

**REPUBLIC OF ALBANIA
UNDP-ALBANIA
Number: 65526**

**TECHNICAL REPORT
ELECTRIC DESIGN**

**FOR THE CONTRACT
PREPARATION OF DESIGN AND SUPERVISION FOR REPAIR AND
RETROFITTING OF:**

ISMET NANUSHI JOINT HIGH SCHOOL

**LOT I
MUNICIPALITY OF DURRES**

CLIENT



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CONSULTANT



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This technical report serves the building "Ismet Nanushi School".

The main and auxiliary electrical systems used in this project are as follows:

1. Electricity supply network
2. Roads in the building
3. Power distribution network
4. Normal and emergency lighting network
5. Atmospheric emission protection plant and earthing plant.
6. Data / telephone network
7. Fire detection plant
8. Anti-theft system
9. Norms, laws and rules.

1. Electricity supply network

The source of supply for the facility will be the New Cabin where the installed power of the cabin provides for the installation of 1 transformer 200 kVA 20 / 0.4 kV, which corresponds to a total computing power of the Dormitory + School of kVA. This cabin will be supplied to the nearest ring that OSHE has in the area. If it is not possible to connect to a ring feeder, the connection to the radial feeder will be made as appropriate.

In the electric cab, since the selected environment has sufficient direct contact with the external environment, natural ventilation will serve to cool the Transformer up to the nominal load (Ref. CEI 99-2 Art. 7.5.7; CEI 14-15 art 2.6.1; CEI 21-39 art. 8).

Also in the Power Center will be provided auxiliary contacts that will make the main protection disconnected in case of exceeding the allowable temperature measured in the transformer windings.

As a source of supply for the building, a medium voltage transformer cabin has been built, organized outside the building according to the respective electrical drawings.

Electronic equipment such as fire detection plant, anti-theft plant, rack units, supply lines of work posts or computer posts in IT rooms will have Back-Up UPS to be unaffected by network interruptions. The UPS will be located on the ground floor and will be 1 for the entire building. This reduces the maintenance and operation costs of the UPS unit.

Electrical installations are protected from direct and indirect touch, overloads and short circuit currents.

Conductors and cables are generally of the non-flammable type and with reduced release of corrosive gases according to the standard referring to the cables used in school premises FG16OM16. An exception is the supply cable of the MKZ pump which is a fireproof type

FTG10OM1 according to CEI norms 20-45. According to the norm, the protection of the MKZ pump is only magnetic and the protection against overload is excluded.

2. Roads in the building

Suspended ceiling installations were used for energy distribution but also for weak currents in the building. The main walkways will pass through the corridor environment and the cables will be placed in crimped metal ducts to increase the natural cooling of the cables. On each floor is provided a technical environment in which is located the electrical floor frame and the respective rack. While in computer science classes, given the high amount of cables, the date that will be laid is foreseen a Rack unit and Electrical Frame for the hall. An exception is the hall on the first floor which is located next to the main technical room, avoiding the need to use the Rack unit and the independent electrical staff. Distribution will be realized mainly in overpasses with flexible pipes and distribution boxes. Communication through the boxes will be realized mainly with flexible tube sections Ø32, while from the distribution box to the switch-socket boxes will be realized the tube distribution Ø25 for the power cables and Ø20 for the signal cables.

3. Power distribution network

a- Electrical Circuits

The manner of realization of electrical installations adapts to the typology of the object and, as the case may be, develops in a trunk and radial manner. Internal electrical installations are provided with non-spreading fire conductors and low gas release rate CEI 20-107, CEI 20-22, inserted in flexible self-extinguishing heavy-duty plastic pipes (CEI 23-82).

In the correspondence of the passage between different environments and / or floors, all the pipes must have enough space to stay freely and without allowing the fire to penetrate, avoiding any possibility of communication of flames or gases.

All conductor connections must be made via screw clamps. The installation architecture envisages a quantity and distribution of switches and sockets in the classroom premises with an optimal and not excessive functionality. The plugs provided are a combination (CEI 23-50) of the German standard 16 A (socket shuko) with the Italian 10/16 A (bivalent socket), in accordance with the requirements of equipment normally used in our country. The protection of persons from the risk of accident from electricity is provided by the PE earth conductor that accompanies the entire installation, as well as by the differential device placed in front of each exit line from the distribution frame.

4. Normal and emergency lighting network

The general lighting of the stairs and corridors is controlled by means of buttons where the control points are positioned in such environments where only the school staff has access and not the students. This is due to the elimination of the possibility of uncontrolled switching on / off by students. The interior lighting of the corridors is in accordance with the European norm EN 12464-1 / 2002.

For emergency lighting:

-Antipanic: Considering the importance of the project and the high number of people in it, emergency lighting is provided in each school environment. These luminaires are equipped with an internal battery kit with a minimum storage time of 1 hour (Sufficient time to carry out the evacuation of the entire school). The luminaires used are with LED lamps max 8 W.

Inside the classrooms or other premises, the lighting will be realized with a key at the entrance of the room on the right side at a height of 1.2m. Excluded here are the toilet rooms where for hygienic reasons the lighting of these rooms will be realized with 360° motion sensors mounted on the ceiling referring to the planimetry of the building.

Reflection of surfaces - standard: 70% ceiling, 50% walls, 20% floor.

Room specifications: referred to EN12464-1

Average minimum illumination E_m / color indicator R_a / height of reference plane:

Classes: 500 Lux / 80 / 0.80 m

Corridor: 150 Lux / 40 / 0.00m

Scales: 100 Lux / 40 / 0.80m

Technical rooms: 300 Lux / 60 / 0.80m

Toilets, showers: 100-150 Lux / 80 / 0.80m

5. Atmospheric emission protection plant and earthing plant

Protection from atmospheric emissions is made for the first class of protection with 99% certainty. The descent conductors are also suitable for the first class of protection with respective distances from each other 10 m. For each of the descent conductors a disconnect is provided to measure the earth resistance. For the realization of the contours on the roof of the building, a driver with a diameter of D8mm was used and at certain intervals, poles with a height of 1m above the level of the perimeter contour were placed.

For the realization of the protective earthing will be used a perimeter contour shifted 1m from the building slab with Zn30x3.56mm strip. As a natural earthing can be used the reinforcement of the building slab slab. Considering the territory as well as the insufficient distance to realize two separate groundings, the working one and the defense one, this grounding will be used for both purposes. This grounding must provide a resistance value with it less than 2ohm at any time of the year otherwise actual field measurements will be made and additional vertical or horizontal electrodes will be added to achieve the desired value.

6. Data / telephone network

The internet distribution network in the facility is foreseen to be realized as a completely separate infrastructure from the power one in order to avoid possible impacts in weak currents. This plant is planned to be realized with UTP Cat.6 cable as well as end sockets as well as UTP Cat.6.

The infrastructure is built on a Main Rack on the first floor Rack 1, which supplies all sockets on the first floor, Rack 2 on the second floor and Laboratory Rack for the computer room on the second floor. The racks of the IT classes will receive respectively from the Rack of the respective floor.

A minimum of one RJ45 UTP Cat.6 outlet is provided for each job post. Also, each computer in the internet halls will have its own line which is supplied in the rack of the same hall.

The telephone system network is intended to extend in parallel with the data system in the premises where there are offices. Telephone system sockets will be supplied by a POE Switch thus enabling their use for VOIP telephone network and where IP telephones will not need external power.

7. Fire detection plant

-School

The system consists of automatic smoke and heat detectors. The system is addressable which means that in case of fire and malfunction each detector signals separately to the plant located in the security room on the ground floor. Each detector must have its own ID in the system and next to the fire detection panel must be printed the plan of the building where the IDs of each sensor are clearly visible. In this way in case of alarm the responsible person has it easier to identify the environment where the fire alarm comes from. The central system signals cases optically and acoustically.

The system will also be equipped with manual activation buttons which trigger an immediate alarm at the switchboard. These buttons must be positioned according to the relevant drawing sheet, specifically at the emergency exits, as well as at certain distances in the corridors referring to the standards in force.



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The system will also be equipped with magnetic modules on emergency doors. These modules in case of fire alarm will enable the opening of emergency doors while in normal working condition the magnetic holders do not allow the opening of these doors.

The fire detection system is equipped with a battery for autonomy for 24 hours for a full operation for the whole system (24 hours fire detection system and 1 hour alarm).

Smoke detectors will be connected in closed LOOP lines so that the plant can read the line on both sides in case of disconnection or defect at a certain point. All equipment located on the LOOP detection lines must be equipped with insulators so that in case of internal failure in a device it is automatically separated from the LOOP and in this way the exchange continues to normally read the line on the other two arms. . LOOP lines will be installed in the signal channel separated from the power cables. The cable used must be G4 insulation fireproof with fencing and special ground. Cables for alarm devices are fire resistant for 90 minutes, cable support components (clamps) are fire resistant for the same time. It is not allowed to install cable support systems, components, cable equipment and so on, which have a lower fire resistance than the cables themselves.

8. Anti-theft system

The anti-theft system will be composed of the Central equipped with a minimum of 21 lines for inputs (Motion Detectors) as well as a minimum of 4 zones for system sharing. Each input of the exchange can be configured as NC / NO etc. configuration as immediate or delayed inputs as the case may be when input can be used to exit the facility after system activation. The plant must conform to the norms and rules in force. The system must have integrated modules and equipment as follows:

- GSM for receiving phone calls. This module must have a minimum limit of 5 registered numbers where it must make the call in case of alarm.
- IP for the possibility of remote control of the system. This module should offer the possibility of activating or deactivating the total or partial system according to the zones. The possibility of receiving alarms and controlling various system parameters ..
- Keyboard to offer the possibility of programming, activating / deactivating the system in total or partial. The keyboard should offer the possibility of the user's master code from where only through the access of this code changes can be made by logging in as an installer user. The keyboard will be located in the principal's room or another staff room on the ground floor.
- Proximity key reader. As well as a kit with 3 keys. Through these, it will be possible to carry out the total or partial reinforcement or dismantling of the system more easily in the premises where it leaves the building.



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- Detectors must be dual Infrared + Microwave technology and offer the possibility of PET-Immunity. Detectors are all equipped with their variable angle hinged hinge so that the detector is optimally directed.
- The external siren must be self-feeding to guarantee a long-term operation. The siren must be acoustic optics.

9. Norms, laws and rules

The characteristics of the equipment, components and materials needed to complete the works must be in accordance with the characteristics shown in this document, respecting the laws, regulations and norms (CEE, UNI, EN, ISO, INAIL, CEI).

All equipment, components, materials must be new and of the best quality on the market, produced and processed by a suitable professional. To be intended for service and the required performance characteristics to be high.

All materials and supplies must be provided with the quality mark in accordance with UNI EN ISO 9001 and / or products certified by the organization, and, although useful, have CE marked according to EC Directives 392/89, as amended, and comply with the provisions of Legislative Decree No. 81/2008 concerning the safety and health protection laid down by the Directive.

The machines and equipment you plan to use will be in accordance with Directive 89/392 EEC and 91/368 / / EEC, as amended, ie equipment supplies and basic requirements set out in Legislative Decree no. 81/2008.

This document contains the "preferential" regulatory requirements (European standards) and the "applicable" standards (standards of other nations).

In case of discrepancy, discrepancy and / or vice versa, are presented, in order: national standards, European standards, other standards.

If there were no national standards in relation to any of the plants envisaged, or they were deficient in the performance characteristics required, European or other countries' standards will be used.

The materials that are installed in the facility meet the conditions or have the following certificates: UNI-EN-ISO 9000 - "Rules Relating to General Conditions for Quality and Quality Assurance (or Guarantee). Selection or Use Criteria".

UNI-EN-ISO 9001 - "Quality systems. Criteria for quality assurance (or guarantee) in design, development, production, installation and assistance".

UNI-EN-ISO 9002 - "Quality systems. Criteria for quality assurance (or guarantee) in production and installation".



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UNI-EN-ISO 9003 - "Quality systems. Criteria for the safety (or guarantee) of quality controls and final tests".

Norms and regulations in the electricity sector according to IEC, EN:

EN 12193 - "Lighting fixtures, lighting - Lighting of sports facilities".

EN 12464-1 - "Lighting fixtures, lighting - Lighting of working environments".

EN 12464-2 - "Lighting fixtures, lighting - Lighting of outdoor work environments".

EN 12665 - "Lighting fixtures - Lighting - Basic criteria for specification of lighting requirements".

EN 13201 - "Street lighting".

EN 15193 - "Energy performance of the building. Energy requirements for lighting".

EN 15232 - "Energy performance of the building. Impact of automation, control and management in a building".

EN 1838 - "Lighting applications. Emergency lighting".

EN 50160 - "Voltage characteristic for energy supplied by the public distributor (OSHE)".

EN 50171 - "Central supply system".

EN 50172 - "Evacuation lighting system".

EN 50174-2 - "Installation of cables".

EN 50272 -1 - "Safety requirements for BACK-UP batteries, and installation of batteries". Part 1

EN 50272-2 - "Safety requirements for BACK-UP batteries, and installation of batteries". Part 2

EN 50464-1 - "Oil-immersed 50Hz 3-phase transformers, from 50kVA to 2500kVA with a maximum voltage of 36kV".

EN 50541-1 - "Dry transformers 50Hz 50Hz dry, from 100kVA to 3150kVA with maximum voltage 36kV".

EN 55015 - "Limits and methods of measuring lighting disturbances and similar equipment".

EN 61100 - "Classification of liquid insulation based on ignition point and net calorific value".

HD 639 S1 / A2 - "Electrical equipment. Uninterruptible power supplies without integrated overcurrent protection, for residential and similar use".

IEC 60034-1 - "Rotating electrical equipment (Motors). Evaluation and performance". Part 1

IEC 60038 - "IEC standard regarding voltage".

IEC 60050-191 - "International Electrotechnical Dictionary. Security and quality of supply".

IEC 60050-601 - "International Electrotechnical Dictionary. Production, transmission and distribution of energy".

IEC 60068-2-30 - "Environmental testing".

IEC 60071-1 - "Insulation Coordination".

IEC 60076-1 - "Power Transformers. General". Part 1

IEC 60076-11 - "Power transformers. Dry". Part 11

IEC 60076-12 - "Power Transformers. Dry Transformer Guide". Part 12

IEC 60076-2 - "Power transformers. Temperature increase for oil immersed transformers". Part 2

- IEC 60076-5 - "Power transformers. Ability to withstand short circuits". Part 5
- IEC 60076-6 - "Power Transformers. Reactors". Part 6
- IEC 60076-7 - "Power transformers. Oil-immersed transformer guide". Part 7
- IEC 60204-1 - "Equipment safety. General requirements". Part 1
- IEC 60204-11 - "Equipment safety. General requirements at high voltage above 1000V". Part 1
- IEC 60255-151 - "Measuring relays and protection equipment. Functional requirements for over / under current protection". Part 151
- IEC 60269-1 - "Low voltage fuses. General requirements". Part 1
- IEC 60269-2 - "Low voltage fuses. Additional requirements regarding the use of fuses". Part 2
- IEC 60269-6 - "Low voltage fuses. Additional requirements for fuses for the protection of photovoltaic systems". Part 6
- IEC 60282-1 - "High voltage fuses. Current limit fuses". Part 1
- IEC 60296 - "Liquids for electrotechnical applications. Mineral oil for insulation of transformers and switches".
- IEC 60364-1 - "Low voltage electrical installations. Basic principles, general characteristics assessment, definitions". Part 1
- IEC 60364-4-41 - "Low voltage electrical installations. Protection against voltage drop". Part 4-41
- IEC 60364-4-43 - "Low voltage electrical installations. Overcurrent protection". Part 4-43
- IEC 60364-5-52 - "Low voltage electrical installations. Selection and supply of equipment. Connection system". Part 5-53
- IEC 60364-5-53 - "Electrical installations in buildings. Selection, supply, insulation, connection / disconnection, and control of equipment". Part 5-54
- IEC 60364-5-54 - "Low voltage electrical installations. Selection and supply of electrical equipment. Earthing and PE conductor". Part 5-54
- IEC 60364-5-56 - "Low voltage electrical installations. Selection and supply of electrical equipment. Safety". Part 5-56
- IEC 60364-6 - "Low voltage electrical installations. Verification". Part 6
- IEC 60364-7-710 - "Electrical installations in buildings. Requirements for special installations. Medical facilities". Part 7-710
- IEC 60364-7-718 - "Low voltage electrical installations. Requirements for special installations. Municipal facilities and workplaces". Part 7-718
- IEC 60364-7-729 - "Low voltage electrical installations. Requirements for special installations. Operation and maintenance of roads". Part 7-729
- IEC 60529 - "Degree of protection based on carcasses (IP code)".
- IEC 60570 - "Lighting supply system".
- IEC 60598-1 - "Illuminators. General requirements and tests". Part 1



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IEC 60598-2-22 - "Lighting fixtures. Special requirements. Lighting fixtures for emergency lighting".

IEC 60617 - DB - "Graphic symbols for schemes".

IEC 60664-1 - "Insulation coordination in low voltage systems. Pricing, requirements and testing".

Part 1

IEC 60831-1 - "Self-regulating type capacitors for AC systems up to 1kV. General, performance, testing and classification, safety requirements, guide for their installation and operation". Part 1

IEC 60870-5-101 - "Remote control systems". Part 5-101

IEC 60896-21 - "Stationary acid batteries. Test methods". Part 21

IEC 60898-1 - "Electrical equipment. Overcurrent automation for residential and similar installations. AC automation operation". Part 1

IEC 60898-2 - "Overcurrent automation for residential and similar installations. Automation for operation on AC and DC networks". Part 2

IEC 60947-1 - "Low voltage switches. General rules". Part 1

IEC 60947-2 - "Low voltage switch. Automatic". Part 2

IEC 60947-3 - "Low voltage switches. Switches, disconnectors, switch switches and combined fuse units". Part 3

IEC 60947-4-1 - "Low voltage switches. Contractors and inverters. Control and start with AC semiconductor". Part 4-2

IEC 60947-8 - "Low voltage switches. Control units built on terminal protection for rotary machinery". Part 8

IEC 61000-2-12 - "Electromagnetic Compatibility (EMC). Permissible levels for last frequency distribution in the public grid with medium voltage". Part 2-12

IEC 61000-2-2 - "Electromagnetic Compatibility (EMC). Levels permitted for low frequency distribution in low voltage public grid". Part 2-2

IEC 61000-2-4 - "Electromagnetic Compatibility (EMC). Levels permitted for low frequency distribution in industrial plants". Part 2-4

IEC 61000-3-11 - "Electromagnetic Compatibility (EMC). Voltage change limits, voltage fluctuations in the public grid with low voltage. Current light $\leq 75A$ ". Part 3-11

IEC 61000-3-12 - "Electromagnetic Compatibility (EMC). Limits of current harmonics Produced by the contact path in the public network with low voltage current from $> 16A$ to $\leq 75A$ per phase". Part 3-12

IEC 61000-3-2 - "Electromagnetic Compatibility (EMC). Limits of current harmonics Produced by the communication path in the public network with low voltage with current $\leq 16A$ ". Part 3-2

IEC 61000-3-3 - "Electromagnetic Compatibility (EMC). Signals in Low Voltage Installations. Emission Levels, Frequency Bands and Electromagnetic Distribution Levels". Part 3 Section 8

IEC 61000-4-15 - "Electromagnetic Compatibility (EMC). Testing and measurement techniques. Fluctuation meter. Professional specifications and design". Section 4-15



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IEC 61000-4-30 - "Electromagnetic Compatibility (EMC). Testing and Measurement Techniques. Excellent Quality Measurement Method".

IEC 61000-4-7 - "Electromagnetic Compatibility (EMC). Testing and Measurement Techniques. General Guide for Harmonics and Interharmonics Measurement and Instrumentation, for Offering and Enabling Data in It". Section 4-7

IEC 61009-1 - "Current-generating machines with integrated overcurrent protection for residential and similar use (RCBOs). General rules". Part 1

IEC 61131-3 - "Program control. Programming languages". Part 3

IEC 61140 - "Electric shock protection. Common aspects of installations and services".

IEC 61347-1 - "Lighting transformers. General and safety requirements". Part 1

IEC 61347-2 - "Lighting transformers. Specific requirements". Part 2

IEC 61439-1 - "Low voltage switches and their assembly". Part 6

IEC 61547 - "General lighting equipment. Electromagnetic compatibility (EMC) immunity requirements".

IEC 61800-3 - "Speed control systems. Electromagnetic compatibility requirements and specific testing methods". Part 3

IEC 61869-1 - "Measuring transformers. General requirements". Part 1

IEC 61869-2 - "Measuring transformers. Additional requirements for current transformers". Part 2

IEC 61869-3 - "Measuring transformers. Additional requirements for voltage transformers". Part 3

IEC 61869-4 - "Measuring transformers. Additional requirements for combined transformers". Part 4

IEC 61936-1 - "Power installations exceeding 1kV in the AC network. Rules". Part 1

IEC 62034 - "Automatic test systems for output lighting supplied with batteries".

IEC 62040-1 - "UPS. General and safety requirements for UPS". Part 1

IEC 62040-2 - "UPS. Electromagnetic Compatibility Requirement". Part 2

IEC 62040-3 - "UPS. Performance specification method and test requirements". Part 3

IEC 62305-2 - "Protection against atmospheric discharges. Risk management". Part 2

IEC 62305-3 - "Protection against atmospheric discharges. Physical damage to structure and damage to life". Part 3

IEC 62305-4 - "Protection against atmospheric discharges. Electrical and electronic systems without structures". Part 4

IEC 62493 - "Evaluation of lighting equipment in relation to human exposure to electromagnetic fields".

IEC 62606 - "General requirements for electric arc detection equipment".

IEC / PAS 62717 - "LED modules for ordinary lighting. Performance requirements".



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IEC / TR 61641 - "Low voltage switches and their assembly. Guide for testing under the conditions of an arc due to an internal defect".

IEC / TR 62655 - "Tutorial and application guide for high voltage fuses".

IEC / TS 60479-1 - "Effect of current on human beings and animals. General aspects". Part 1

ISO 12100 - "Safety of machinery. General principles for design. Risk assessment and risk reduction".

ISO 13849-1 - "Safety of machinery. General principles for design". Part 1

ISO 14001 - "Environmental Management Systems. Specifications with user guide".

ISO 23570-2 - "Industrial automation and integration system". Part 2

ISO 23570-3 - "Industrial automation and integration system". Part 2

ISO 23601 - "Safety identification. Signs of exit and evacuation plan".

ISO 50001 - "Energy management system. Requirements and user guide".

ISO 9001 - "Quality management system. Demand".

Norms and regulations in the electricity sector according to CEI:

CEI 0-2 - "Guide for determining the design documentation of electrical systems".

CEI 11-1 - "Electrical installations with voltage greater than 1 kV AC".

CEI 11-27 - "Work on Electrical Systems."

CEI EN 60445 - "Basic safety principles for human-machine interface, for labeling and identification - Identification of equipment terminals and conductor terminals described and general rules for an alphanumeric system".

CEI 64-12 - "Guidelines for the implementation of the earthing system of buildings for residential and other use".

CEI 64-14 - "Guidelines for the verification of usable electrical installations".

CEI 64-57 - "Residential and tertiary residential construction - Guide for the integration of usable electrical systems and for the preparation of specialized installations, telephone and service transmitters in buildings - further produced for distribution".

CEI 64-55 - "Guide for the integration of electrical system users and the provision of hotel assistance facilities".

CEI EN 60439-3 (17-13 / 3) - "Low voltage protection and maneuvering equipment (Low voltage service) Part 3: Seek to provide more services and maneuver intended for installation in places where personal unqualified may have access to tire use - Distribution Frames ".

CEI EN 62305 - "CEI 81-10 Lightning Protection".

CEI 79-3 - "Technical regulation for plants against theft, intrusion and against aggression".

CEI 23-51 - "Search for construction, verification and testing of distribution panels for fixed household and other installations".

CEI 20-19 / 1 - "Insulated cable with rated voltage not exceeding 450/750 V".

CEI 20-19 / 4 - "Rubber insulated cables with a rated voltage not lower than 450/750 V - flexible cables".

CEI 20-19 / 9 - "Rubber insulated cables with a voltage to be rated no more than 450/750 V - unipolar cables without sheath gage, for fixed installations, with low level of smoke, toxic and corrosive emissions".

CEI 20-19 / 10 - "Rubber insulated cables with a voltage rated for not less than 450/750 V - insulated flexible EPR cables and windings with polyurethane ideas".

CEI 20-19 / 11 - "Rubber insulated cables with a rated voltage not lower than 450/750 V - flexible cables with EVA insulation".

CEI 20-19 / 12 - "Rubber insulated cables with a voltage rated for not less than 450/750 V - flexible EPR cables resistant to partitions".

CEI 20-19 / 13 - "Rubber insulated cables with a voltage to be rated not less than 450/750 V - single and multi-strand cables, insulated and twisted".

CEI 20-19 / 14 - "Rubber insulated cables with a voltage for rated not less than 450/750 V - cables for applications with Demand to gain flexibility".

CEI 20-19 / 16 - "Rubber insulated cables with a rated voltage not exceeding 450/750 V - water resistant cables with polychloroprene coating or other equivalent synthetic sheath".

CEI 20-20 - "Guide for using low voltage cable".

CEI 20-20 / 1 - "Rubber insulated cable with rated voltage not exceeding 450/750 V - General requirements".

CEI 20-20 / 3 - "Rubber insulated cables with a rated voltage not exceeding 450/750 V - unshielded cables for fixed installations".

CEI 20-20 / 4 - "Rubber insulated cables with a rated voltage not exceeding 450/750 V - cables with sheath cables for fixed installations".

CEI 20-20 / 5 - "Rubber insulated cables with rated voltage not exceeding 450/750 V - flexible cables".

CEI 20-20 / 9 - "Rubber insulated cables with a rated voltage not exceeding 450/750 V - cables without sheath are suitable for installation at low temperatures".

CEI 20-20 / 12 - "Rubber insulated cables with a rated voltage not exceeding 450/750 V - Heat resistant flexible cables".

CEI 20-20 / 14 - "Rubber insulated cables with a rated voltage not exceeding 450/750 V - Flexible cables with gouache coating and insulation with twenty non-halogenated thermoplastic compounds".

CEI-UNEL 35026 - "Electrical cables with elastomeric or thermoplastic insulation and insulating mineral for nominal voltage not more than 1000V in alternating current AC and 1500 V in direct current DC".

CEI 20-20 / 67 - "Guide for the use of 0.6 / 1 kV cables".



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Specific electronic rules:

CEI 83-2 (EN 50090-2-1) - "Electronic Home and Local Systems (HBES). Section 2.1 System Summary: Architecture".

CEI 83-3 (EN 50090-3-1) - "Electronic Home and Local Systems (HBES). Section 2.1 Applications, Introduction".



Ing. Ylli Molla
Nr. Lic. E.0206/2