 and 5 mm wide. 240x130 80x50 Portable poster</p>  <p>Hangs on disconnector and combination switch-disconnector drives</p>
2	To prohibit voltage being applied to a line where people are working: "Do not switch on! Working on the line"	<p>White letters on red background. 13 and 5 mm wide white edging. 240x130 80x50</p>  <p>Hangs on disconnector drives and combination circuit breakers that are disconnected for work on overhead or cable lines, irrespective of the number of teams working.</p>


Continued Table F.1

3	To prohibit the supply of compressed air, gas: "Do not open! People working!"	<p>Portable poster Red letters on white background. Red border, 13mm wide. 240x130 Portable poster</p>  <p>НЕ ОТКРЫВАТЬ www.pt-trudovik.ru работают люди</p> <p>Hangs on disconnecter drives, combination switches and on gate valves</p>
Warning signs and posters		
4	To warn of the risk of electric shock: "Warning! Electric Voltage".	<p>The background is yellow, the border and arrow are black. Side of triangle: 360 - on doors 160 100 - for equipment and packaging 80 50 40 25 Sign permanent</p>
5	To warn of an electric shock hazard: "Stop! Voltage"	<p>Black letters on a white background. Cai-ma red, width 21 mm. Arrow red according to ST RK GOST 12.4.026 - 2002. 280x210 Portable poster</p>  <p>СТОЙ! www.pt-trudovik.ru НАПРЯЖЕНИЕ</p> <p>Displayed on cell fences, cabinets and panels bordering the workplace</p>



Continued Table F.1

6	To warn against the risk of electric shock when conducting an overvoltage test: "Test. Hazard to life".	<p>Black letters on white background. Edging is red, 21 mm wide. Red arrow according to ST RK GOST 12.4.026 - 2002. 280x210 Portable poster</p>  <p>To be displayed when testing a cable line if the opposite end is located in a locked chamber, switchgear compartment or room, on a door or fence</p>
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Continued Table F.1

7	To warn against climbing on structures where there is a risk of coming into contact with live parts: "Don't climb. DO KILL!".	<p>Black letters on a white background. Cai-ma red, width 21 mm. Arrow red according to ST RK GOST R 12.4.026 - 2002. 280x210 Portable poster</p>  <p>Displayed on structures below, bordering the one that is allowed to climb</p>
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Continued Table F.1

Posters prescribing		
8	To indicate a workplace: "Work here"	<p>A white circle with a diameter of 168 and 68 mm on a green background. The letters are black inside the circle. White edging 5 and 2 mm wide 250x250 100x100 Portable poster</p>  <p>Displayed at prepared workstations in electrical installations</p>
9	To indicate a safe ascent route to a workplace located at a height: "LIFT HERE"	<p>White circle with a diameter of 168 and 68 mm on a green background. Green background. The letters are black inside the circle. White edging 5 and 2 mm wide 250x250 100x100 Portable poster</p> 

Continued Table F.1

		Displayed on fixed ladders and structures that are permitted to be climbed for work purposes
1	2	3
Poster pointer		
10	To indicate that voltage shall not be applied to an earthed part of the installation: "Earthed"	<p>Black letters on blue background. 13 and 5 mm wide white edging. 240x130 80x50</p>  <p>Hang on disconnecter, isolator and load-break switch actuators, which may apply voltage to an earthed part of the installation if switched on incorrectly, and on keys and buttons for remote control of switchgear</p>

Notes:

1. In electrical installations with large equipment, the dimensions of the placards may be increased in ratios of 2:1; 4:1; 6:1 to those given in Table F.1.
2. Posters and safety signs made according to old rules shall be replaced with new ones (with a border according to ST RK GOST 12.4.026-2002) as they fail.

Annex G
(informational)

Electrical safety groups for personnel operating electrical installations

Table G.1

Electrical safety group	Minimum length of service in electrical installations, months.								Characteristics of the personnel
	Non-electrical personnel	Electrical technicians	Electrical technicians			Trainees			
			Without secondary education		With secondary education and specialised training	With a specialised higher technical education	Vocational schools	Institutes and technical colleges	
1	2	3	4	5	6	7	8	9	10
I	Not regulated								Persons who have no special electrical training, but have a basic understanding of the hazards of electric current and safety measures when working at the serviced area, electrical equipment, installation. Persons with group I shall be familiar with the rules of first aid for victims of electric current.
II		2	2	1	1	Not regulated	Not regulated		For persons with group II the following are compulsory: 1. basic technical knowledge of electrical installations. 2. a clear understanding of the hazards of electric current and of approaching live parts. 3. Knowledge of the basic safety measures for working within an electrical installation. 4. Practical skills of giving first aid to electric shock victims.

Continuation of Table G.1

III	- in the previous group	10 in the previous group	4 in the previous group	3 in the previous group	2 in the previous group	1 in the previous group	6 in the previous group	3 in the previous group	For persons with Group III, it is compulsory: 1. Familiarity with the design and operation of electrical installations. 2. a clear understanding of the hazards involved in working within an electrical installation. 3. Knowledge of general safety rules. 4. Awareness of the permissions for working on the electrical installation up to 1000V. 5. 5. Knowledge of special safety rules for the types of work which are the responsibility of this person. 6. 6. Ability to supervise the personnel working on electrical installations. 7. Knowledge of first aid rules and ability to practically provide first aid to an injured person (artificial respiration techniques, etc.) from electric current.
IV	-	6 in the previous group	12 in the previous group	8 in the previous group	3 in the previous group	2 in the previous group	- -	- -	For persons with Group IV, it is compulsory: 1. A knowledge of electrical engineering to the extent of a specialist vocational school. 2. Complete knowledge of the hazards of working in electrical installations. 3. Knowledge of the present rules to the extent of the position held. 4. Knowledge of the installation to such an extent that he is able to understand freely which parts shall be disconnected in order to conduct work, to find in situ all these parts and to check that the necessary safety measures have been implemented. 5. 5. Ability to organise and supervise the safe conduct of work. 6. Knowing the rules of first aid and the ability to practically provide first aid to the injured (CPR techniques, etc.).

Continuation of Table G.1

									7. Knowledge of the schemes and equipment of his area. 8. To be able to teach safety rules and first aid to electric shock victims to the personnel of other groups.
V	-	-	42	24	12	3	-	-	For persons with group V, it is compulsory: 1. Knowledge of the diagrams and equipment of his area. 2. profound knowledge of these rules as well as of the special chapters. and specific chapters. 3. a clear understanding of the reasons for the requirement of a particular clause. 4. The ability to organise and supervise safe working practices in electrical installations of any voltage. 5. 5. Knowledge of first aid, and the ability to practically give first aid (CPR, etc.) to an electrocuted person 6. To be able to teach safety rules and first aid to the victim of electric current to the personnel of other groups.

Notes:

- 1 Electricians with electrical safety groups II to V, who have expired certificates or have not passed the knowledge test, are equal to those with group I.
2. The trainees under 18 are not allowed to be assigned to the group II and higher.
3. For a safety engineer supervising electrical installations, at least 3 years' experience in the workplace is required (not necessarily in electrical installations).

