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Plazza della Borsa nr. 14 34121 Trieste Italy

OBJECT² MIXED HIGH SCHOOL "DANILO KIŠ", Budva, Montenegro

LOCATION³ c.p. 1617/1 cadastral district Budva
Municipality Budva

TYPE OF TECHNICAL DOCUMENTATION⁴ ADAPTATION PROJECT OF PARTS OF THE FACILITY

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² The name of the object

³ Construction site, planning document, urban plot, cadastral plot

⁴ Conceptual solution, conceptual project, main project, i.e. the project of the finished object project (if it is the cover page of the entire technical documentation)

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OBJECT ² :	JU SREDNJA MJEŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora
LOCATION ³ :	k.p. 1617/1, KO Budva, Opština Budva
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¹ Name of the investor

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³ Construction site, planning document, urban plot, cadastral plot

⁴ Architectural project, construction project, electrotechnical project, i.e. mechanical project (if it is the cover page of the part of the technical documentation)

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TEXTUAL DOCUMENTATION

1 TECHNICAL DESCRIPTION

1.1 Introduction

The subject of this investment-technical documentation is the electrotechnical installations of high current for the building JU SREDNJA MJEŠOVITA ŠKOLA "DANILO KIŠ", which is located on cadastral plot no. 1617/1 KO Budva, Opština Budva, Investor Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste Italy.

The documentation provided technical solutions at the level of the adaptation project of part of the building - installation of high current in accordance with the project task.

According to the architectural and construction solution, the subject of adaptation processed in this project is the restaurant part (on the ground floor) and the block with classrooms (on the first floor) of the mixed school Danilo Kiš, which is located in Žrtava fašizma street in Budva. The building was built in a skeletal system of AB beams and columns with brick walls, P+1 floors, and the clear height of the ground floor is 3.40 m, and the upper floor is 3.00 m. The building is designed for education.

The building is a combined reinforced concrete structure.

The project foresees:

- general consumption installations,
- lighting installations,
- installation of potential equalization.

During the creation of this project, the appropriate legal provisions, special regulations, technical norms, quality norms, standards and professional recommendations were observed.

The electrical installation project foresees new electrical installations in the designated rooms: reception, pantry, hall, computer cabinets, toilet, multifunctional room and cabinet, animation cabinet and apartment A on the floor and designated rooms: restaurant hall, bar, toilet, and kitchen block (only lighting installations), which are fully adapted to the requirements of new equipment and valid standards.

In the part of the entrance to the building on the ground floor, at the entrance to the restaurant hall, there is the existing main distribution cabinet GRO in which the existing equipment is located and they are retained and are not the subject of this project. On the ground floor, there are two existing switchboards RT-R1 and RT-R2, which are kept, while in RT-R2, the project foresees the installation of new equipment due to the replacement of the existing lighting.

The newly designed distribution boards RT-R in the restaurant hall (ground floor) and the distribution boards RT-1 located on the first floor are powered with GRO. The existing GRO is currently retained, and the project foresees a part of the equipment that needs to be installed.

With RT-1, which is located on the floor of the building in the storage room, the other switchboards on the floor are powered: RT-2, RT-3 and RT-4, which are located in: room number 5, in room number 7 and room number 4 respectively.

All newly designed installations are with halogen-free insulation. The power cables to the switchboards are of suitable cross-section with halogen-free insulation. The power cable is laid according to the route shown in the graphic attachment, where the plan of the works foresees chipping and trimming for the needs of installing the cable, as well as restoring the surfaces to their original state.

In the premises, it is planned to replace worn-out and non-functioning lamps with energy-efficient lighting. All newly designed lamps are with an LED light source, adapted to the purpose and installation conditions, and according to the legend on the installation plans. The provided lamps correspond to the purpose

and location of the rooms and have the appropriate degree of protection. Newly designed lamps provide lighting in the appropriate lx value on work surfaces, which is given in the attached photometric calculation.

1.2 Low -voltage electrical installations - technical description

1.2.1 LOW VOLTAGE CABLE CONECTION

With this part of the documentation, the electrical installations are processed from the main distribution cabinet GRO, which is located at the entrance to the restaurant hall, from which it is necessary to bring power cables of the type N2XH-J 5x16mm² to the subject, newly designed distribution boards, marked on the drawing RT-R and RT-1.

The RT-R is positioned in the restaurant hall near the bar, while the RT-1 is located upstairs in the pantry.

Distribution boards: RT-2, RT-3 and RT-4, which are located in: room number 5, in room number 7 and room number 4 respectively, are powered from RT-1. Power cables N2XH-J 5x4mm² are laid for power supply of switchboards: RT-2, RT-3 and RT-4.

The power cable must be laid on the wall and ceiling under the plaster. The conductors are laid in the wall with the creation of slits and the repair of damaged surfaces, as well as bringing the damaged surfaces to their original state. The scope of this project also includes the appropriate equipment, as well as the work required for their installation inside the existing main distribution cabinet.

1.2.2 DISTRIBUTION BOARDS AND POWER LINES

The place of electricity transmission in the subject part of the building is the existing main switchboard GRO, from which the newly designed switchboards RT-1 and RT-R are powered by power cables type N2XH-J 5x16mm² which are located in the storage room on the first floor and near the bar on the ground floor respectably . RT-1 is used to power distribution boards: RT-2, RT-3 and RT-4 with power cables type N2XH-J 5x4mm².

Switchboards are installed in the position marked on the general consumption installation plan.

All switchboards in the facility are designed for surface mounting, suitable dimensions, degree of protection IP40, with the introduction of cables from the bottom and top for housing and interconnection of equipment.

In the drawings, the consumer fields are separated and it is indicated from which switchboard the consumers are supplied.

The switchboards of the part of the building consist of a field of automatic switches (fuses) appropriately dimensioned. Switchboards and cabinets should be made and equipped in everything according to single-pole schemes and material measurements.

Power cables are laid partly on the wall and ceiling under the plaster (type C distribution), according to the attached drawing.

In the front part of the project, there is a selection and verification of the cross-section of the power cables to the switchboard of the building, as well as from the switchboard to the end consumers.

1.2.3 ELECTRICAL INSTALLATION OF GENERAL CONSUMPTION AND HEATING

For the needs of general consumption, according to the purpose of this building, the required number of single-phase sockets and connectors is provided, as indicated on the electrical installation plans.

IT SHOULD BE NOTED THAT THE SCHEDULE OF THE CONNECTORS IS GIVEN IN ACCORDANCE WITH THE GIVEN EQUIPMENT SCHEDULE. IN THE EVENT THAT THE EQUIPMENT ARRANGEMENT HAS BEEN CHANGED, THE POSITION OF THE CONNECTIONS MUST BE MATCHED WITH THE SAME.

Within the subject part of the building, the installation of general consumption should be carried out with cables of type N2XH-j 5x2.5mm²; N2XH-j 3x2.5mm² laid partly on the wall and ceiling under the plaster, and partly through the installation halogen free pipes under the concrete floor screed.

On the electrical installation plans, the necessary installation heights of the sockets are marked (along with the number of the circuit).

Protection against indirect contact voltage is provided by the TN-C-S protection system as well as by differential current protection devices.

1.2.4 ELECTRICAL LIGHTING INSTALLATION

In the subject part of the building, an appropriate lighting installation is provided, adapted to the purpose and installation conditions, according to the legend on the installation plans. The provided lamps correspond to the purpose and location of the rooms and have the appropriate degree of protection.

Lighting control within the subject part of the building is provided through ordinary switches, and in the toilet room it is controlled through motion sensors (detectors). The lamps on the building's facade are controlled via a time relay (astronomical clock).

The switches are mounted at a height of 1.2 meters from the finished floor.

The installation inside the building should be carried out with conductors type N2XH-J 3x1.5 mm² laid partly on the wall and ceiling under the plaster.

1.2.5 EMERGENCY LIGHTING INSTALLATION

Taking into account the purpose of the subject part of the building, safety (necessary) lighting was also designed in the subject part of the building (dental office and corridor), and for this purpose, the installation of lamps for necessary lighting is planned, as indicated on the installation plan.

The provided lamps provide the necessary lighting for 3 hours in the event of a power failure. The installation should be carried out on a separate circuit, conductors type N2XH-j 3x1.5mm² laid partly on the wall and ceiling under the plaster, whereby the mentioned lamps are connected directly, via the fuse located in the distribution board.

Construction, method of execution, method of mounting, insulation class of electrical equipment and materials correspond to the nominal network voltages and environmental conditions.

1.2.6 INSTALLATION OF POTENTIAL EQUALIZATION

In accordance with the Technical Regulations for the execution of electrical installations, an installation for equalization of potential is provided.

Connect all metal masses to protective busbars inside the associated RT with 1x6 mm² conductors with halogen-free insulation.

1.2.7 LIGHTNING PROTECTION INSTALLATION AND GROUNDING

As it is about the adaptation of part of the building, the lightning protection installation and grounding are included in the basic project and as such are not the subject of this project.

2 TECHNICAL REQUIREMENTS FOR PERFORMING LOW VOLTAGE

2.1 Overview of technical solutions for implementation of health and safety

measures

A. Electricity hazards

High current electrical installations, under certain conditions, can cause dangers and damages as a result:

- short circuit currents
- overload currents
- illegal voltage drop
- accidentally touching live parts
- occurrences of high touch voltage
- the influence of moisture, water and dust on electrical equipment
- the effect of the installation on the occurrence of fire and explosion

In order to prevent the aforementioned phenomena, the project envisages the following protection measures:

1. The entire installation is protected against short circuits and overloading of the corresponding fuses.
 2. The entire installation is dimensioned in such a way that the voltage drops, under normal conditions, do not exceed the permitted values. In emergency conditions, the protection will shut down the corresponding circuit.
 3. All equipment is selected in such a way that it is impossible to accidentally touch live parts, and to protect against the occurrence of too high contact voltage in the installation, a protective grounding system with a special protective water, the TNS system, has been applied. take measurements:
 - loop resistance
 - efficiency of potential equalization (the resistance between the protective contact of the electrical installation and metal parts of other installations must not exceed the value of 2Ω in any room of the facility).
 - grounding resistance
- During exploitation, periodically, and at the latest every second year, check loop resistance, potential equalization efficiency and grounding resistance.
4. Electrical installations are protected from the influence of moisture and dust by the correct selection of cables and equipment in accordance with the conditions prevailing at the installation site.
 5. The object is protected from fire or explosion, which could occur due to the effect of electrical installations, by the correct selection and dimensioning of fuses, switches and other equipment.

B. Supervision

1. If necessary, the supervisory service can make minor changes to the project, otherwise the consent of the Investor and the designer is required
2. All changes to the approved project must be made by the Contractor in the project, which will be handed over to the Investor after the completion of the works.
3. The warranty period for the performed works will be determined by the Performance Agreement.

C. Testing requirements

1. The results of measuring the resistance of the loop between the conductors, as well as between the conductors and the earth, must be entered in the construction diary.
2. The fault current in each individual measured part of the installation in dry and wet rooms must not exceed 1mA, i.e. the resistance must be at least 1000 Ohms for each volt of the nominal voltage (for a voltage of 380/220V, the resistance is 380/220 k Ω -a)
3. The project includes the delivery of complete materials, transport, assembly and preparatory finishing works.
4. The Investor's consent is required for the performance of unforeseen or planned works.
5. Commissioning of installations can only be done after the technical acceptance and obtaining the work permit.

2.2 General and technical requirements for executing works

These conditions are an integral part of the Project and as such oblige the Investor and the Contractor to adhere to these conditions, among other things, when making the designed installations, because they contain many elements that are not mentioned in the technical description and the rest of the text, and are important for the execution works. Therefore, when creating the designed installations, it is necessary to adhere to the following.

1. The entire electrical installation must be carried out according to the attached plans, these conditions and valid JUS regulations for the execution of electrical installations of high and low current, i.e. the Rulebook on technical norms for low-voltage electrical installations ("Official Gazette of SFRY" No. 53/88 , 54/88 and 29/95).
2. Before starting the works, the Contractor is obliged to familiarize himself with the Elaborate in detail and to submit all his objections, if any, in a timely manner to the Investor, i.e. to the supervisory authority.
3. The investor is obliged to provide professional supervision over the execution of the works during the entire construction of the building.
4. Before the start of the works, the contractor is obliged to familiarize himself with the object on site, and if he finds that certain changes are necessary, due to construction changes, he must inform the supervisory authority about this and obtain the necessary consent from him for possible changes.
5. If, during construction, a justified need arises for certain deviations or minor changes in the Project, the Contractor is obliged to obtain the approval of the supervisory authority for any such deviation or changes. If necessary, the supervisory authority will inform the designer of the proposed change and ask for his consent.
6. Based on the given Elaboration, the Contractor will only start work after the review and approval by the Supervisory Authority.
7. All installation material and equipment that will be used to perform these installations must meet the standards and be of first-class quality. Material that does not meet these conditions must not be used.
8. When performing these works, care must be taken to damage the already performed works and existing structures as little as possible. In the same way, work coordination should be carried out, in order to avoid mutual interference during the work of different phases.
9. During the execution of the works, the Contractor is obliged to keep a correct construction diary, with all the data that such a diary provides, and all requests and announcements, both by the Supervisory Body and by the Contractor, must be communicated through the construction diary.
10. For the correctness of the performed works, the Contractor guarantees for 2 years, counting from the date of technical acceptance of the object. All breakdowns and malfunctions, which would appear during that period, either due to the use of bad materials or unsound workmanship, must be removed by the Contractor without any compensation.
11. Upon completion of the works, the Contractor should perform the necessary tests of the installations and obtain the appropriate certificates.

2.2.1 GENERAL PROVISIONS

1. Devices and equipment for electrical installations must be suitable for the operation of the installation at the rated voltage of the electrical installation.
Electrical equipment must withstand the currents that flow during normal operation as well as in emergency circumstances, during the time allowed by the characteristics of the protection device.

Electrical equipment, when switched on and off, must not adversely affect other equipment. Equipment, including conductors and cables, must be located so that it can be easily inspected, maintained and its connections accessed and handled. The above also applies to equipment installed in the housing.

2. Labels and other identification means must be placed on switchgear to indicate their purpose. Control elements and signaling elements must be placed in easily accessible and visible places.

3. Insulated conductors and cables must be laid and marked so that they can be easily identified during testing, repair or replacement. Protective conductor (PE) or protective-neutral conductor (PEN) is marked with a combination of green and yellow colors, and neutral (N) with light blue color. These colors may not be used for any other marking. Marking can also be done at the end of the conductor near the joint, especially when the conductors are not insulated.

4. The protection device must be placed and marked so that their associated circuit can be easily recognized. The protection device must be placed in the switching block /distribution panel/.

5. Schemes, diagrams or tables of low-voltage electrical installations must be placed in places where there are multiple circuits, so that they indicate the nature and composition of the circuits and the characteristics for distinguishing devices for protection, switching on and off, as well as the place of their installation and isolation.

6. In the switching block/panel/, the electric must be placed and grouped. equipment of the same type of current and voltage so that there can be no mutual harmful effects.

2.2.2 WIRING

1. The connection of conductors and other electrical equipment must be made in such a way that it is safe and placed in such a way as to allow the possibility of constant checking. The joint must be secured by means appropriate to the material of the conductor and its cross-section. The joint must be accessible after removing the cover or partition with a tool, and access must have a degree of protection of at least IP 2X, according to JUS N.A5.070.

2. Insulated conductors and cables must not be continued in installation pipes and installation channels. They can only be connected in installation boxes, cable connectors or switching blocks, and the connection points must be insulated with the degree of insulation that corresponds to the type of electrical distribution. Exceptionally, in walls that are assembled from elements poured from concrete, the connection can also be made in wall socket boxes, provided that the depth of those boxes allows the placement of connections of the same circuit.

3. The mutual connection of the electrical installation or the connection of the electrical distribution with the electrical equipment must be made so that the electrical distribution is not exposed to pulling or twisting forces. If the effect of forces cannot be avoided, a relief system must be provided.

4. The connection must be made so that there is no reduction in cross-section or damage to the conductor and insulation. Permanent sealing must be performed at the ends of the electrical distribution, especially at the entrances and exits, as well as at the points where the electrical distribution penetrates through walls and electrical equipment.

5. If there are other non-electrical installations near the electrical outlet, such a distance must be provided between them that the maintenance of one installation does not endanger other installations. The minimum permitted distance is 30 mm. If there are heating installations, hot air pipes or a chimney near the electrical distribution, the electrical distribution must be insulated with thermal insulation or screens or it must be placed away from thermal influences.

6. The electrical distribution must not be placed under a non-electrical installation on which condensation of water or other liquids is possible. The electric distribution must not be installed in the same installation channel, pipe or similar, with other non-electrical installations, and if this cannot be avoided, protection against indirect contact must be ensured by automatically disconnecting the power supply or applying insulation for class II equipment and

must install appropriate protection against dangerous influences of other installations. The metal parts of the electrical distribution that are exposed to condensation must be protected from corrosion from the outside and inside and must have a condensate drain provided.

7. If the electrical distribution is installed on the wall, the minimum permissible voltage between the elements of the electrical distribution and the wall is 5 mm. The electrical distribution of a lower voltage must not be installed in the same casing or pipe, nor near the electrical distribution whose voltage is higher, unless there is an insulating partition between the two distributions that withstands the test voltage of the electrical distribution of a higher voltage. In the same installation pipe or inst. conductors of only one circuit can be installed in the channel, except for the conductors of control and auxiliary circuits.

8. El. the distribution must be placed so that in the event of a malfunction it does not endanger the environment. Distribution boxes for cables or conductors that are laid under plaster must be made of insulating material or of metal with insulating lining and inlets made of insulating material. For attaching el. means of separation can be used and procedures that do not cause deformation or damage to the insulation can be used, such as: plastering, clips made of insulating material adapted to the shape and cross-section of the cable, gluing or riveting with nails with supporting plates made of insulating material.

9. Cables laid directly under the mortar and in the wall must be covered with mortar of min. 4 mm thickness along their entire length. Exceptionally, they do not have to be covered with plaster if they are laid in the cavities of ceilings and walls made of concrete or a similar material that does not burn or helps burn.

10. Cables and installation conductors laid in installation pipes in the wall or cables laid directly in the plaster and under the plaster must be guided vertically and/or horizontally so that they are parallel to the edges of the room. When laying them horizontally, they are placed at a distance of 30 cm to 110 cm from the floor and 200 cm from the floor to the ceiling. When laying cables and conductors vertically, the distance from the edges of windows and doors must be at least 15 cm. Routes of cables feeding fixed water heaters must coincide with the axis of the heater. Slanted laying of cables and installation conductors is allowed in ceilings, but not in walls.

11. Laying cables on the wall is allowed if the cable has insulation from thermoplastic materials with filling and sheath, if they are laid on clips on the wall and if it is additionally mechanically protected from the floor up to a height of 2 m from the floor. Junction boxes and other accessories that are placed on the wall along with the laying of cables must have sealing inlets and a degree of protection, at least IP 5X determined for wet rooms, that is, an appropriate degree of protection determined for other rooms.

12. Cables without filling, such as PP/R type, may be laid only in dry rooms, under plaster, and in ceiling cavities and concrete walls, etc. non-combustible material and without covering with plaster. The specified cables must not be laid in a bundle, placed in installation channels or under plasterboard panels, regardless of the way they are attached, and they must not be laid on combustible materials or when covered with plaster.

2.2.3 DISTRIBUTION BOARD

1. Switchboards of the closed or hermetic type are installed at 1.7 m from the floor, and open boards at 2.5 m from the floor. Distribution cabinets in installations must meet the following conditions:

- the external appearance of the wardrobe must not violate the idea of the interior designer;
- they must be mounted either in the wall, or freestanding on the wall;
- meters must be separated from other built-in equipment;
- the door must have a lock with a key;
- all clamps on the built-in equipment must be accessible from the front. In normal operation, all terminals and parts of the equipment that are under voltage must be protected against contact.

2. Live parts of the control or distribution block must be 20 mm away from the housing, and a smaller distance is allowed only if insulated partitions are used .

2.2.4 INSPECTION AND TESTING

Each electrical installation must be inspected and tested during installation or when it is finished, but before handing over to the user. When checking and testing, measures must be taken for personal safety and protection against electrical damage. and other equipment. If the electrical installation is changed, it must also be checked and examined whether the electrical installation in accordance with the provisions of the Rulebook.

2.2.5 GENERAL NOTES AND OBLIGATIONS

1. During the development of this project, all requirements of valid technical regulations, Yugoslav standards, as well as the Law on Occupational Safety ("Official Gazette of SRCG" No. 79/04) were respected.
2. Electrical equipment and materials foreseen by this project must correspond to the corresponding JUS.
3. The work organization is obliged to inform the competent authority about the start of the work 8 days before the start of the work.
4. The labor organization is obliged to implement all prescribed normative acts in the field of occupational safety and to familiarize workers with working conditions and sources of harm and danger, as well as protection measures.
5. RO is obliged to determine jobs with special working conditions, if such positions exist.
6. Everywhere, where the regulations require it, it is necessary to place visibly marked inscriptions with warnings about:
 - voltage height,
 - purpose of certain equipment, i
 - other important notifications.
7. During interventions in TS, RT and installations, the professional person is obliged to apply protective equipment and means.

2.2.6 INSTRUCTIONS FOR THE MANAGEMENT OF CONSTRUCTION WASTE, OR HAZARDOUS WASTE GENERATED DURING THE CONSTRUCTION, USE OR REMOVAL OF THE BUILDING, IN ACCORDANCE WITH A SPECIAL REGULATION

The waste generated during the construction of high-current electrical installations belongs to non-hazardous solid waste and does not have the characteristics of hazardous waste. The phases of managing this waste are the transport and disposal of solid waste, which includes the collection of waste in the vehicle and transport to the designated disposal location where the vehicle is unloaded. Waste collection is the activity of systematic collection, sorting and/or mixing of waste for transport. The works provided for in this project are exclusively of the prescribed nature of the classic execution of construction works. Take the excavated material to the landfill. Parts of the installation material will be brought to the construction site and installed. The resulting waste, material during preparatory work, the remains of the packaging of individual elements that are installed, etc., must be carefully picked up and taken to the designated landfill. After the completion of the works, arrange the entire used belt of the construction site and restore it to its original condition, return the excess material to the warehouse.

Environmental protection measures

Environmental protection measures consist, first of all, in the selection of quality materials, their proper installation, and regular monitoring and maintenance of the planned buildings. In addition, the rehabilitation of the construction site will refer to the arrangement of the environment after the completion of construction.

Fire protection measures

When applying fire protection measures, comply with the Law on Protection and Rescue (Official Gazette of the Republic of Croatia 13/07, 32/11 and 54/16).

During the execution of the designed works, it is necessary to accurately determine the position of the existing electrical installations. Pay special attention to easily flammable materials that can cause a fire on the construction site (oil, boards, beams, slats, etc.). Such materials should be kept away from heat sources and stored in appropriate fireproof areas.

Rehabilitation of the environment

After the completion of the works, the entire used belt of the construction site should be arranged and restored to its original condition, the excess material should be returned to the warehouse, and the waste material from the construction site should be taken to the appropriate landfill. Road and pedestrian surfaces should be repaired, grass areas should be planned and sown with grass, and road canals should be cleaned. When carrying out the works, all planned excavations in the vicinity of existing installations should be carried out manually, taking care not to damage existing installations and to damage the roots as little as possible.

3 LOW VOLTAGE QUALITY CONTROL AND ASSURANCE PROGRAM

3.1 General conditions

This rulebook regulates the procedure and determines the deadlines for carrying out periodic inspections and tests of work equipment, equipment and personal protection at work and working environment conditions.

Means of work, in terms of this rulebook, are:

- means of work with increased dangers to the life and health of employees (hereinafter: certain means of work) who work with them and come into contact during work, namely: presses, scissors, cranes and other means of internal transport, construction machines, machines for processing and processing metals and similar materials, machines for processing and processing wood and similar materials, baths with nitrate salts, acetylene developers and acetylene stations, pressure vessels and pipe network, mobile closed pressure vessels and associated installation, compressors and compressor stations as well as electric power, i.e. electrical and lightning protection installations and
- means of work that do not pose an increased danger to the life and health of employees (hereinafter: other means of work).

3.2 Periodic inspections and testing of certain means of operation

Periodic inspections and tests of certain means of work are carried out in accordance with the regulations on occupational safety, standards, technical regulations, manufacturer's instructions and the provisions of this rulebook, in order to determine whether safe work is ensured by the measures applied, and especially whether:

- instructions for work, assembly and disassembly methods, as well as for handling and maintenance have been prepared,
- the place where a certain work tool is placed corresponds to the regulations, especially with regard to free areas and passages, the operator's position, etc.,
- the foundations were made in accordance with the regulations and manufacturer's instructions,
- signs with prescribed data that are important for employees have been placed,
- are measuring, regulating, safety or control devices installed and whether their correctness is ensured,
- are devices and devices for switching on and off, signal devices and signal management devices installed in accordance with the designer's requirements, technical regulations, manufacturer's instructions, standards and regulations on occupational safety, whether they work reliably, whether they are secured against unintentional inclusion, whether there are signs of the direction of movement and action, inclusion and exclusion, as well as whether the movements and actions of certain means of work or their parts are carried out according to the signs that are located and show the way of their use,
- devices for protection against moving parts, physical, chemical, biological harm and microclimate have been installed or installed and whether their effective functioning is ensured,
- measures to prevent the occurrence of noise, vibrations, harmful and dangerous substances, dust, steam, etc. have been applied to certain means of work. and whether a concentration above the maximum allowed in the working environment is created,
- due to use or transport, there have been changes that can lead to phenomena (breakage, weakening of materials due to fatigue, etc.) that threaten the safety and health protection of employees,
- are certain means of work that are interconnected into a functional unit, and which are used constantly or occasionally in the work process, are safe for work as a functional unit and
- the electrical installations are carried out in accordance with the regulations, especially with regard to ensuring the effectiveness of protection against dangerous contact voltage (proper connection, measurement of the distance between conductors, selection and adjustment of control devices, selection of equipment and protection measures against external influences, etc.).

Periodic inspections and tests of certain work equipment are carried out while they are at rest and in operation (static and dynamic tests).

Through periodic inspection and testing from the point of view, the functionality of their parts is checked, as well as measurements with instruments and equipment, while they are unloaded and at the highest permissible load, according to the order of use that is determined technologically and structurally, with the use of all devices and tools that are used on a certain means of work. Periodic inspections and tests of certain means of work are carried out in such a way that when defects are found in some part, inspections and tests may not be continued in other parts, if they are functionally related, until the identified defects are removed. During the inspection and testing of certain work equipment, safety measures at work must be applied, especially with regard to the installation of protective devices and the safe way of working of the person performing the inspection and testing.

3.3 Inspections and tests of electrical installations

Inspections and tests of explosion-proof devices and electrical installations are carried out in order to select appropriate explosion-proof protection and implement appropriate protection measures, such as ensuring:

- reports on individual inspections and tests of explosion-proof devices from domestic suppliers of devices with appropriate explosion protection marks,
- certificate of the authorized commission for imported devices in anti-explosion protection with anti-explosion protection marks,
- bridging of metal masses in order to equalize the potential and prevent the appearance of electrostatic charges,
- marking the borders of danger zones according to the project,
- floors of rooms made of non-sparking material (for rooms where mixtures of explosive gases are developed that are ignited with low energy),
- a warning plate about the danger of introducing an open flame as well as sparking tools,
- appropriate schemes and inscriptions (on the type of protection against touch voltage, on current circuits, distribution batteries, cabinets, etc.),
- properly selected thermal protection of electric motors and other devices connected to the electrical installation,
- the appropriate choice of protection against electric shock,
- conductors correctly laid and mechanically protected in places at risk from mechanical damage,
- correct connection of conductors,
- identifying neutral and protective conductors and
- free space for access to the installation for maintenance.

In order to determine the correctness of the explosion-proof electrical installation, the following inspections and tests are performed:

- checking the continuity of the protective conductor and the conductor for potential equalization,
- measuring the resistance of the grounding device in accordance with the standard *jus N.B2.762*,
- measuring the impedance of the fault loop in accordance with the *jus N.B2.763* standard,
- checking the operation of the differential current protective device in accordance with the standard *jus N.B2.764*,
- measurement of conductor insulation resistance,
- checking protection by electrical separation,
- checking the resistance of the floors in accordance with the standard *jus N.B2.761*,
- checking permanently installed explosive concentration meters i
- checking of permanently installed humidity meters in the room where a certain percentage of humidity is maintained as a protective measure against static electricity.

Periodic inspections and tests of explosion-proof devices and electrical installations are carried out:

- before commissioning,
- after reconstruction or adaptation,
- after cessation of use for more than six months i
- within 24 months of the previous examination and examination.

Inspections and tests on the electrical installation that is not in explosion protection are carried out in order to prove whether the electrical installation was carried out in accordance with the regulations on occupational safety, standards and other regulations from the electrical industry.

The inspection checks the electrical installation in a de-energized state, and in particular:

- whether the electrical installation was done in accordance with the project, i.e. with a single-pole scheme,
- whether the choice of equipment and protection was carried out according to external influences and the JUS standard. NB2. 730,
 - is the neutral and protective conductor distinguished,
 - is the presence of schemes and warning plates and other similar information ensured,
 - whether the conductors and devices are installed in the prescribed manner, ensuring the identification of fuse circuits, clamps, etc.,
 - method of connecting conductors i
 - accessibility for operation and maintenance.

In the case of earthing installations and lightning protection installations, special attention must be paid to common bias voltages between low voltage power installations and communication lines that supply the devices.

Testing of electrical installations checks, in particular:

- insulation resistance (low-voltage and high-voltage installations and insulation resistance of power transformers),
- loop resistance of protected circuits (JUS. NB2. 730) i
- grounding resistance.

Periodic inspections and tests of electrical installations are carried out:

- before commissioning,
- after reconstruction or adaptation,
- after cessation of use for more than six months i
- within 36 months of the previous examination and examination.

3.4 Inspections and testing of means and equipment for personal protection at

work

Periodic inspections and tests of means and equipment of personal protection at work are carried out in order to determine:

- whether they are made in accordance with the regulations on occupational health and safety,
- whether they were made and whether the means were accompanied by instructions for their purpose and method of testing, maintenance and use,
- are the means and equipment of personal protection at work adapted to the purpose in relation to the means for work and the working environment,
- whether the means and equipment of personal protection at work have the following information clearly displayed: type, type, series, purpose, serial number and
- do they have certificates on the quality of the materials from which they are made.

Inspections and tests of the means referred to in paragraph 1 of this article are carried out in the manner, according to the procedure and within the deadlines established by the regulations on occupational safety, standards, technical regulations and manufacturer's instructions.

3.5 Periodic testing of the working environment

In accordance with occupational safety regulations, standards and other regulations, work rooms and workspaces in which the following occur or are created due to technical-technological and other work processes are subjected to periodic testing of the working environment.

1. physical damage,
2. chemical damage,
3. biological damage,
4. harmful radiation i
5. unfavorable microclimatic conditions.

Examinations from paragraph 1 of this article determine whether the working environment meets conditions that will not lead to occupational diseases and occupational diseases.

During the development of the project, the following technical regulations, standards and literature were applied:

Rulebook on technical norms for low-voltage electrical installations

("SL. list SFRJ" no. 53/88),

- Requirements for security JUS N.B2.741/1989
- Rulebook on technical standards for the protection of buildings against atmospheric discharge ("Sl. list SFRJ" no. 11/96),
- Yugoslav standards - lightning protection installations - general conditions JUS IEC 1024 -1/1996
- Law on fire protection ("Official Gazette of the Republic of Croatia" no. 79/04),
- Law on Health and Safety at Work ("Official Gazette of SRCG" No. 34/14),
- Law on space planning and construction of buildings "Official Gazette of Montenegro" no. 064/17 from 06.10.2017.
- Technical recommendation - Typification of measuring points (EPCG - Podgorica 2009) TP2ED
- Technical recommendation - for consumer connections to the low-voltage network (TP-2 amended edition-Podgorica 2008)
- General conditions for the delivery of electricity ("Official Gazette of the Republic of Croatia" No. 1/90)
- Rulebook on the supply of electricity (Official Gazette of the Republic of Croatia No. 13/05)
- MEST HD 60364-4-41:2011 - Low-voltage electrical installations - Part 4-41: Safety protection – Protection against electric shock
- MEST HD 60364-4-42:2011 - Low-voltage electrical installations - Part 4-42: Safety protection – Protection against electric shock
- MEST HD 60364-4-43:2011 - Low-voltage electrical installations - Part 4-43: Safety protection - Overcurrent protection
- MEST HD 60364-5-51:2011 - Electrical installations on buildings - Part 5-51: Selection and installation of electrical equipment - General rules
- MEST HD 60364-5-52: 2011 - Electrical installations on buildings - Part 5-52: Selection and installation of electrical equipment - Wiring systems
- MEST HD 60364-5-534:2011 - Low-voltage electrical installations - Part 5-534: Selection and installation of electrical equipment - Isolation, disconnection and control - Clause 534: Surge protection devices.
- MEST HD 60364-5-54:2011 - Electrical installations on buildings - Part 5-54: Selection and installation of electrical equipment - Earthing methods, protective conductors and connecting protective conductors
- MEST HD 60364-7-701:2011 - Low-voltage electrical installations - Part 7-701: Requirements for special installations or locations - Locations where bathtubs or shower cubicles are location
- MEST EN 50274: 2010 - Low-voltage switchgear - Protection against electric shock - Protection against accidental direct contact with dangerous active parts
- MEST EN 61543: 2009 - Residual current protective devices (RCDs) for household and similar use - Electromagnetic compatibility
- MEST EN 50525-2-31:2011 - Electric cables - Low-voltage power cables of nominal voltages up to and including 450/750 V (U0/U) - Part 2-31: Cables for general purposes - Unshielded single-core cables with thermoplastic PVC insulation
- MEST EN 61140:2010 - Protection against electric shock - Common aspects for installation and equipment
- MEST EN 1838:2011 - Application of lighting - Lighting in emergencies
- MEST EN 60529:2010 - Degrees of protection provided by enclosures (IP code)
- MEST EN 50368:2008 - Cable fasteners for electrical installations
- MEST EN 50425:2009 - Switches for household and similar permanent installations
- MEST EN 60269-1:2010 - Low-voltage fuses - Part 1: General requirements

- MEST EN 60269-1:2010/A1:2010 - Low-voltage fuses - Part 1: General requirements
- MEST EN 60320-1:2008 - Plug-in accessories for household and similar general purpose appliances - Part 1: General requirements
- MEST EN 60320-2-2:2008 - Plug-in accessories for household and similar general purpose appliances - Part 2-2: Inter-plug (connector) accessories for household and similar equipment
- MEST EN 60670-1:2010 - Boxes and enclosures for household electrical appliances and similar fixed electrical installations - Part 1: General requirements
- MEST EN 60670-22:2010 - Boxes and enclosures for household electrical appliances and similar fixed electrical installations - Part 22: Particular requirements for junction boxes and enclosures
- MEST EN 60730-2-14:2009 - Electrical appliances for automatic control in household and similar use - Part 2-14: Particular requirements for electrical actuators
- MEST EN 60898-1:2010 - Electrical accessories - Circuit breakers for overcurrent protection for household and similar installations - Part 1: Circuit breakers for alternating current (ac)

NUMERICAL DOCUMENTATION

4 CALCULATION

4.1 BALANCE LOAD

The simultaneous load of a part of the object is taken from the single-pole schemes, and the total load of the part of the object is obtained by multiplying with the simultaneity factor (determined by experience).

Peak load at the level of the newly designed part of the building (GRO):

$$P_I = P_{I_1} \times k_j = 34,06 \times 0,75 = 25,55 \text{ kW}$$

Total power at the level of the newly designed part of the building:

$$P_I = P_{I_1} / \cos \varphi = 25,5 / 0,95 = 26,89 \text{ kVA}$$

Estimation of electricity consumption. energy at the level of one year for the facility:

$$P_{GP} = 39,000 \text{ kWh}$$

As it is a project of adaptation of the existing classrooms and offices, i.e. replacement of the existing sockets and lamps in the relevant part of the building, while no larger consumers were added, we can conclude that there was no increase in simultaneous power and therefore the existing power cables and metering are retained.

4.2 ELECTRICAL CALCULATION

The electrical calculation is tabulated in two parts:

- Selection of lines and conductors for permanently permitted currents, according to JUS N.B2.752 with verification of protection against overload, according to JUS N.B2.743 (table 5.)
- Check for voltage drop (table 6.)

The simultaneous (peak) current of the cable, on the basis of which the cross-section of the cable will be checked, will be calculated according to the formula:

$$I_b = \frac{P_{vn}}{\sqrt{3} \times U_n \times \cos \varphi} \quad A \quad (2.12)$$

wherein:

- $\cos \varphi$ - power factor
- P_{vn} - transmission power of the cable
- $U_n = 400 \text{ V}$ - nominal voltage

The cross-section of the cables selected in this way will also be checked on the criterion of the permitted voltage drop from the PMO to the point of connection. The check will be carried out according to the form:

$$u\% = \frac{10^5 \sum P_{vn} \times l}{k \times U_n^2 \times S} (\%) \quad (2.13)$$

wherein :

- P_{vn} - peak power
- l (m) - the length of the cable on the calculated section
- $U_n = 400$ V - nominal voltage
- $k = 53.3$ cm/mm²

4.2.1 Protection against indirect contact voltage

The project envisages a protection system against indirect contact voltage TN-cs, i.e. from the TS to the "PMO" TN-c connection-measuring cabinet, and the TN-s system in the installation.

The Fe/Zn 25x4 mm strip laid in the cable trench is connected to the grounding of the facility with the protective busbar and single-potential busbars in the PMO. This fulfills the condition of connecting all masses (exposed visible parts) to the grounded point of the system. From the TS to the PMO cabinet, the function of the protective conductor is taken over by the neutral conductor (PEN conductor), given that the selected sections meet the requirements of the JUS N.B2.754 standard. and that in the PMO of the building it is planned to connect the neutral bus with a strip of Fe/Zn 25x4 mm to the grounding of the building.

The basic condition of protection in the applied system of protection against indirect contact by automatic shutdown of the power supply, in the time provided according to JUS N.B2. 741 for the TN-cs protection system, is satisfied if the condition is met:

$$Z_k \times I_a \leq U_0 \quad (2.25)$$

where is:

- U_0 - nominal voltage to earth (V),
- Z_k - the impedance of the fault loop that includes the source, the phase conductor to the fault point and the protective conductor between the fault point and the source (Ω),
- I_a - the current that ensures the operation of the protective device for automatic shutdown in time (for 220 V - 0.4 sec.) or 5 sec for power supply circuits.

At the same time, this system effectively protects the cables themselves from the occurrence of a short circuit.

In the next part of the project (Table 4, Table 5) the check of automatic disconnection is presented in a tabular manner, where the most critical case in the installation of the facility is assumed, that is, for the section with the highest impedance of the fault loop.

Table 5: Selection of conductors for permanently permitted currents according to JUS N.B2. 752 with overload protection check according to JUS N.B2. 743

Relation		Installed power P (W)	Factor once-minority	Pvt (W)	Ib (A)	Type and section cable (mm ²)	Type divorce according to	Permanently permission current Id (A)	Correction. groups current circles K1	factor temp Surroundings K2	Permanently bearable current From (A)	More-a doublet nominal electricity K	Adopted fuse In (A)	1.45xIz/K	Comment: How is it: Ib=<In<=Iz i In<=1.45xIz/K that selected cable cross-section
FROM	TO						according to JUS N. B2. 752					N.E5.206	N.E5.206		
GRO	RO-R	29960	0.50	14,980.00	21.62	N2XH-J 5x16	C	96	0.7	1	67.2	1.45	40	67.2	satisfies
GRO	RO-1	31800	0.60	19,080.00	27.54	N2XH-J 5x16	C	96	0.7	1	67.2	1.45	40	67.2	satisfies
RO-1	RO-4	18800	0.45	8,460.00	12.21	N2XH-J 5x4	C	40	0.7	1	28	1.45	20	28.0	satisfies
RO-R	str.krug br.1	4500	1.00	4,500.00	6.50	N2XH-J 5x2.5	C	30	0.7	1	21	1.45	16	21.0	satisfies
RO-4	str.krug br.1	3000	1.00	3,000.00	13.04	N2XH-J 3x2,5	C	33	0.7	1	23.1	1.45	16	23.1	satisfies
RO-4	str.krug br.15	300	1.00	300.00	1.30	N2XH-J 3x1,5	C	24	0.7	1	16.8	1.45	10	16.8	satisfies

Table 6: Checking the section of the selected conductor for voltage drop according to JUS N.B2. 752

Relation		Installed power P (W)	Factor one-time minority	Length l (m)	k (cm/mm ²)	Cross section conductor (mm ²)	Stress (C)	P overvoltage			Comment allowable drop voltage according to Article 20 of the Rules
FROM	TO							to the relationship %	in a relationship %	total %	
GRO	RO-R	29960	0.50	15	53.6	N2XH-J 5x16	400	1.000	0.164	1.164	satisfies
GRO	RO-1	31800	0.60	25	53.6	N2XH-J 5x16	400	1.000	0.348	1.348	satisfies
RO-1	RO-4	18800	0.45	33	53.6	N2XH-J 5x4	400	1.348	0.814	2.161	satisfies
RO-R	str.krug br.1	4500	1.00	15	53.6	N2XH-J 5x2.5	400	1.164	0.315	1.479	satisfies
RO-4	str.krug br.1	3000	1.00	11	53.6	N2XH-J 3x2,5	230	2.161	0.466	2.627	satisfies
RO-4	str.krug br.15	300	1.00	13	53.6	N2XH-J 3x1,5	230	2.161	0.092	2.253	satisfies

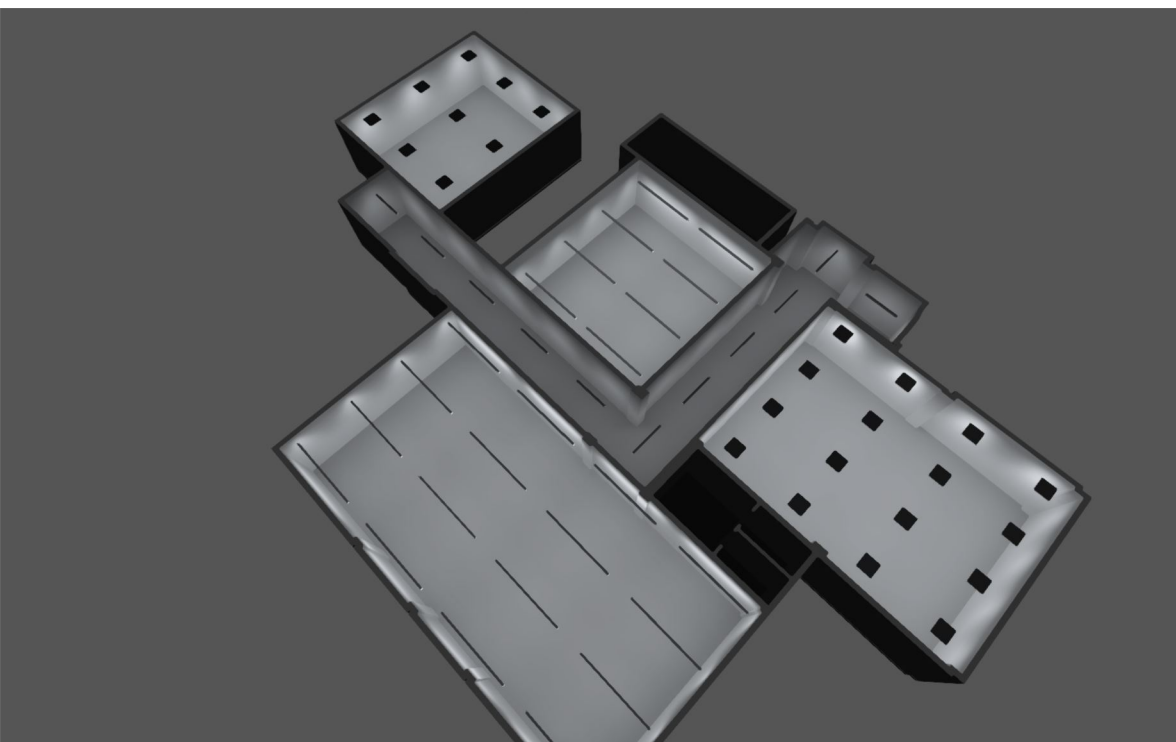
Responsible engineer::

Slobodan Marković, dipl.inž.el.

4.3 PHOTOMETRIC CALCULATION

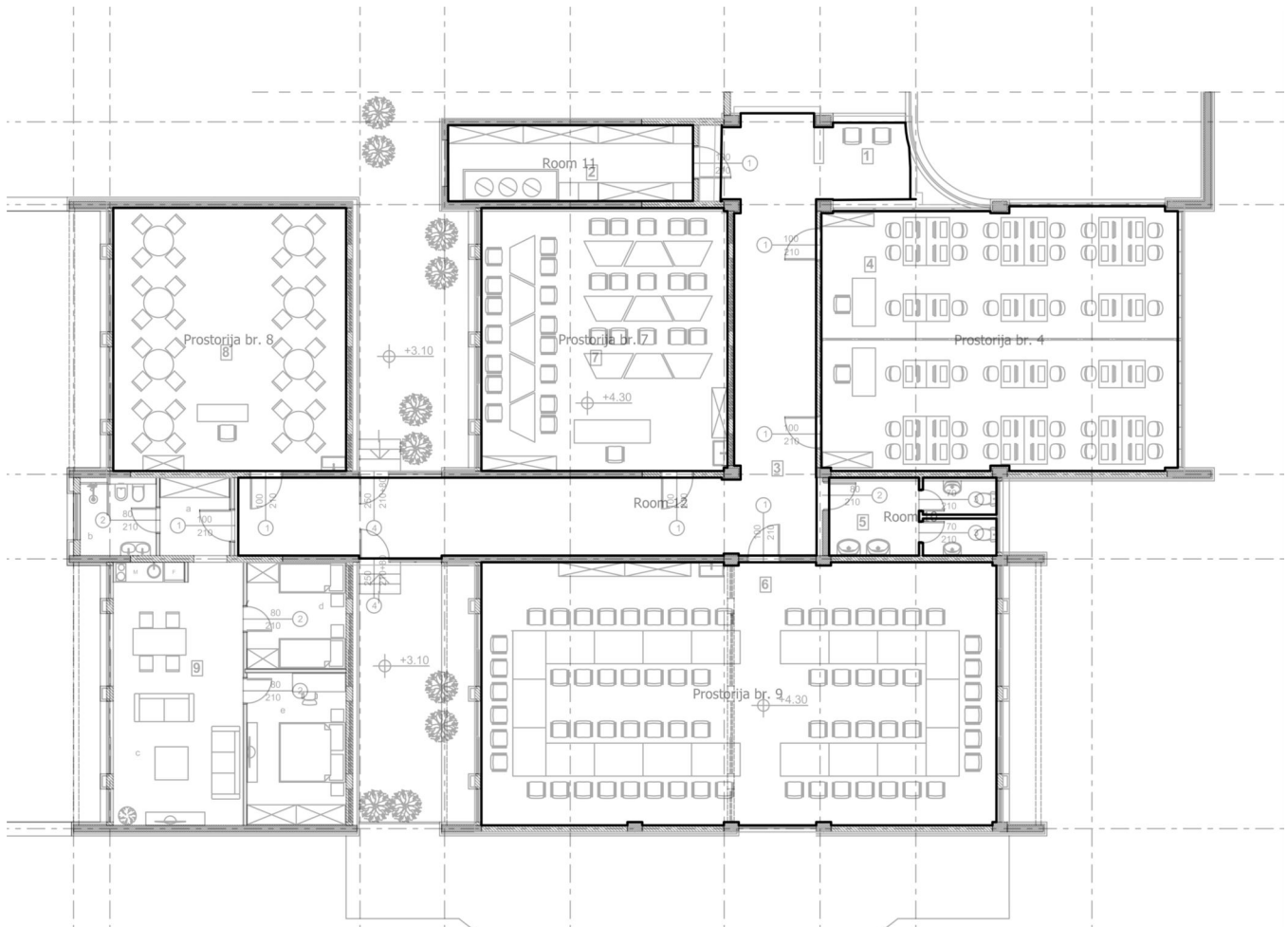
The photometric calculation was performed in the photometric program DIALux and was made for the selected type of lamps. Based on the photometric calculation, the number and arrangement of lamps in the space was determined. In the front part of the project, a calculation is attached, which shows that the international recommendations for the mean value of illumination are met.

Responsible engineer:
Slobodan Marković, dipl. inž. el.

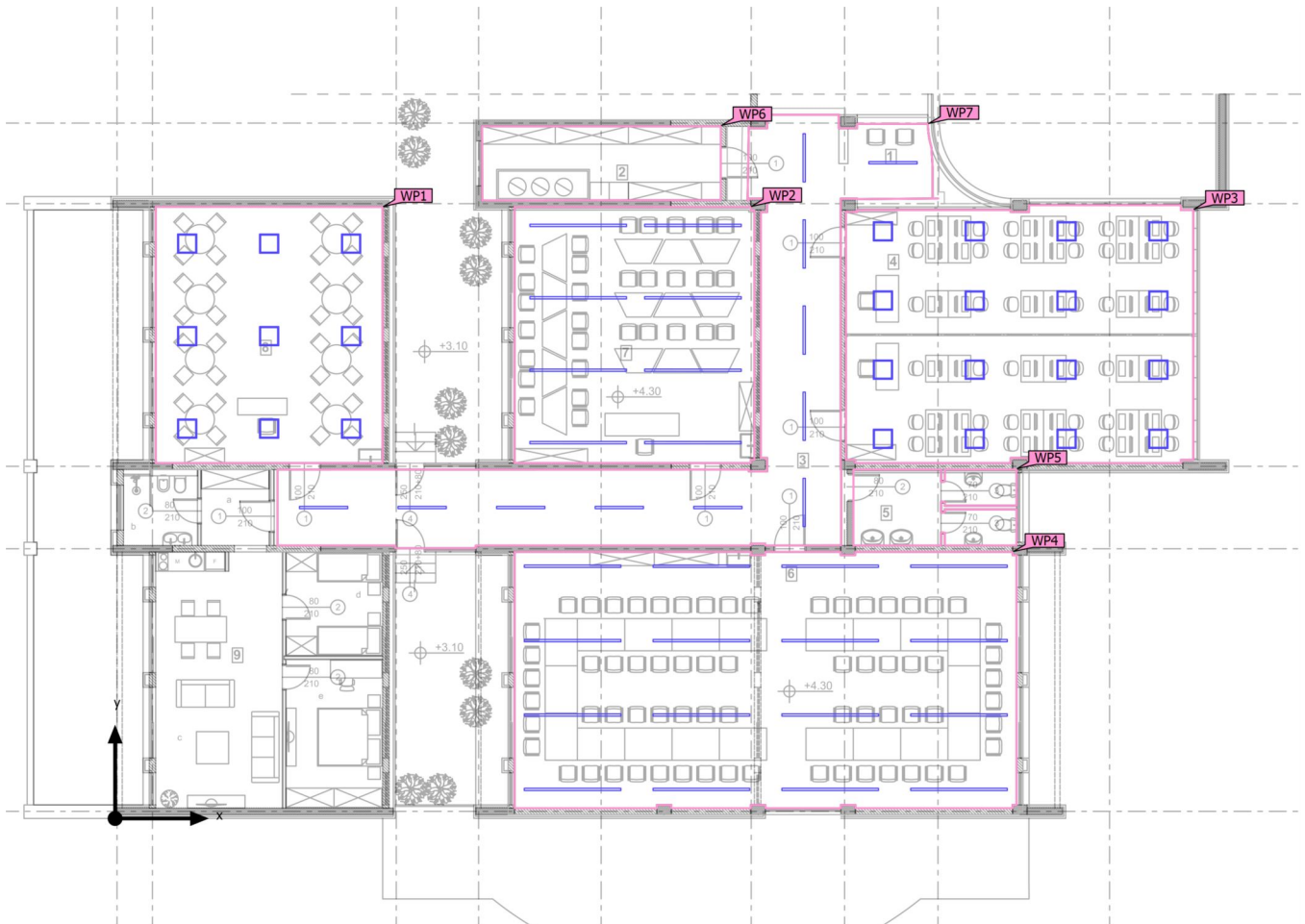


Project

Building 1 · Sprat (Light scene 1)

Room list

Building 1 · Sprat (Light scene 1)

Calculation objects

Building 1 · Sprat (Light scene 1)

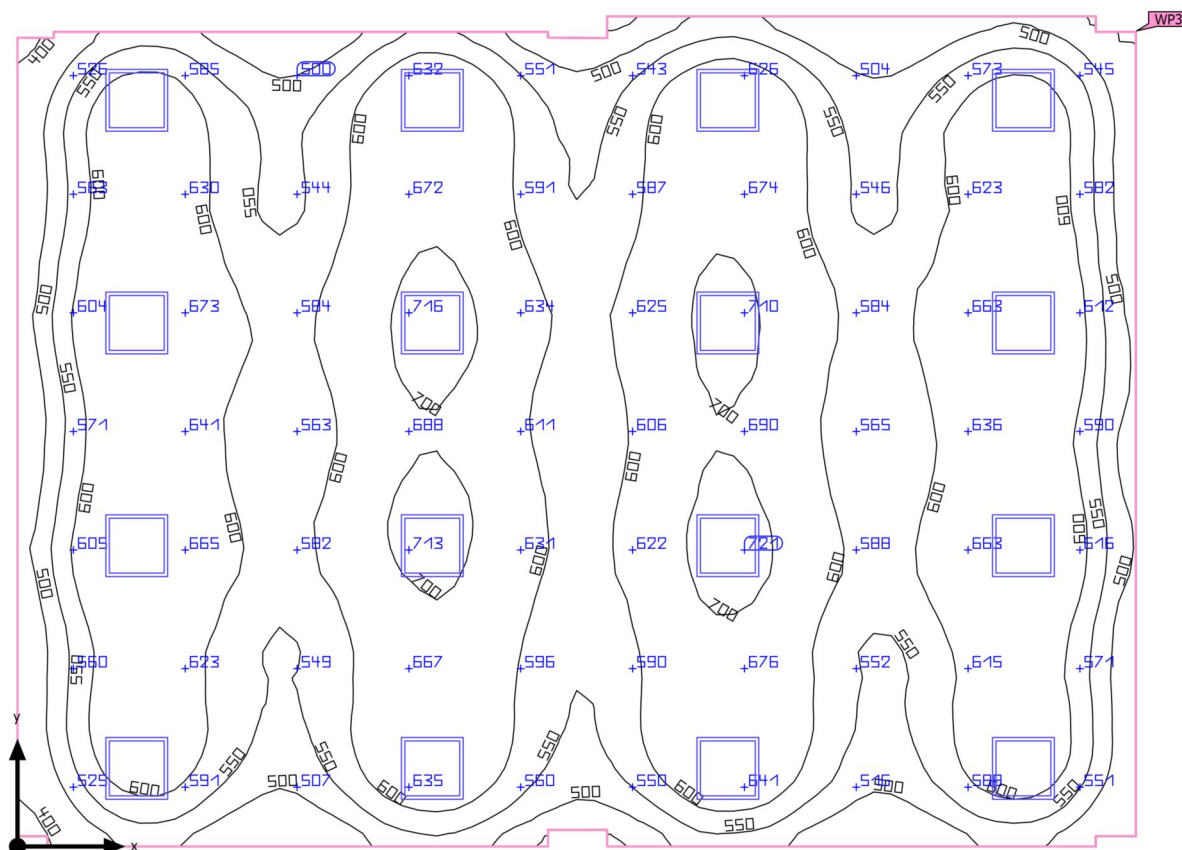
Calculation objects

Working planes

Properties	\bar{E} (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Prostorija br. 8) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.000 m	495 lx (≥ 300 lx) ✓	306 lx	621 lx	0.62 (≥ 0.60) ✓	0.49	WP1
Working plane (Prostorija br. 7) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.000 m	504 lx (≥ 500 lx) ✓	247 lx	668 lx	0.49 (≥ 0.60) ✗	0.37	WP2
Working plane (Prostorija br. 4) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.000 m	600 lx (≥ 300 lx) ✓	365 lx	727 lx	0.61 (≥ 0.60) ✓	0.50	WP3
Working plane (Prostorija br. 9) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.000 m	476 lx (≥ 300 lx) ✓	292 lx	573 lx	0.61 (≥ 0.60) ✓	0.51	WP4
Working plane (Room 10) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.000 m	0.00 lx (≥ 500 lx) ✗	0.00 lx	0.00 lx	- (≥ 0.60)	-	WP5
Working plane (Room 11) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.000 m	0.00 lx (≥ 500 lx) ✗	0.00 lx	0.00 lx	- (≥ 0.60)	-	WP6
Working plane (Room 12) Perpendicular illuminance (adaptive) Height: 0.000 m, Wall zone: 0.000 m	188 lx (≥ 100 lx) ✓	77.3 lx	241 lx	0.41 (≥ 0.40) ✓	0.32	WP7

Building 1 · Sprat · Prostorija br. 4 (Light scene 1)

Summary



Ground area	85.30 m²	Clearance height	3.060 m
Reflection factors	Ceiling: 70.0 %, Walls: 50.0 %, Floor: 20.0 %	Mounting height	3.000 m
		Height _{Working plane}	0.800 m
Maintenance factor	0.80 (fixed)	Wall zone _{Working plane}	0.000 m

Building 1 · Sprat · Prostorija br. 4 (Light scene 1)

Summary

Results

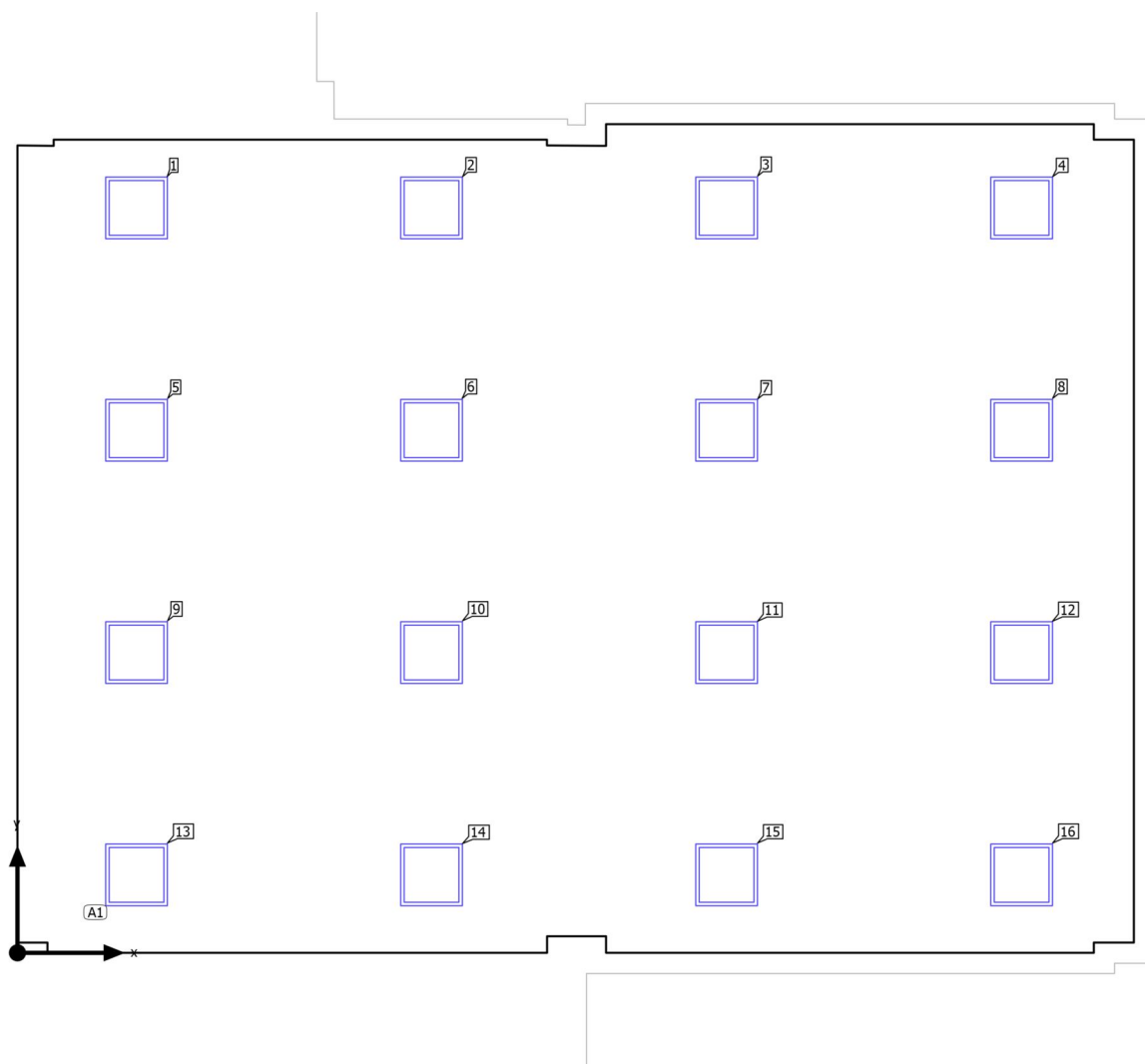
	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{\text{perpendicular}}$	600 lx	$\geq 300 \text{ lx}$	✓	WP3
	$U_o (g_1)$	0.61	≥ 0.60	✓	WP3
Glare valuation ⁽¹⁾	$R_{UG, \text{max}}$	17	≤ 19	✓	
Energy estimation ⁽²⁾	Consumption	724 kWh/a	max. 3000 kWh/a	✓	
Room	Lighting power density	6.38 W/m ²	–		
		1.06 W/m ² /100 lx	–		

(1) Based on a rectangular space of 8.009 m x 10.790 m and SHR of 0.25.

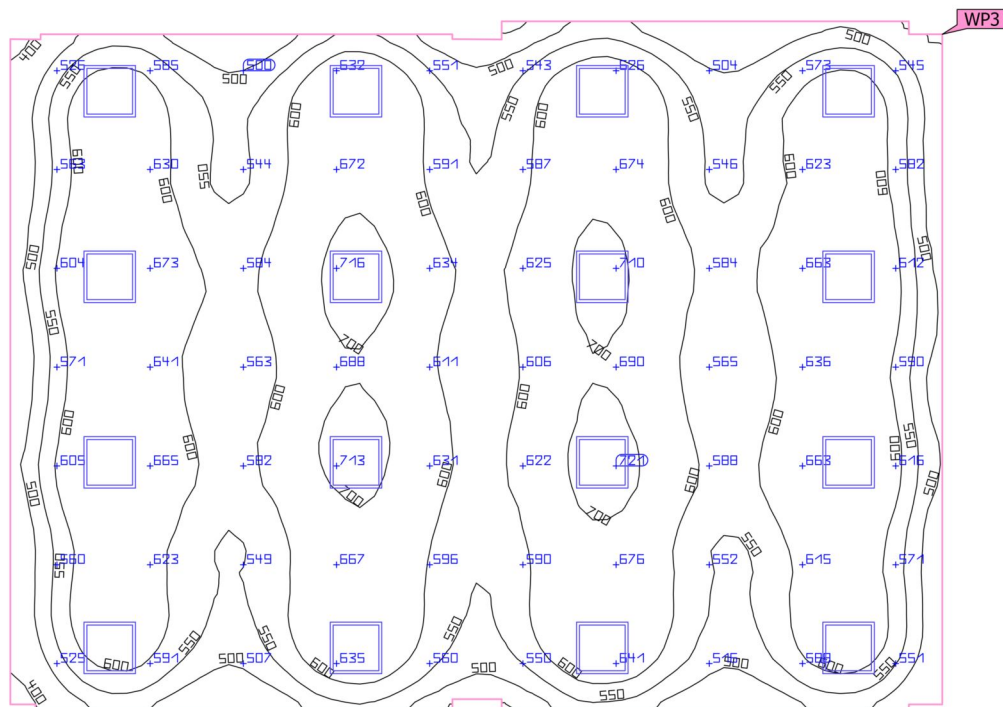
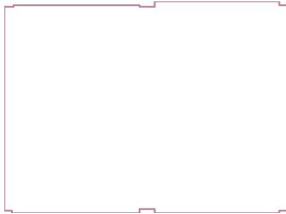
(2) Calculated using DIN:18599-4.

Utilisation profile: Educational premises - Educational buildings (5.36.1 Classrooms, tutorial rooms)

Building 1 · Sprat · Prostorija br. 4

Luminaire layout plan

Building 1 · Sprat · Prostorija br. 4 (Light scene 1)

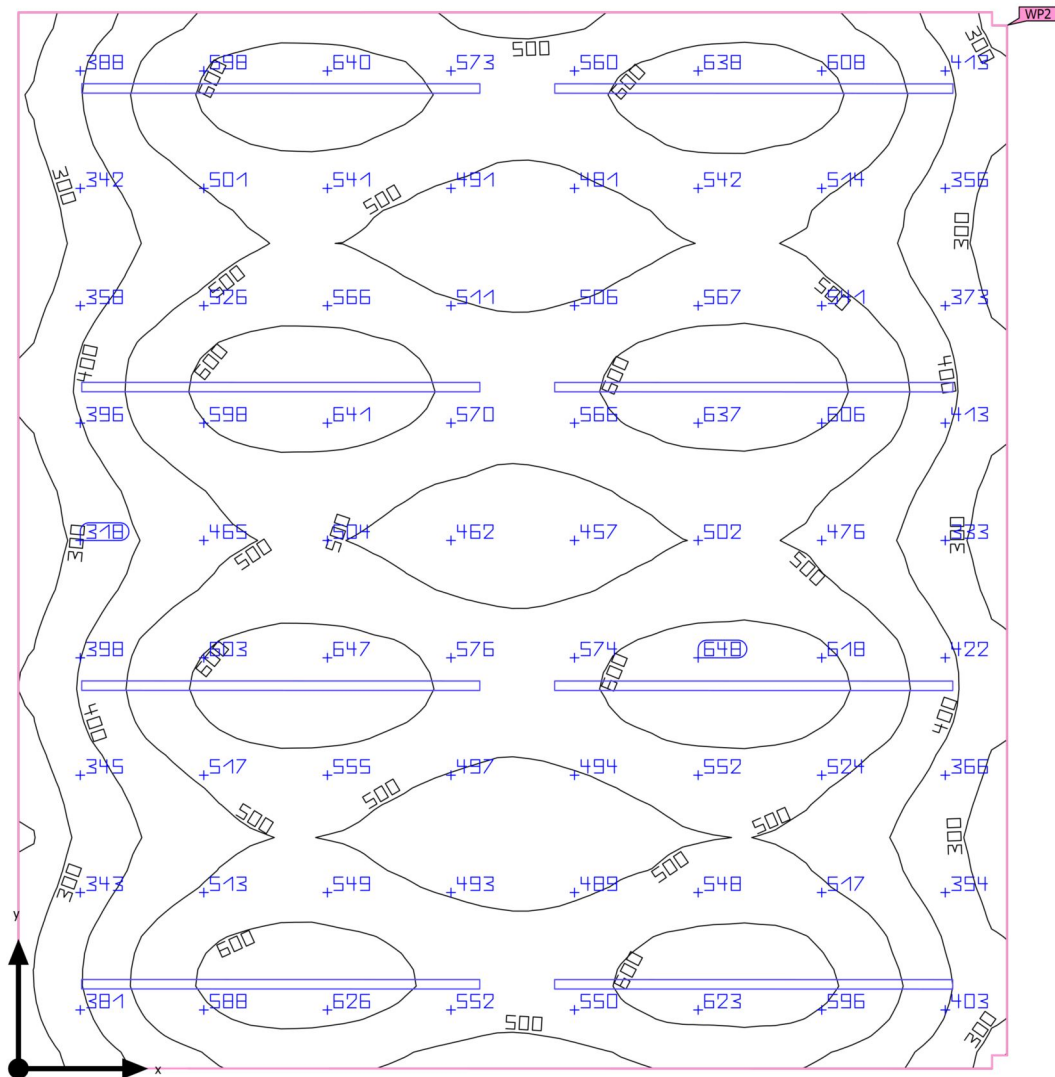
Working plane (Prostorija br. 4)

Properties	\bar{E} (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Prostorija br. 4)	600 lx	365 lx	727 lx	0.61	0.50	WP3
Perpendicular illuminance (adaptive)	≥ 300 lx			≥ 0.60		
Height: 0.800 m, Wall zone: 0.000 m	✓			✓		

Utilisation profile: Educational premises - Educational buildings (5.36.1 Classrooms, tutorial rooms)

Building 1 · Sprat · Prostorija br. 7 (Light scene 1)

Summary



Ground area 59.27 m²

Reflection factors Ceiling: 70.0 %,
Walls: 50.0 %,
Floor: 20.0 %

Maintenance factor 0.80 (fixed)

Clearance height 3.000 m

Mounting height 2.500 m

Height_{Working plane} 0.800 m

Wall zone_{Working plane} 0.000 m

Building 1 · Sprat · Prostorija br. 7 (Light scene 1)

Summary

Results

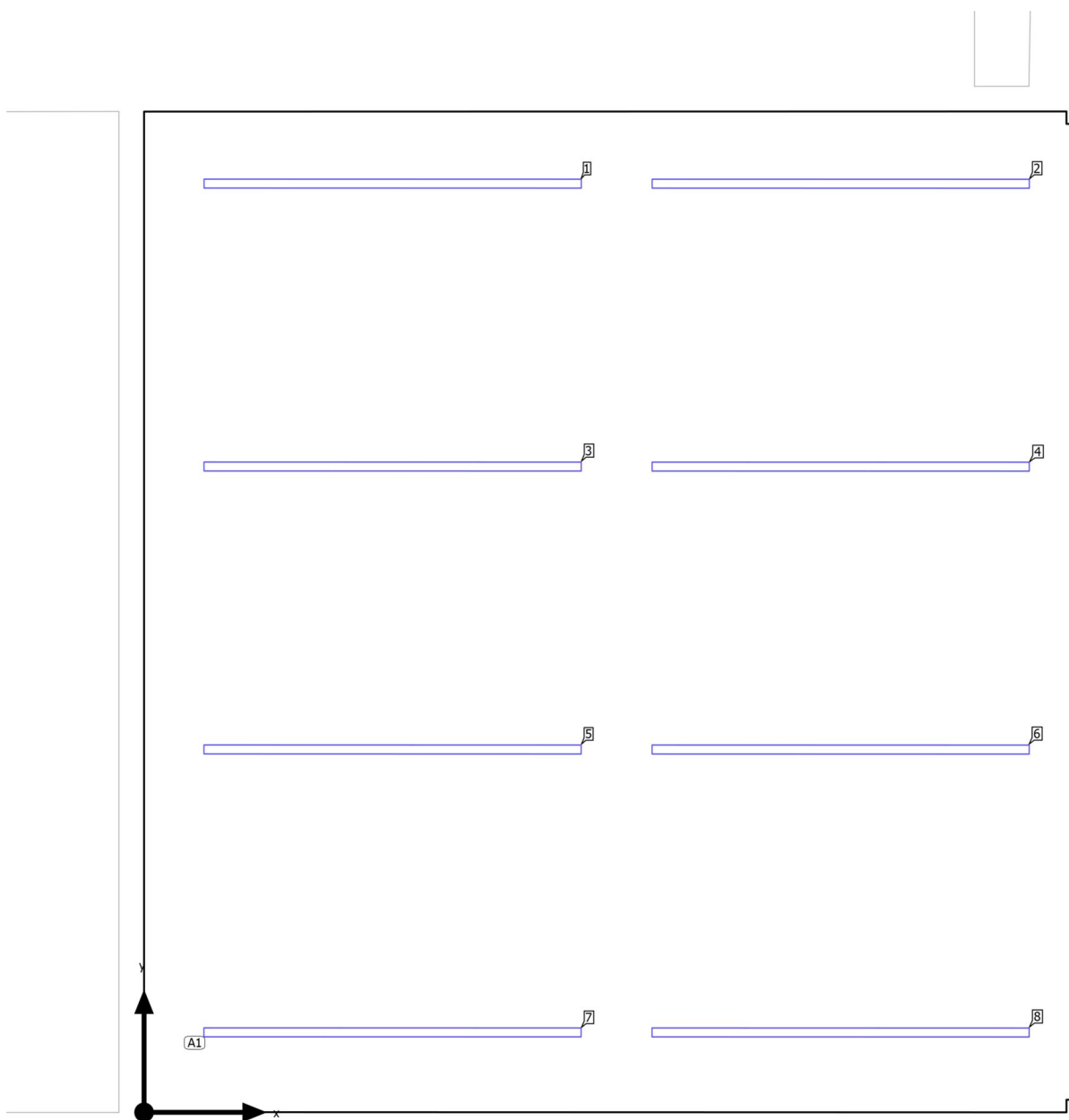
	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{\text{perpendicular}}$	504 lx	$\geq 500 \text{ lx}$	✓	WP2
	$U_o (g_1)$	0.49	≥ 0.60	✗	WP2
Glare valuation ⁽¹⁾	$R_{UG, \text{max}}$	20	≤ 19	✗	
Energy estimation ⁽²⁾	Consumption	564 kWh/a	max. 2100 kWh/a	✓	
Room	Lighting power density	7,15 W/m ²	–		
		1.42 W/m ² /100 lx	–		

(1) Based on a rectangular space of 7.960 m x 7.450 m and SHR of 0.25.

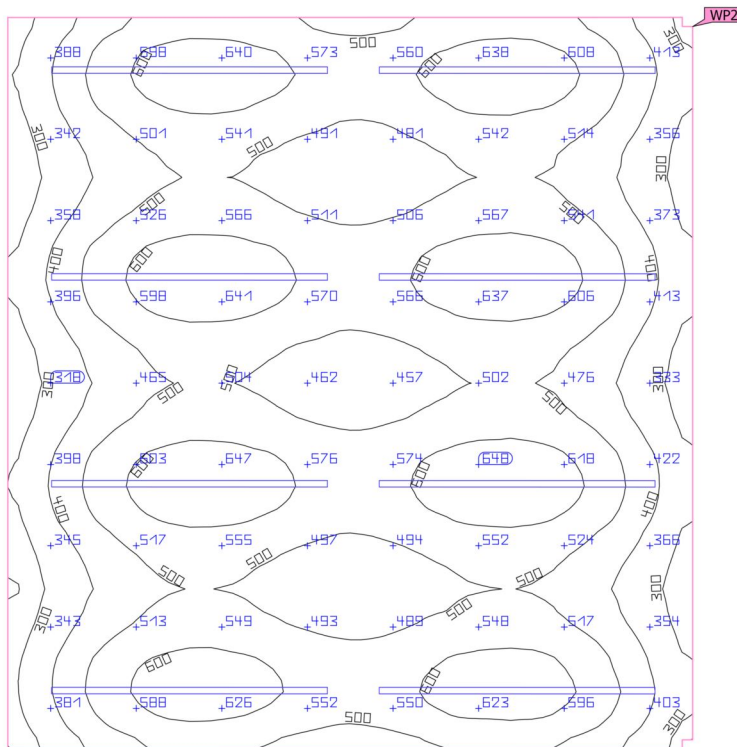
(2) Calculated using DIN:18599-4.

Utilisation profile: Educational premises - Educational buildings (44.1 Classroom - general activities)

Building 1 · Sprat · Prostorija br. 7

Luminaire layout plan

Building 1 · Sprat · Prostorija br. 7 (Light scene 1)

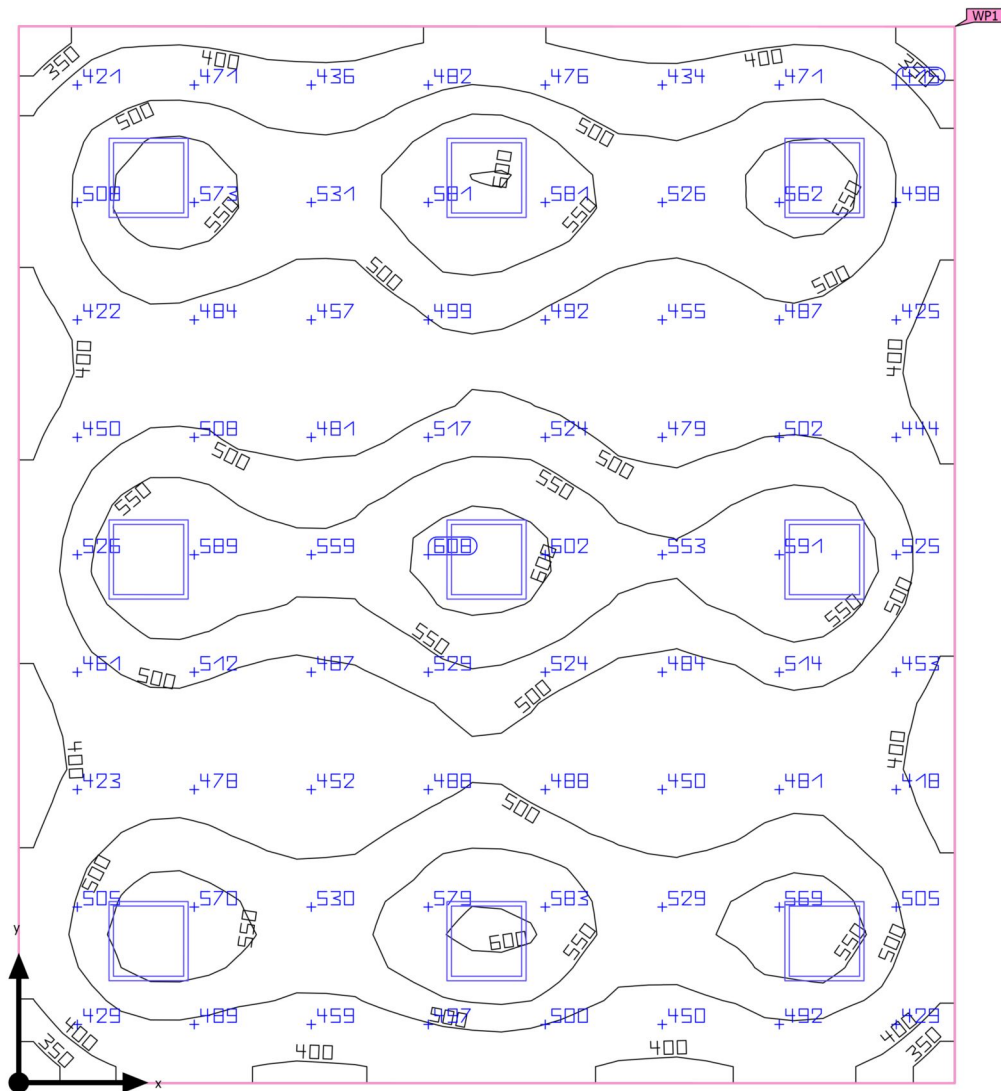
Working plane (Prostorija br. 7)

Properties	\bar{E} (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Prostorija br. 7)	504 lx	247 lx	668 lx	0.49	0.37	WP2
Perpendicular illuminance (adaptive)	(≥ 500 lx)			(≥ 0.60)		
Height: 0.800 m, Wall zone: 0.000 m	✓			✗		

Utilisation profile: Educational premises - Educational buildings (44.1 Classroom - general activities)

Building 1 · Sprat · Prostorija br. 8 (Light scene 1)

Summary



Ground area	56.11 m ²	Clearance height	3.000 m
Reflection factors	Ceiling: 70.0 %, Walls: 50.0 %, Floor: 20.0 %	Mounting height	3.027 m
Maintenance factor	0.80 (fixed)	Height _{Working plane}	0.800 m
		Wall zone _{Working plane}	0.000 m

Building 1 · Sprat · Prostorija br. 8 (Light scene 1)

Summary

Results

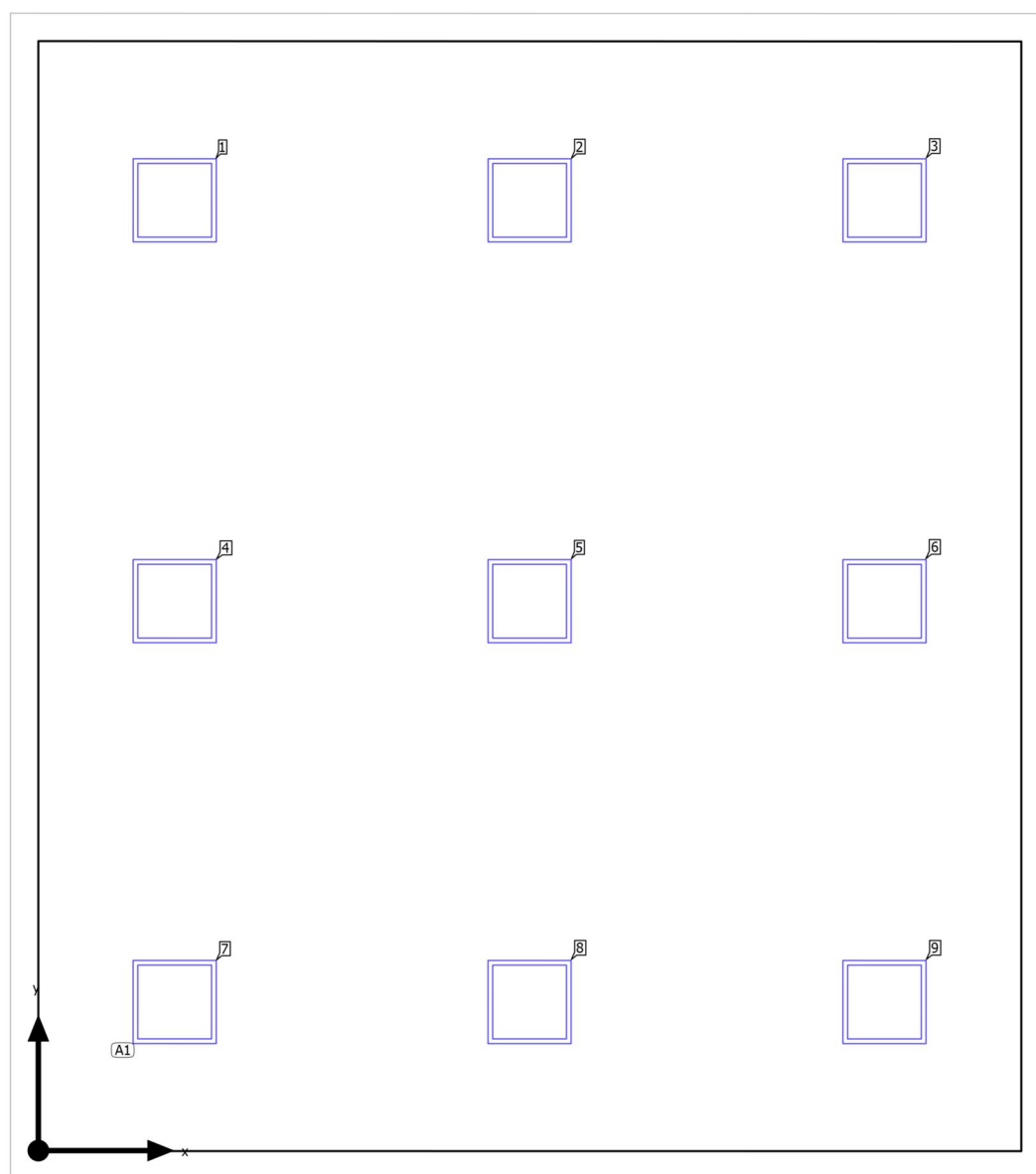
	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{\text{perpendicular}}$	495 lx	$\geq 300 \text{ lx}$	✓	WP1
	$U_o (g_1)$	0.62	≥ 0.60	✓	WP1
Glare valuation ⁽¹⁾	$R_{UG, \text{max}}$	17	≤ 19	✓	
Energy estimation ⁽²⁾	Consumption	407 kWh/a	max. 2000 kWh/a	✓	
Room	Lighting power density	5,45 W/m ²	–		
		1.10 W/m ² /100 lx	–		

(1) Based on a rectangular space of 7.961 m x 7.050 m and SHR of 0.25.

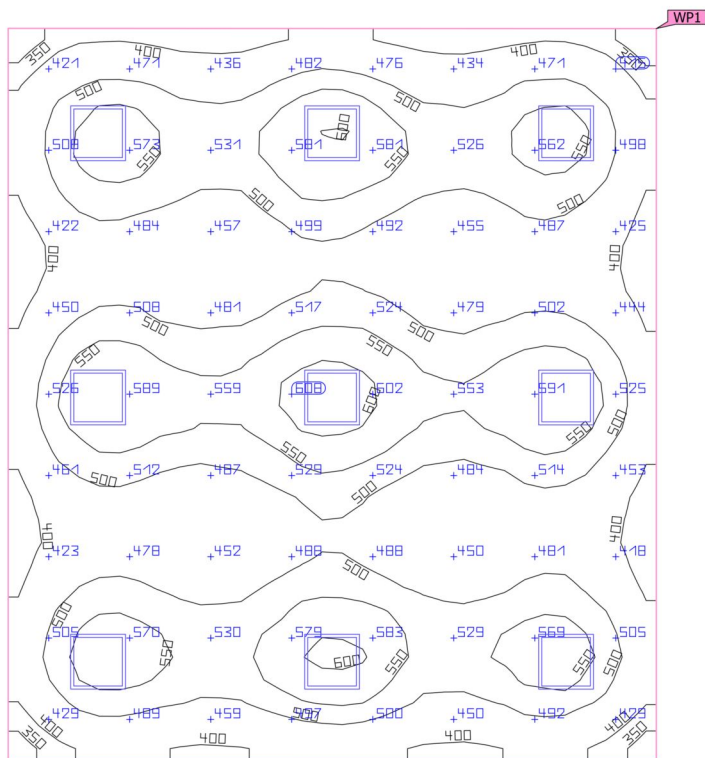
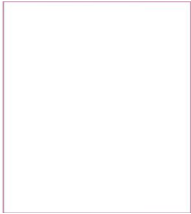
(2) Calculated using DIN:18599-4.

Utilisation profile: Educational premises - Educational buildings (5.36.1 Classrooms, tutorial rooms)

Building 1 · Sprat · Prostorija br. 8

Luminaire layout plan

Building 1 · Sprat · Prostorija br. 8 (Light scene 1)

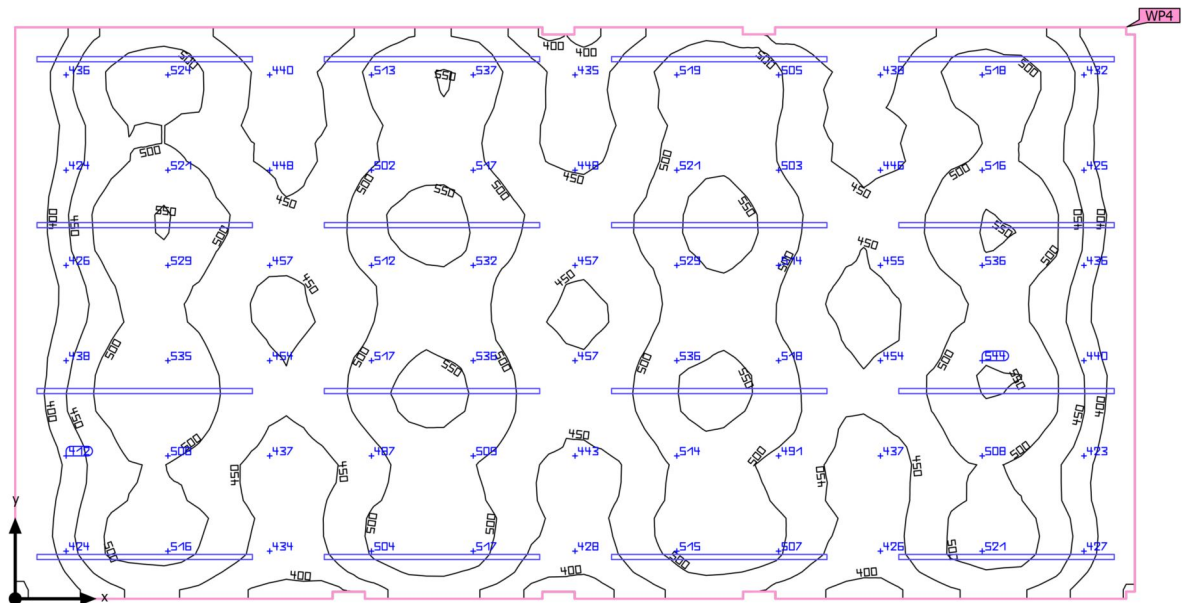
Working plane (Prostorija br. 8)

Properties	\bar{E} (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Prostorija br. 8)	495 lx	306 lx	621 lx	0.62	0.49	WP1
Perpendicular illuminance (adaptive)	(≥ 300 lx)			(≥ 0.60)		
Height: 0.800 m, Wall zone: 0.000 m	✓			✓		

Utilisation profile: Educational premises - Educational buildings (5.36.1 Classrooms, tutorial rooms)

Building 1 · Sprat · Prostorija br. 9 (Light scene 1)

Summary



Ground area	123.85 m²	Clearance height	3.000 m
Reflection factors	Ceiling: 70.0 %, Walls: 50.0 %, Floor: 20.0 %	Mounting height	3.000 m
Maintenance factor	0.80 (fixed)	Height _{working plane}	0.800 m
		Wall zone _{Working plane}	0.000 m

Building 1 · Sprat · Prostorija br. 9 (Light scene 1)

Summary

Results

	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{\text{perpendicular}}$	476 lx	$\geq 300 \text{ lx}$	✓	WP4
	$U_o (g_1)$	0.61	≥ 0.60	✓	WP4
Glare valuation ⁽¹⁾	$R_{UG, \text{max}}$	20	≤ 19	✗	
Energy estimation ⁽²⁾	Consumption	1128 kWh/a	max. 4350 kWh/a	✓	
Room	Lighting power density	6.85 W/m ²	–		
		1.44 W/m ² /100 lx	–		

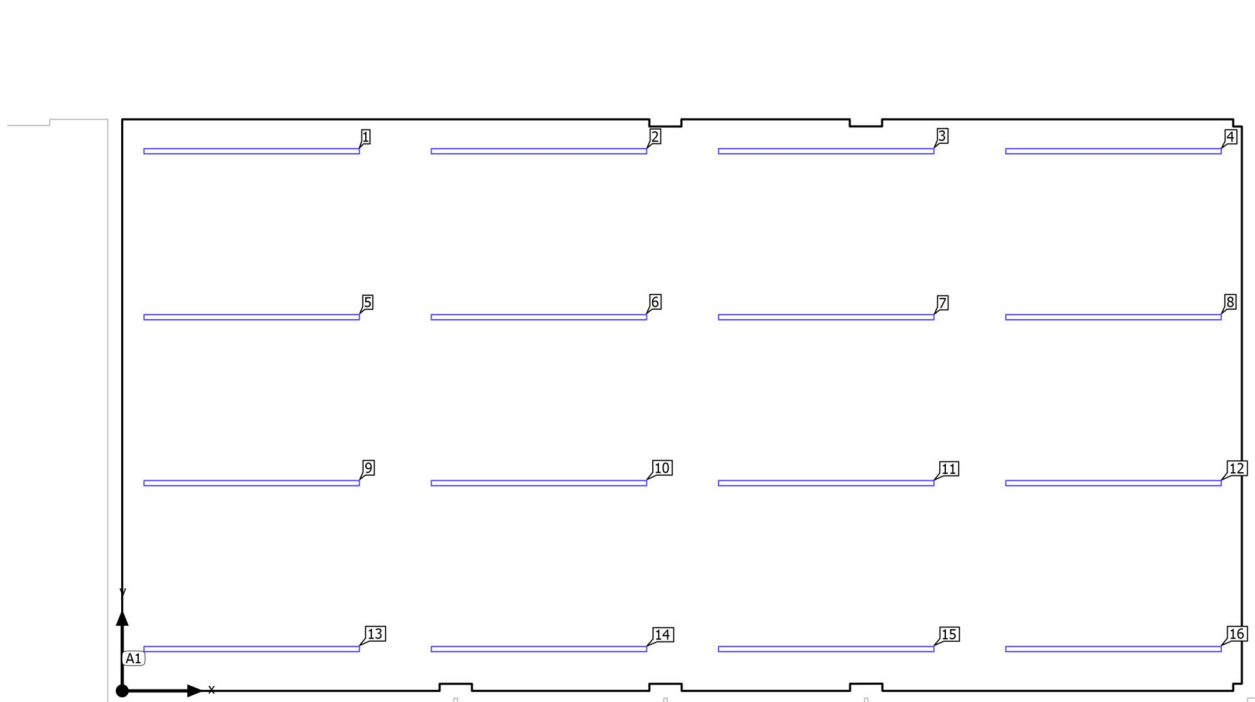
(1) Based on a rectangular space of 7.960 m x 15.590 m and SHR of 0.25.

(2) Calculated using DIN:18599-4.

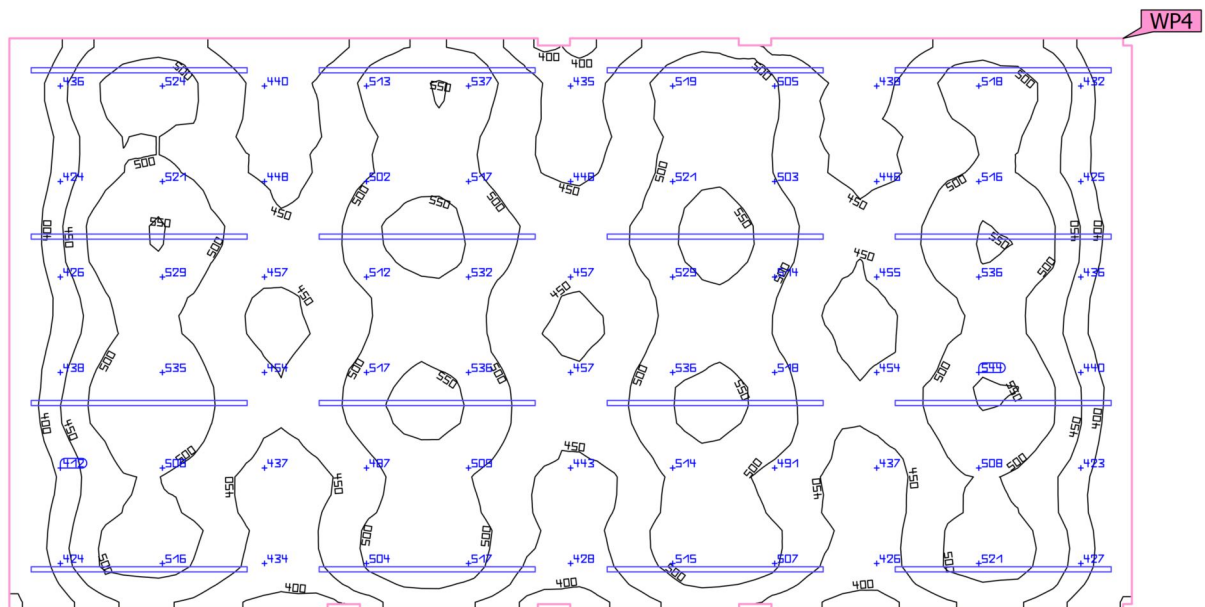
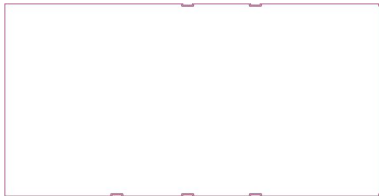
Utilisation profile: Educational premises - Educational buildings (5.36.1 Classrooms, tutorial rooms)

Building 1 · Sprat · Prostorija br. 9

Luminaire layout plan



Building 1 · Sprat · Prostorija br. 9 (Light scene 1)

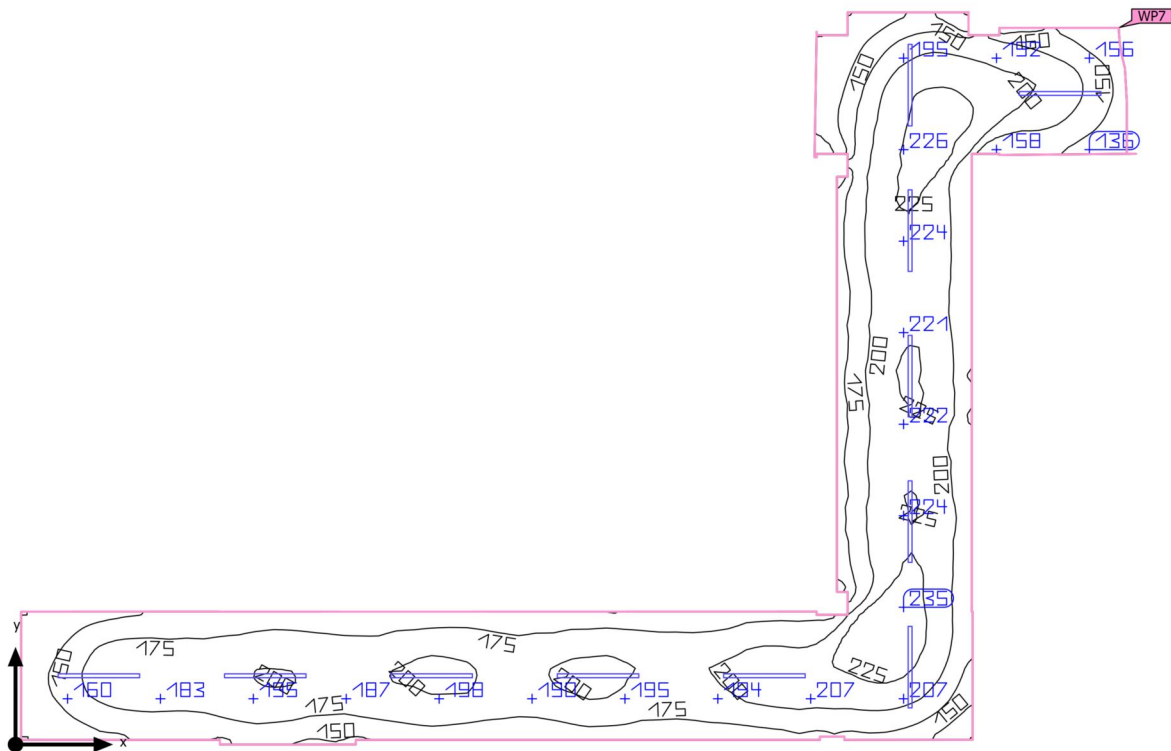
Working plane (Prostorija br. 9)

Properties	\bar{E} (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Prostorija br. 9)	476 lx	292 lx	573 lx	0.61	0.51	WP4
Perpendicular illuminance (adaptive)	≥ 300 lx			≥ 0.60		
Height: 0.800 m, Wall zone: 0.000 m	✓			✓		

Utilisation profile: Educational premises - Educational buildings (5.36.1 Classrooms, tutorial rooms)

Building 1 · Sprat · Room 12 (Light scene 1)

Summary



Ground area	75.87 m²
Reflection factors	Ceiling: 70.0 %, Walls: 50.0 %, Floor: 20.0 %
Maintenance factor	0.80 (fixed)

Clearance height	3.000 m
Mounting height	3.000 m
Height _{Working plane}	0.000 m
Wall zone _{Working plane}	0.000 m

Building 1 · Sprat · Room 12 (Light scene 1)

Summary

Results

	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{\text{perpendicular}}$	188 lx	$\geq 100 \text{ lx}$	✓	WP7
	$U_o (g_1)$	0.41	≥ 0.40	✓	WP7
Glare valuation ⁽¹⁾	$R_{UG, \text{max}}$	20	≤ 25	✓	
Energy estimation ⁽²⁾	Consumption	327 kWh/a	max. 2700 kWh/a	✓	
Room	Lighting power density	3.91 W/m ²	–		
		2.08 W/m ² /100 lx	–		

(1) Based on a rectangular space of 20.608 m x 13.401 m and SHR of 0.25.

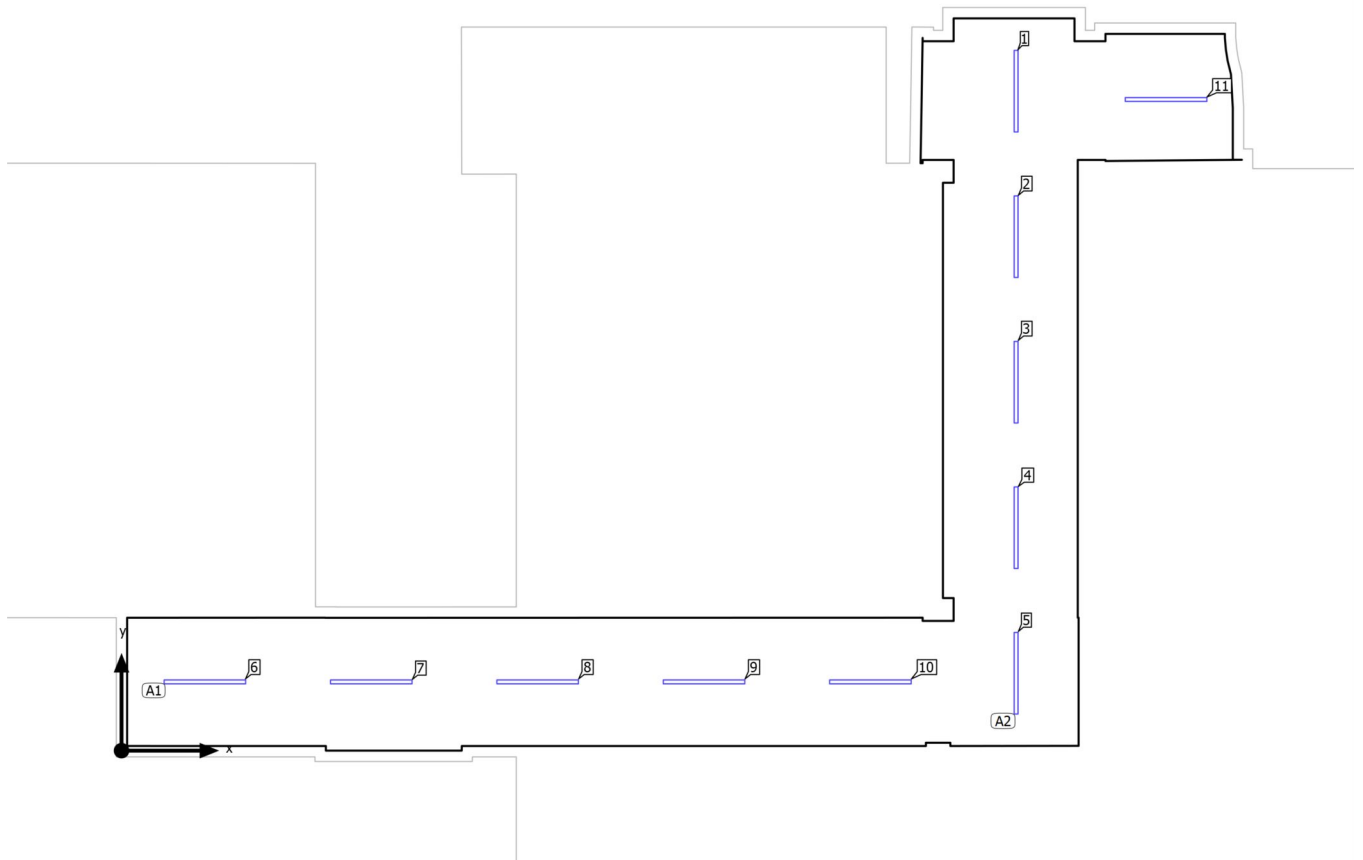
(2) Calculated using DIN:18599-4.

Utilisation profile: Educational premises - Educational buildings (44.19 Circulation areas, corridors)

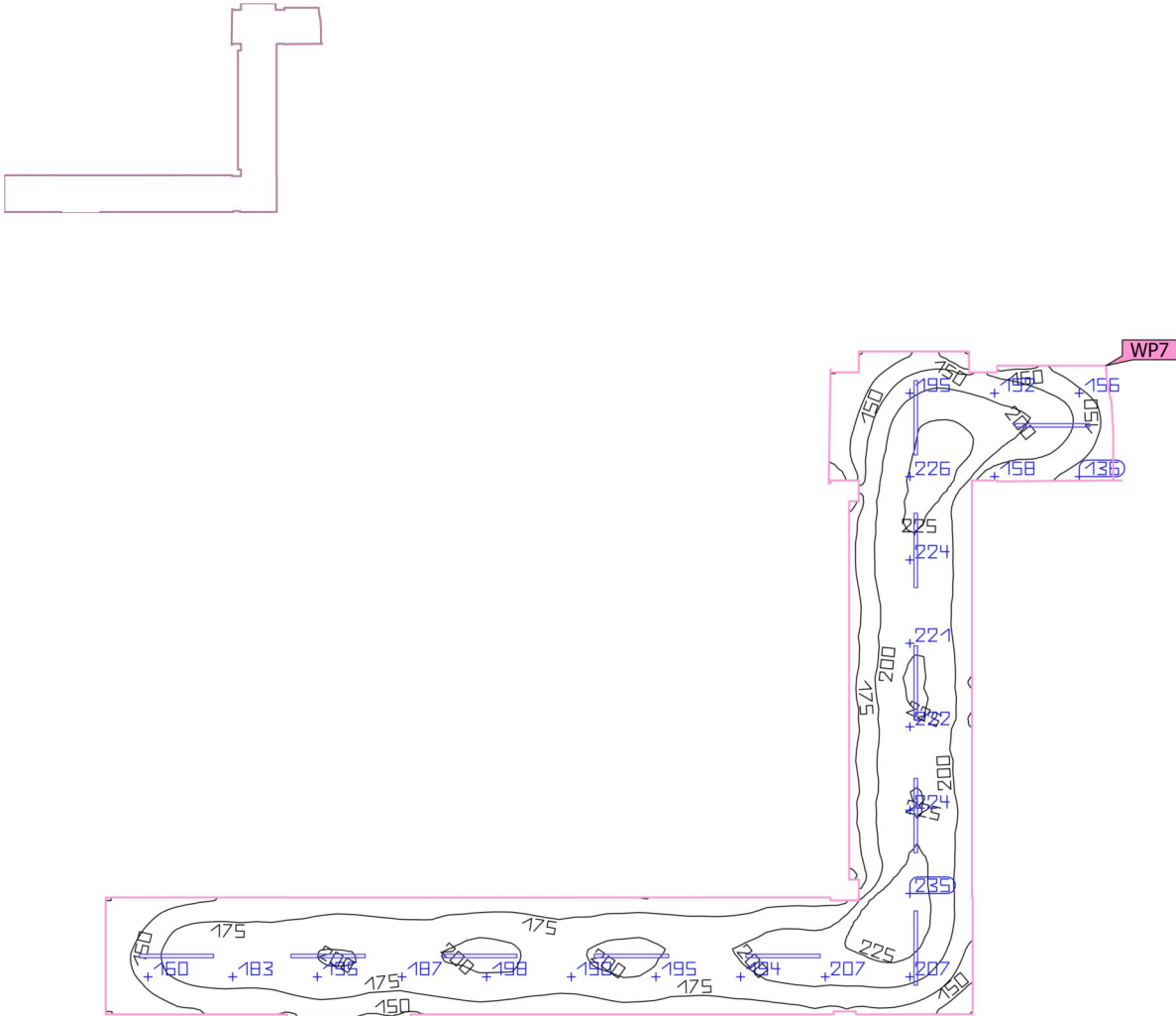
Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
11	Lighting	96632031	EQL C L1500 LRO WH	20	27.0 W	2540 lm	94.1 lm/W

Building 1 · Sprat · Room 12

Luminaire layout plan

Building 1 · Sprat · Room 12 (Light scene 1)

Working plane (Room 12)

Properties	\bar{E} (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Room 12)	188 lx	77.3 lx	241 lx	0.41	0.32	WP7
Perpendicular illuminance (adaptive)	≥ 100 lx			≥ 0.40		
Height: 0.000 m, Wall zone: 0.000 m	✓			✓		

Utilisation profile: Educational premises - Educational buildings (44.19 Circulation areas, corridors)

Glossary

A

A	Formula symbol for a surface in the geometry
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B

Background area	The background area borders the direct ambient area according to DIN EN 12464-1 and reaches up to the borders of the room. In larger rooms, the background area is at least 3 m wide. It is located horizontally at floor level.
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C

CCT	<p>(Engl. correlated colour temperature)</p> <p>Body temperature of a thermal radiator which serves to describe its light colour. Unit: Kelvin [K]. The lesser the numerical value the redder; the greater the numerical value the bluer the light colour. The colour temperature of gas-discharge lamps and semi-conductors are termed "correlated colour temperature" in contrast to the colour temperature of thermal radiators.</p> <p>Allocation of the light colours to the colour temperature ranges acc. to EN 12464-1:</p> <p>Light colour - colour temperature [K] warm white (ww) < 3,300 K neutral white (nw) ≥ 3,300 – 5,300 K daylight white (dw) > 5,300 K</p>
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Clearance height	The designation for the distance between upper edge of the floor and bottom edge of the ceiling (in the completely furnished status of room).
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Control group	A group of luminaires that are dimmed and controlled together. For each lighting scene, a control group provides its own dimming value. All luminaires within a control group share this dimming value. The control groups with their luminaires are automatically determined by DIALux on the basis of the created light scenes and their luminaire groups.
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CRI	<p>(Engl. colour rendering index)</p> <p>Designation for the colour rendering index of a luminaire or a lamp acc. to DIN 6169: 1976 or CIE 13.3: 1995.</p> <p>The general colour rendering index Ra (or CRI) is a dimensionless figure that describes the quality of a white light source in regards to its similarity with the remission spectra of defined 8 test colours (see DIN 6169 or CIE 1974) to a reference light source.</p>
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Glossary

D

Daylight autonomy	Describes what percentage of the daily working time the required illuminance is met by daylight. The nominal illuminance is used from the room profile, unlike described in EN 17037. The calculation is not done in the centre of the room but at the placed sensor measuring point. A room is considered sufficiently supplied with daylight if it achieves at least 50% daylight autonomy.
Daylight factor	Ratio of the illuminance achieved solely by daylight incidence at a point in the inside to the horizontal illuminance in the outer area under an unobstructed sky. Formula symbol: D (Engl. daylight factor) Unit: %
Daylight quotient effective area	A calculation surface within which the daylight quotient is calculated.

E

Energy evaluation	<p>Based on an hourly calculation procedure for daylight in indoor spaces, considering the project geometry and any existing daylight control systems. Orientation and location of the project are also considered. The calculation uses the specified system power of the luminaires to determine the energy demand. A linear relationship between power and luminous flux in the dimmed state is assumed for daylight-controlled luminaires. Times of use and nominal illuminance are determined from the usage profiles of the spaces. Switched-on luminaires that are explicitly excluded from control also consider the specified times-of-use. The daylight control systems use a simplified control logic that closes them at an outdoor horizontal illuminance of 27,500lx.</p> <p>The calendar year 2022 is used as a reference only. It is not a simulation of this year. The reference year is only used to assign the days of the week to the calculated results. The changeover to summer time is not considered. The reference sky type used is the average sky described in CIE 110 without direct sunlight.</p> <p>The method was developed together with the Fraunhofer Institute for Building Physics and is available for review by the Joint Working Group 1 ISO TC 274 as an extension of the previous annual regression-based method.</p>
Eta (η)	<p>(light output ratio)</p> <p>The light output ratio describes what percentage of the luminous flux of a free radiating lamp (or LED module) is emitted by the luminaire when installed.</p> <p>Unit: %</p>

Glossary

G

g_1	Often also U_o (Engl. overall uniformity) Designates the overall uniformity of the illuminance on a surface. It is the quotient from E_{min} to \bar{E} and is required, for instance, in standards for illumination of workstations.
g_2	Actually it designates the "non-uniformity" of the illuminance on a surface. It is the quotient of E_{min} to E_{max} and is generally only relevant for certifying the emergency lighting acc. to EN 1838.

I

Illuminance	Describes the ratio of the luminous flux that strikes a certain surface to the size of this surface ($lm/m^2 = lx$). The illuminance is not tied to an object surface. It can be determined anywhere in space (inside or outside). The illuminance is not a product feature because it is a recipient value. Luxometers are used for measuring. Unit: Lux Abbreviation: lx Formula symbol: E
Illuminance, adaptive	For the determining of the middle adaptive illuminance on a surface, this is rastered "adaptively". In the area of large illuminance differences within the surface, the raster is subdivided finer; within lesser differences, a rougher classification is made.
Illuminance, horizontal	Illuminance that is calculated or measured on a horizontal (level) surface (this can be for example a table top or the floor). The horizontal illuminance is usually identified by the formula letter E_h .
Illuminance, perpendicular	Illuminance that is calculated or measured plumb-vertical to a surface. This needs to be taken into account for tilted surfaces. If the surface is horizontal or vertical, then there is no difference between the perpendicular and the horizontal or vertical illuminance.
Illuminance, vertical	Illuminance that is calculated or measured on a vertical surface (this can be for example the front of some shelves). The vertical illuminance is usually identified by the formula letter E_v .

L

LENI	(Engl. lighting energy numeric indicator) Lighting energy numeric indicator acc. to EN 15193 Unit: $kWh/(m^2 \cdot a)$
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Glossary

LLMF	<p>(Engl. lamp lumen maintenance factor)/acc. to CIE 97: 2005 Lamp flux maintenance factor that takes the luminous flux reduction into account of a luminaire or an LED module in the course of the operating time. The lamp flux maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no luminous flux reduction existing).</p>
LMF	<p>(Engl. luminaire maintenance factor)/acc. to CIE 97: 2005 Luminaire maintenance factor that takes the soiling into account of the luminaire in the course of the operating time. The luminaire maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no soiling existing).</p>
LSF	<p>(Engl. lamp survival factor)/acc. to CIE 97: 2005 Lamp survival factor that takes the total failure into account of a luminaire in the course of the operating time. The lamp survival factor is specified as a decimal digit and can have a maximum value of 1 (no failures existing within the time concerned or prompt replacement after the failure).</p>
Luminance	<p>Dimension for the "brightness impression" that the human eye has of a surface. The surface itself can emit light thereby or light striking it can be reflected (emitter value). It is the only photometric value that the human eye can perceive.</p> <p>Unit: Candela per square metre Abbreviation: cd/m² Formula symbol: L</p>
Luminous efficacy	<p>Ratio of the emitted luminous flux Φ [lm] to the absorbed electrical power P [W] Unit: lm/W.</p> <p>This ratio can be formed for the lamp or LED module (lamp or module light output), the lamp or module with control gear (system light output) and the complete luminaire (luminaire light output).</p>
Luminous flux	<p>Dimension for the total light output that is emitted from one light source in all directions. It is thus an "emitter value" that specifies the entire emitting output. The luminous flux of a light source can only be determined in a laboratory. A difference is made between the lamp or LED module luminous flux and the luminaire luminous flux.</p> <p>Unit: Lumen Abbreviation: lm Formula symbol: Φ</p>
Luminous intensity	<p>Describes the intensity of the light in a certain direction (emitter value). The luminous intensity is a matter of the luminous flux Φ that is emitted in a certain spherical angle Ω. The radiation characteristics of a light source are presented graphically in a light distribution curve (LDC). The luminous intensity is an SI base unit.</p> <p>Unit: Candela Abbreviation: cd Formula symbol: I</p>

Glossary

M

Maintenance factor	See MF
MF	<p>(Engl. maintenance factor)/acc. to CIE 97: 2005</p> <p>Maintenance factor as decimal number between 0 and 1 that describes the ratio of the new value of a photometric planning parameter (e.g. of the illuminance) to a maintenance value after a certain time. The maintenance factor takes into account the soiling of luminaires and rooms as well as the luminous flux reduction and the failure of light sources.</p> <p>The maintenance factor is taken into account either overall or determined in detail acc. to CIE 97: 2005 by the formula $RMF \times LMF \times LLMF \times LSF$.</p>

P

P	<p>(Engl. power)</p> <p>Electric power consumption</p> <p>Unit: watt</p> <p>Abbreviation: W</p>
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R

$R_{(UG)} \max$	<p>Measure of the psychological glare in indoor spaces.</p> <p>In addition to the luminance of luminaires, the level of the $R_{(UG)}$ value also depends on the observer position, the viewing direction and the ambient luminance. The calculation is made according to the table method, see CIE 117. Among other things, EN 12464-1:2021 specifies maximum permissible $R_{(UG)}$-values $R_{(UGL)}$ for various indoor workplaces.</p>
Reflection factor	The reflection factor of a surface describes how much of the striking light is reflected back. The reflection factor is defined by the colour of the surface.
RMF	<p>(Engl. room maintenance factor)/acc. to CIE 97: 2005</p> <p>Room maintenance factor that takes the soiling into account of the space encompassing surfaces in the course of the operating time. The room maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no soiling existing).</p>

S

Surrounding area	The ambient area directly borders the area of the visual task and should be planned with a width of at least 0.5 m according to DIN EN 12464-1. It is at the same height as the area of the visual task.
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Glossary

U

UGR (max)

(unified glare rating)

Measure for the psychological glare effect in interiors.

In addition to luminaire luminance, the UGR value also depends on the position of the observer, the viewing direction and the ambient luminance. Among other things, EN 12464-1 specifies maximum permissible UGR values for various indoor workplaces.

UGR observer

Calculation point in the room, for the DIALux the UGR value is determined. The location and height of the calculation point should correspond to the typical observer position (position and eye level of the user).

V

Visual task area

The area that is needed for carrying out the visual task in accordance with DIN EN 12464 -1. The height corresponds with the height at which the visual task is executed.

W

Wall zone

Circumferential area between working plane and walls which is not taken into account for the calculation.

Working plane

Virtual measuring or calculation surface at the height of the visual task that generally follows the room geometry. The working plane may also feature a wall zone.

MATERIAL SPECIFICATION

MATERIAL SPECIFICATION
of electrical installation of low voltage

no.	Description of the item	unit of measure	quantity		
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1 DISTRIBUTION CABINETS AND POWER SUPPLY LINES

- 1.1. Delivery of equipment that needs to be installed in the existing main distribution cabinet GRO located in the technical room under the stairs. The item should include the examination of the equipment from which the consumers on the floor are supplied, their dismantling, rescheduling of the equipment cabinets and installation of new equipment. The following equipment is installed in the cabinet (NOTE: the existing electric meter is kept):

automatic switch iC60H-C/40A, 1p; 10kA pcs
the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material: set

- 1.2. Delivery of equipment that needs to be installed in the existing distribution board RT-R2 located in room number 4 on the ground floor (restaurant). It is necessary to include the examination of the equipment from which the existing lighting consumers are powered, their dismantling, rescheduling of the equipment cabinets and installation of new equipment. The following equipment is installed in the cabinet

automatic switch iC60N-C/16A, 1p; 6kA pcs
automatic switch iC60N-C/10A, 1p; 6kA pcs
time relay (astronomical clock) pcs
selector switch iSSW 1-0-2, 20A pcs
contactor iCT 16A, 1NO, 230V pcs
the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material: set

- 1.3. Delivery of switchboard: RT-R; factory production, IP40. The panel is built-in, for the installation of 54 modules (3x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 63A, 1-0, 3P pcs
differential current protective device iID 63/0,03A, 4p pcs
automatic switch iC60N-C/16A, 3p; 6 kA pcs

automatic switch iC60N-C/16A, 1p; 6 kA	pcs
automatic switch iC60N-C/10A, 1p; 6 kA	pcs
automatic switch iC60N-C/6A, 1p; 6 kA	pcs
time relay (astronomical clock)	pcs
selector switch iSSW 1-0-2, 20A	pcs
contactor iCT 16A, 1NO, 230V	pcs

the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material:

set

- 1.4. Delivery of switchboard: RT-1; factory production, IP40. The panel is built-in, for the installation of 36 modules (2x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 63A, 1-0, 3P	pcs
automatic switch iC60N-C/20A, 1p; 6 kA	pcs
differential current protective device iID 40/0,03A, 4p	pcs
automatic switch iC60N-C/16A, 1p; 6 kA	pcs
automatic switch iC60N-C/10A, 1p; 6 kA	pcs

the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material:

set

- 1.5. Delivery of switchboard: RT-2; factory production, IP40. The panel is built-in, for the installation of 36 modules (2x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 40A, 1-0, 3P	pcs
differential current protective device iID 40/0,03A, 4p	pcs
automatic switch iC60N-C/16A, 1p; 6 kA	pcs
automatic switch iC60N-C/10A, 1p; 6 kA	pcs

the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material:

set

- 1.6. Delivery of switchboard: RT-3; factory production, IP40. The panel is built-in, for the installation of 36 modules (2x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 40A, 1-0, 3P	pcs
differential current protective device iID 40/0,03A, 4p	pcs
automatic switch iC60N-C/16A, 1p; 6 kA	pcs
automatic switch iC60N-C/10A, 1p; 6 kA	pcs
the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material:	set

- 1.7. Delivery of switchboard: RT-4; factory production, IP40. The panel is built-in, for the installation of 36 modules (2x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 40A, 1-0, 3P	pcs
differential current protective device iID 40/0,03A, 4p	pcs
automatic switch iC60N-C/16A, 1p; 6 kA	pcs
automatic switch iC60N-C/10A, 1p; 6 kA	pcs
the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material:	set

- 1.8. Procurement and delivery of a power cable types:
- | | |
|-----------------------------|-----|
| N2XH-J 5x16 mm ² | pcs |
| N2XH-J 5x4 mm ² | |

- 1.9. Procurement and delivery of a power cable types:
- | | |
|-----------------------------|---|
| N2XH-J 5x16 mm ² | m |
| N2XH-J 5x4 mm ² | m |

2 GENERAL ELECTRICAL INSTALLATION

- 2.1. Procurement and delivery of a power cable types:
- | | |
|-----------------------------|---|
| N2XH-j 5x2,5mm ² | m |
|-----------------------------|---|

- 2.2. Procurement and delivery of a power cable types:
- | | |
|-----------------------------|---|
| N2XH-j 3x2,5mm ² | m |
|-----------------------------|---|

3 ELECTRICAL LIGHTING INSTALLATION

3.1. Procurement and delivery of a power cable types:

N2XH-j 3x1,5 mm² m

- 3.2. (S1) Procurement and delivery of overhead LED lamps. Diffuser: opal polycarbonate. Class II electrical, IP65, IK10. Complete with 4000K LED. Suitable for direct mounting on the wall or ceiling. Loop-in, loop-out is possible for cables up to 2.5 mm². BESA compatible. Dimensions: Ø307x58 mm; Lamp input power: 16.3 W; Luminous flux of the lamp: 1950 lm; Lamp efficiency: 120 lm/W; Weight: 0.98 kg. Total for material:

pcs

- 3.3. (S2) Procurement and delivery of built-in LED lamps with excellent glare control and high efficiency for office and education. The 36 LED cells (arranged in a 6x6 pattern) each have a prismatic primary lens that allows for greater light output with low glare and user comfort. LED driver with fixed output. Class II electrical, IP40, Impact resistance: IK04. Body: sheet steel, white. Diffuser: prism structure. Complete with 4000K LED. UGR < 19 and L65 < 3000 cd/m² according to EN 12464. Dimensions: 596x596x32 mm; Lamp input power: 34 W; Luminous flux of the lamp: 4392 lm; Lamp efficiency: 129 lm/W; Weight: 2.1 kg. Total for material:

pcs

Procurement and delivery of an additional housing for the lamp S2. Total for material:

pcs

- 3.4. (S3.1) Procurement and delivery of a surface lamp, suitable for surface, hanging and plaster installation. For one-time and continuous installation. Lamp wired with halogen-free conductors. Dimensions: 3000x72x88 mm; Lamp input power: 53 W; Luminous flux of the lamp: 5080 lm; Lamp efficiency: 96 lm/W; Weight: 6.3 kg. Total for material:

pcs

Procurement and delivery of suspension equipment for part of lamps S3.1 which are installed in part of room no. 6 and room no. 7. Total for material:

pcs

- 3.5. (S3.2) Procurement and delivery of a surface lamp, suitable for surface, hanging and plaster installation. For one-time and continuous installation. Lamp wired with halogen-free conductors. Dimensions: 1500x72x88 mm; Lamp input power: 26.7 W; Luminous flux of the lamp: 2540 lm; Lamp efficiency: 95 lm/W; Weight: 3.2 kg. Total for material:

pcs

Procurement and delivery of suspension equipment for part of the lamps S3.1 that are installed in the part of the corridor. Total for material:

pcs

- 3.6. (S4) Procurement and delivery of a surface lamp, suitable for surface, hanging and plaster installation. For one-time and continuous installation. Lamp wired with halogen-free conductors. Dimensions: 1500x72x88 mm; Lamp input power: 26.7 W; Luminous flux of the lamp: 2540 lm; Lamp efficiency: 95 lm/W; Weight: 3.2 kg. Total for material:

pcs

- 3.7. (S5) Procurement and delivery of a built-in LED lamp in the ceiling with a 14 mm profile. DALI LED driver with dimming option. Class II electrical, IP65, IK06. Complete with 4000K LED. Dimensions: 596x596x14 mm; Lamp input power: 33 W; Luminous flux of the lamp: 3800 lm; Lamp efficiency: 115 lm/W; Weight: 4.2 kg. Total for material:
- pcs
- Procurement and delivery of built-in housing for S5 lamps to be installed in room no. 4 on the ground floor. Total for material:
- pcs
- 3.8. (S6) Procurement and delivery of a built-in LED downlighter of low height. Suitable for ceiling cutouts Ø190-230 mm for easy repair or quick initial installation. Remote, plug-in, fixed output LED driver with DC function, adjustable 50-100%, NFC configurable. Class II electrical, IP44_IP20. Spring clamps suitable for ceiling thicknesses from 1 to 35 mm. Complete with 4000K LED. Dimensions: Ø248x100 mm; Lamp input power: 26.9 W; Luminous flux of the lamp: 3463 lm; Lamp efficiency: 129 lm/W; Weight: 0.81 kg. Total for material:
- pcs
- 3.9. (S7) Procurement and delivery of a decorative lamp with a lampshade, electric socket E27. The lamp is delivered complete with hanging accessories. Total for material:
- pcs
- 3.10. (S8) Procurement and delivery of wall lamp, Downlight. Semi-round conical lamp IP65, for outdoor use with black cast aluminum housing. Color temperature 3000K (warm white) with color rendering index Ra80, LED working life: 50000 h before reducing the luminous flux to 80% of the initial value. Lamp input power: 5 W, 300 lumens @ 60lm/W; IK04; IP65; 230V. Quick-connect terminal for wires up to 2.5 mm² for quick installation. Dimensions: 94x160x58 mm, weight: 0.52 kg. Total for material:
- pcs
- 3.11. (P1) Procurement and delivery of emergency LED surface mount light, manual test (3 hours) with open space optipcs. IP40. Electrical connection (230VAC). Complete with LEDs. Lamp input power: 4 W. Dimensions: 146x146x34 mm. Weight: 1 kg. Luminous flux: 130 lm. Lamp efficiency: 33 lm/W. Total for material:
- pcs

- 3.12. (P2) Procurement and delivery of LED pictograms, autonomy 1,2,3 or 8h (can be selected using a switch), in standby or permanent connection, input power 6.1 W, housing lamp made of polycarbonate (RAL9016), expected lifetime is 50,000 working hours, uniform illumination of the pictogram >500cd/m², the lamp is easy to mount, complete with pictograms according to ISO 7010 standard, maximum visible distance 23m, the lamp does not need to be maintained thanks to LED technology, protection IP40, mechanical protection IK03, the possibility of working at an ambient temperature of 5° C to 40°C, dimensions 330x45x190mm, weight 0.8kg. Total for material:

pcs

- 3.13. Procurement and delivery of an overhead ceiling motion sensor (detector) with degree of protection IP20, detection radius 4m. Total for material:

pcs

4 INSTALLATION EQUIPMENT

- 4.1. Procurement and delivery of modular accessories, white color
built-in PVC box Ø60mm
armature 2M
decorative mask 2M
socket 2P+E 16A, 2M - 1pc - white color
Total for material:

set

- 4.2. Procurement and delivery of modular accessories, white color
built-in PVC box Ø60mm
armature 2M
decorative mask 2M
socket 2P+E 16A, 2M - 1pcs - white color, sa IP44 stepenom zaštite
Total for material:

set

- 4.3. Procurement and delivery of modular accessories, white color
built-in PVC box 3M
armature 3M
decorative mask 3M - white color
socket 2P+E 16A, 2M - 1 pc - white color
free module for low current, 1M - 1 pcs - white color
Total for material:

set

- 4.4. Procurement and delivery of modular accessories, white color
built-in PVC box 3M
armature 3M
decorative mask 3M - white color
socket 2P+E 16A, 2M - 1 pc - white color
socket 2P, 16A, 1M - 1pcs , bijele boje
Total for material: set
- 4.5. Procurement and delivery of modular accessories, white color
built-in PVC box4M
armature 4M
decorative mask 4M - white color
socket 2P+E 16A, 2M - 2 pcs - white color
Total for material: set
- 4.6. Procurement and delivery of modular accessories, white color
built-in PVC box4M
armature 4M
decorative mask 4M - white color
socket 2P+E 16A, 2M - 2 pcs - white color
socket 2P, 16A, 1M - 1pcs , bijele boje
free module for low current, 1M - 1 pcs - white color
Total for material: set
- 4.7. Procurement and delivery of modular accessories, white color
built-in PVC box 7M
armature 7M
decorative mask 7M - white color
socket 2P+E 16A, 2M - 2 pcs - white color
free module for low current, 1M - 3 pcs
Total for material: set
- 4.8. Procurement and delivery of modular accessories, white color
built-in PVC box 7M
armature 7M
decorative mask 7M - white color
socket 2P+E 16A, 2M - 2 pcs - white color
socket 2P, 16A, 1M - 2pcs , bijele boje
free module for low current, 1M - 1 pcs
Total for material: set

BUILT IN FLOOR BOX

4.9. Procurement and delivery of equipment for floor box 7M.

- Built-in housing 7M, metal, for installation in the floor or double floor. Built-in dimensions 273x182.5mm, depth min. 83 mm. Adjustable height 83-128mm.
- Floor box insert for housing 7M modules
- Floor box cover 7M, metal, installation dimensions 265x178mm, depth min 17.5mm

For installation in a floor box:

- single-phase šuko socket 2P+E, 16A - pcs 2;
- free module for low current 1M - pcs 2;
- blind modules - cover 1M - pcs 1;

Total for material:

set

4.10. Procurement and delivery of equipment for the floor box 2x7M.

- Built-in housing 2x7M, metal, for installation in the floor or double floor. Built-in dimensions 273x269.5mm, depth min. 83 mm. Adjustable height 83-128mm.
- Floor box insert for accommodating 2x7M modules
- Floor box cover 2x7M, metal, installation dimensions 265x265mm, depth min 17.5mm

For installation in a floor box:

- single-phase šuko socket 2P+E, 16A - pcs 4;
- free module for low current 1M - pcs 2;
- blind modules - cover 1M - pcs 4;

Total for material:

set

4.11. Procurement and delivery of equipment for floor box 18M.

- Built-in metal housing, for installation in the floor or double floor.
- Floor box cover 18M, metal

For installation in a floor box:

- single-phase šuko socket 2P+E, 16A - pcs 6;
- free module for low current 1M - pcs 4;
- blind modules - cover 1M - pcs 2;

Total for material:

set

SWITCHES

4.12. Procurement and delivery of modular accessories, white color

built-in PVC box 2M

armature 2M

decorative mask 2M - white color

single-pole switch 2M - 1pcs - white color

Total for material:

set

- 4.13. Procurement and delivery of modular accessories, white color
built-in PVC box 2M
armature 2M
decorative mask 2M - white color
alternate switch 2M - 1pcs - white color
Total for material: set
- 4.14. Procurement and delivery of modular accessories, white color
built-in PVC box 2M
armature 2M
decorative mask 2M - white color
single-pole switch 1M - 2pcs - white color
Total for material: set
- 4.15. Procurement and delivery of modular accessories, white color
built-in PVC box 3M
armature 3M
decorative mask 3M - white color
single-pole switch 1M - 2pcs - white color
alternate switch 1M - 1pcs - white color
Total for material: set
- 4.16. Procurement and delivery of modular accessories, white color
built-in PVC box 3M
armature 3M
decorative mask 3M - white color
single-pole switch sa indic.Lamp. 1M,10A-2pcs-white color
single-pole switch sa indic.Lamp. 1M,16A-1pcs-white color
Total for material: set
- 4.17. Procurement and delivery of modular accessories, white color
built-in PVC box 3M
armature 3M
decorative mask 3M - white color
single-pole switch 1M - 3pcs - white color
Total for material: set
- 4.18. Procurement and delivery of modular accessories, white color
built-in PVC box 4M
armature 4M
decorative mask 4M - white color
single-pole switch 1M - 4pcs - white color
Total for material: set

4.19. Procurement and delivery of modular accessories, white color

built-in PVC box 7M

armature 7M

decorative mask 7M - white color

single-pole switch 1M - 7pcs - white color

Total for material:

set

4.20. Procurement and delivery of socket protection against contact. Protectors are mounted on sockets located in room no. 9, and the color is defined by the interior project. Total for material:

set

5 INSTALLATION OF POTENTIAL EQUALIZATION5.1. Fine wire conductor of section H07Z-R 1x6mm². Total for material:

m

5.2. Halogen-free fine-wire conductor H07Z-R 1x16mm². The item also includes HFT halogen free pipes through a concrete jacket. Total for material:

m

Responsible Engineer:

Slobodan Marković, dipl.inž.el.

BILL OF QUANTITIES OF MATERIALS AND WORKS

BILL OF QUANTITIES
elecrical installation of low voltage

This bill of quantities envisages the delivery and installation of its material, specified by position and its small unspecified material required for complete production and installation as indicated by position, testing and commissioning as well as bringing to the proper original condition. All material used must be of first-class quality and conform to standards. The work must be carried out by a skilled workforce, in full compliance with the applicable technical regulations for the same types of work. The price includes the cost of materials, labor costs and all taxes and contributions on material. The specified equipment manufacturers are not exclusive. The Contractor may install other equipment or material, provided that such equipment or material has the same electrical and structural characteristics as stated, and confirmed by the expert - the supervisory authority.

no.	Description of the item	unit of measure	quantity	price unit	sum
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1 DISTRIBUTION CABINETS AND POWER SUPPLY LINES

- 1.1. Delivery and installation of equipment that needs to be installed in the existing main distribution cabinet GRO located in the technical room under the stairs. The item should include the examination of the equipment from which the consumers on the floor are supplied, their dismantling, rescheduling of the equipment cabinets and installation of new equipment. The following equipment is installed in the cabinet (NOTE: the existing electric meter is kept):

automatic switch iC60H-C/40A, 1p; 10kA	pcs	6
the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material and labor:	set	1

- 1.2. Delivery and installation of equipment that needs to be installed in the existing distribution board RT-R2 located in room number 4 on the ground floor (restaurant). It is necessary to include the examination of the equipment from which the existing lighting consumers are powered, their dismantling, rescheduling of the equipment cabinets and installation of new equipment. The following equipment is installed in the cabinet

automatic switch iC60N-C/16A, 1p; 6kA	pcs	2
automatic switch iC60N-C/10A, 1p; 6kA	pcs	4
time relay (astronomical clock)	pcs	1
selector switch iSSW 1-0-2, 20A	pcs	1
contactor iCT 16A, 1NO, 230V	pcs	1
the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material and labor:	set	1

- 1.3. Delivery and installation of switchboard: RT-R; factory production, IP40, The panel is built-in, for the installation of 54 modules (3x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 63A, 1-0, 3P	pcs	1
differential current protective device iID 63/0,03A, 4p	pcs	1
automatic switch iC60N-C/16A, 3p; 6 kA	pcs	1
automatic switch iC60N-C/16A, 1p; 6 kA	pcs	22
automatic switch iC60N-C/10A, 1p; 6 kA	pcs	12
automatic switch iC60N-C/6A, 1p; 6 kA	pcs	1
time relay (astronomical clock)	pcs	1
selector switch iSSW 1-0-2, 20A	pcs	1
contactor iCT 16A, 1NO, 230V	pcs	1
the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material and labor:	set	1

- 1.4. Delivery and installation of switchboard: RT-1; factory production, IP40, The panel is built-in, for the installation of 36 modules (2x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 63A, 1-0, 3P	pcs	1
automatic switch iC60N-C/20A, 1p; 6 kA	pcs	9
differential current protective device iID 40/0,03A, 4p	pcs	1
automatic switch iC60N-C/16A, 1p; 6 kA	pcs	12
automatic switch iC60N-C/10A, 1p; 6 kA	pcs	7

the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material and labor:

set 1

- 1.5. Delivery and installation of switchboard: RT-2; factory production, IP40, The panel is built-in, for the installation of 36 modules (2x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 40A, 1-0, 3P	pcs	1
differential current protective device iID 40/0,03A, 4p	pcs	1
automatic switch iC60N-C/16A, 1p; 6 kA	pcs	18
automatic switch iC60N-C/10A, 1p; 6 kA	pcs	5

the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material and labor:

set 1

- 1.6. Supply and installation of switchboard: RT-3; factory production, IP40, The panel is built-in, for the installation of 36 modules (2x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 40A, 1-0, 3P	pcs	1
differential current protective device iID 40/0,03A, 4p	pcs	1
automatic switch iC60N-C/16A, 1p; 6 kA	pcs	14
automatic switch iC60N-C/10A, 1p; 6 kA	pcs	6

the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material and labor:

set 1

- 1.7. Delivery and installation of switchboard: RT-4; factory production, IP40, The panel is built-in, for the installation of 36 modules (2x18M). The item also includes all "small" elements necessary for the installation of panels, switches and cable routing. Install the following equipment in the panel according to the single-pole scheme:

Interpact disconnecter iSW 40A, 1-0, 3P	pcs	1
differential current protective device iID 40/0,03A, 4p	pcs	1
automatic switch iC60N-C/16A, 1p; 6 kA	pcs	15
automatic switch iC60N-C/10A, 1p; 6 kA	pcs	4
the item includes busbars, row clamps, POK channels, plastic labels, pertinax, nameplates, copper braids, cable glands, single-pole scheme, pocket for single-pole scheme and other necessary small material necessary for the installation of the cabinet. Complete equipment with all connections. Total for material and labor:		
	set	1

- 1.8. Dismantling of existing switchboards, as well as elements in the switchboard. Dismantled equipment must be stored in a place designated by the investor. Total for work:

flat rate 1

- 1.9. Procurement and installation of cable terminations for the termination of the cable to make the connection in GRO and RO-R and RO-1, and in everything according to the technical description and installation instructions. Total for procurement and operation, calculated by the installed cable end for power supply cables of section:

N2XH-J 5x4 mm²

N2XH-J 5x16 mm²

pcs 4

- 1.10. Procurement, delivery and installation of a power cable with GRO, intended for powering the distribution board RT-1 and RT-R; as well as for powering distribution boards RT-2, RT-3, RT-4 from distribution board RT-1. The conductors are laid partly on the wall and ceiling under the plaster, and partly through halogen-free installation hoses of the appropriate diameter under the concrete lining. Conductors are laid in the wall with slits and repair of damaged surfaces. The item includes all the small materials needed for their installation, electrical connection on both sides, installation of halogen-free hoses, cleaning as well as restoring damaged surfaces to their original state. pcsplet delivery of cables, as well as materials for their installation, with installation, connection and testing of cables of the following types:

N2XH-J 5x16 mm ²	m	40
N2XH-J 5x4 mm ²	m	80

Total distribution cabinets and lines:

2 GENERAL ELECTRICAL INSTALLATION

- 2.1. Procurement, delivery and construction of three-phase connection points for electricity supply needs. ramps according to plan and single-pole schemes. The conductors are laid partly on the wall and ceiling under the plaster, and partly through halogen-free installation hoses of the appropriate diameter under the concrete lining. Conductors are laid in the wall with slits and repair of damaged surfaces. The item includes all the small materials needed for their installation, electrical connection on both sides, halogen-free installation hoses, cleaning as well as restoring damaged surfaces to their original state. Total for material and labor:

N2XH-j 5x2,5mm ²	m	15
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- 2.2. Procurement, delivery and execution of single-phase connection points for socket circuits and other connection points according to the plan and single-pole schemes. The conductors are laid partly on the wall and ceiling under the plaster, partly above the suspended ceiling, and partly through installation halogen-free hoses with an internal section of 16 mm under the concrete floor screed. Conductors are laid in the wall with slits and repair of damaged surfaces. The item includes all the small materials needed for their installation, electrical connection on both sides, halogen-free installation hoses, cleaning as well as restoring damaged surfaces to their original state. Total for material and labor:

N2XH-j 3x2,5mm ²	m	1859
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Total electrical installation of general consumption:

3 ELECTRICAL LIGHTING INSTALLATION

- 3.1. Delivery of materials and execution of lighting circuits without installing lamps and switches. Inside the building, the conductors are laid partly on the wall and ceiling under the plaster, and partly above the suspended ceiling. Outside the building, conductors are laid through an earthen trench of appropriate dimensions. The conductors are laid in the wall with the creation of slits and the repair of damaged surfaces. The item includes all small materials required for their installation, electrical connection on both sides, cleaning and restoration of damaged surfaces. Carry out the installation in all respects according to the technical description. Total for material and labor:

N2XH-j 3x1,5 mm ²	m	2110.0
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- 3.2. (S1) Procurement, delivery and installation of overhead LED lamps. Diffuser: opal polycarbonate. Class II electrical, IP65, IK10. Complete with 4000K LED. Suitable for direct mounting on the wall or ceiling. Loop-in, loop-out is possible for cables up to 2.5 mm². BESA compatible. Dimensions: Ø307x58 mm; Lamp input power: 16.3 W; Luminous flux of the lamp: 1950 lm; Lamp efficiency: 120 lm/W; Weight: 0.98 kg. Total for material and labor:

	pcs	11
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- 3.3. (S2) Supply, delivery and installation of built-in LED lamps with excellent glare control and high efficiency for office and education. The 36 LED cells (arranged in a 6x6 pattern) each have a prismatic primary lens that allows for greater light output with low glare and user comfort. LED driver with fixed output. Class II electrical, IP40, Impact resistance: IK04. Body: sheet steel, white. Diffuser: prism structure. Complete with 4000K LED. UGR < 19 and L65 < 3000 cd/m² according to EN 12464. Dimensions: 596x596x32 mm; Lamp input power: 34 W; Luminous flux of the lamp: 4392 lm; Lamp efficiency: 129 lm/W; Weight: 2.1 kg. Total for material and labor:

	pcs	22
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Procurement, delivery and installation of an additional housing for the lamp S2. Total for material and labor:	pcs	22
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3.4. (S3.1) Supply, delivery and installation of a surface lamp, suitable for surface, hanging and plaster installation. For one-time and continuous installation. Lamp wired with halogen-free conductors. Dimensions: 3000x72x88 mm; Lamp input power: 53 W; Luminous flux of the lamp: 5080 lm; Lamp efficiency: 96 lm/W; Weight: 6.3 kg. Total for material and work:	pcs	24
Procurement, delivery and installation of suspension equipment for part of lamps S3.1 which are installed in part of room no. 6 and room no. 7. Total for material and work:		
	pcs	16
3.5. (S3.2) Supply, delivery and installation of a surface lamp, suitable for surface, hanging and plaster installation. For one-time and continuous installation. Lamp wired with halogen-free conductors. Dimensions: 1500x72x88 mm; Lamp input power: 26.7 W; Luminous flux of the lamp: 2540 lm; Lamp efficiency: 95 lm/W; Weight: 3.2 kg. Total for material and work:	pcs	11
Procurement, delivery and installation of suspension equipment for part of the lamps S3.1 that are installed in the part of the corridor. Total for material and work:		
	pcs	3
3.6. (S4) Supply, delivery and installation of a surface lamp, suitable for surface, hanging and plaster installation. For one-time and continuous installation. Lamp wired with halogen-free conductors. Dimensions: 1500x72x88 mm; Lamp input power: 26.7 W; Luminous flux of the lamp: 2540 lm; Lamp efficiency: 95 lm/W; Weight: 3.2 kg. Total for material and work:	pcs	2
3.7. (S5) Supply, delivery and installation of a built-in LED lamp in the ceiling with a 14 mm profile. DALI LED driver with dimming option. Class II electrical, IP65, IK06. Complete with 4000K LED. Dimensions: 596x596x14 mm; Lamp input power: 33 W; Luminous flux of the lamp: 3800 lm; Lamp efficiency: 115 lm/W; Weight: 4.2 kg. Total for material and work:	pcs	12
Procurement, delivery and installation of built-in housing for S5 lamps to be installed in room no. 4 on the ground floor. Total for material and work:		
	pcs	12

<p>3.8. (S6) Procurement, delivery and installation of a built-in LED downlighter of low height. Suitable for ceiling cutouts Ø190-230 mm for easy repair or quick initial installation. Remote, plug-in, fixed output LED driver with DC function, adjustable 50-100%, NFC configurable. Class II electrical, IP44_IP20. Spring clamps suitable for ceiling thicknesses from 1 to 35 mm. Complete with 4000K LED. Dimensions: Ø248x100 mm; Lamp input power: 26.9 W; Luminous flux of the lamp: 3463 lm; Lamp efficiency: 129 lm/W; Weight: 0.81 kg. Total for material and work:</p>	pcs	53
<p>3.9. (S7) Supply, delivery and installation of a decorative lamp with a lampshade, electric socket E27. The lamp is delivered complete with hanging accessories. Total for material and work:</p>	pcs	6
<p>3.10. (S8) Supply, delivery and installation of wall lamp, Downlight. Semi-round conical lamp IP65, for outdoor use with black cast aluminum housing. Color temperature 3000K (warm white) with color rendering index Ra80, LED working life: 50000 h before reducing the luminous flux to 80% of the initial value. Lamp input power: 5 W, 300 lumens @ 60lm/W; IK04; IP65; 230V. Quick-connect terminal for wires up to 2.5 mm² for quick installation. Dimensions: 94x160x58 mm, weight: 0.52 kg. Total for material and work:</p>	pcs	36
<p>3.11. (P1) Supply, delivery and installation of emergency LED surface mount light, manual test (3 hours) with open space optipcs. IP40. Electrical connection (230VAC). Complete with LEDs. Lamp input power: 4 W. Dimensions: 146x146x34 mm. Weight: 1 kg. Luminous flux: 130 lm. Lamp efficiency: 33 lm/W. Total for material and work:</p>	pcs	15

- 3.12. (P2) Procurement, delivery and installation of LED pictograms, autonomy 1,2,3 or 8h (can be selected using a switch), in standby or permanent connection, input power 6.1 W, housing lamp made of polycarbonate (RAL9016), expected lifetime is 50,000 working hours, uniform illumination of the pictogram >500cd/m², the lamp is easy to mount, complete with pictograms according to ISO 7010 standard, maximum visible distance 23m, the lamp does not need to be maintained thanks to LED technology, protection IP40, mechanical protection IK03, the possibility of working at an ambient temperature of 5° C to 40°C, dimensions 330x45x190mm, weight 0.8kg. Total for material and work:

pcs 12

- 3.13. Procurement, delivery and installation of an overhead ceiling motion sensor (detector) with degree of protection IP20, detection radius 4m. Total for material and work:

pcs 6

Total electrical lighting installation:

4 INSTALLATION EQUIPMENT

- 4.1. Procurement, delivery and installation of modular accessories, white color

built-in PVC box Ø60mm
 armature 2M
 decorative mask 2M
 socket 2P+E 16A, 2M - 1pc - white color
 Total for material and labor:

set 18

- 4.2. Procurement, delivery and installation of modular accessories, white color

built-in PVC box Ø60mm
 armature 2M
 decorative mask 2M
 socket 2P+E 16A, 2M - 1pcs - white color, sa IP44 stepenom zaštite

Total for material and labor:

set 8

- 4.3. Procurement, delivery and installation of modular accessories, white color

built-in PVC box 3M
armature 3M
decorative mask 3M - white color
socket 2P+E 16A, 2M - 1 pc - white color
free module for low current, 1M - 1 pcs - white color
Total for material and labor: set 4

4.4. Procurement, delivery and installation of modular accessories, white color

built-in PVC box 3M
armature 3M
decorative mask 3M - white color
socket 2P+E 16A, 2M - 1 pc - white color
socket 2P, 16A, 1M - 1pcs , bijele boje
Total for material and labor: set 5

4.5. Procurement, delivery and installation of modular accessories, white color

built-in PVC box4M
armature 4M
decorative mask 4M - white color
socket 2P+E 16A, 2M - 2 pcs - white color
Total for material and labor: set 42

4.6. Procurement, delivery and installation of modular accessories, white color

built-in PVC box4M
armature 4M
decorative mask 4M - white color
socket 2P+E 16A, 2M - 2 pcs - white color
socket 2P, 16A, 1M - 1pcs , bijele boje
free module for low current, 1M - 1 pcs - white color
Total for material and labor: set 2

4.7. Procurement, delivery and installation of modular accessories, white color

built-in PVC box 7M
armature 7M
decorative mask 7M - white color
socket 2P+E 16A, 2M - 2 pcs - white color
free module for low current, 1M - 3 pcs
Total for material and labor: set 24

4.8. Procurement, delivery and installation of modular accessories, white color

built-in PVC box 7M

armature 7M

decorative mask 7M - white color

socket 2P+E 16A, 2M - 2 pcs - white color

socket 2P, 16A, 1M - 2pcs , bijele boje

free module for low current, 1M - 1 pcs

Total for material and labor:

set 1

BUILT IN FLOOR BOX

4.9. Procurement, delivery and installation of equipment for floor box 7M.

- Built-in housing 7M, metal, for installation in the floor or double floor. Built-in dimensions 273x182.5mm, depth min. 83 mm.

Adjustable height 83-128mm.

- Floor box insert for housing 7M modules

- Floor box cover 7M, metal, installation dimensions 265x178mm, depth min 17.5mm

For installation in a floor box:

- single-phase šuko socket 2P+E, 16A - pcs 2;

- free module for low current 1M - pcs 2;

- blind modules - cover 1M - pcs 1;

Total for material and labor:

set 16

4.10. Procurement, delivery and installation of equipment for the floor box 2x7M.

- Built-in housing 2x7M, metal, for installation in the floor or double floor. Built-in dimensions 273x269.5mm, depth min. 83 mm.

Adjustable height 83-128mm.

- Floor box insert for accommodating 2x7M modules

- Floor box cover 2x7M, metal, installation dimensions 265x265mm, depth min 17.5mm

For installation in a floor box:

- single-phase šuko socket 2P+E, 16A - pcs 4;

- free module for low current 1M - pcs 2;

- blind modules - cover 1M - pcs 4;

Total for material and labor:

set 6

4.11. Procurement, delivery and installation of equipment for floor box 18M.

- Built-in metal housing, for installation in the floor or double floor.
- Floor box cover 18M, metal

For installation in a floor box:

- single-phase šuko socket 2P+E, 16A - pcs 6;
- free module for low current 1M - pcs 4;
- blind modules - cover 1M - pcs 2;

Total for material and labor:

set 3

SWITCHES

4.12. Procurement, delivery and installation of modular accessories, white color

built-in PVC box 2M

armature 2M

decorative mask 2M - white color

single-pole switch 2M - 1pcs - white color

Total for material and labor:

set 7

4.13. Procurement, delivery and installation of modular accessories, white color

built-in PVC box 2M

armature 2M

decorative mask 2M - white color

alternate switch 2M - 1pcs - white color

Total for material and labor:

set 1

4.14. Procurement, delivery and installation of modular accessories, white color

built-in PVC box 2M

armature 2M

decorative mask 2M - white color

single-pole switch 1M - 2pcs - white color

Total for material and labor:

set 2

4.15. Procurement, delivery and installation of modular accessories, white color

built-in PVC box 3M

armature 3M

decorative mask 3M - white color

single-pole switch 1M - 2pcs - white color

alternate switch 1M - 1pcs - white color

Total for material and labor:

set 1

4.16. Procurement, delivery and installation of modular accessories, white color		
built-in PVC box 3M		
armature 3M		
decorative mask 3M - white color		
single-pole switch sa indic.Lamp. 1M,10A-2pcs-white color		
single-pole switch sa indic.Lamp. 1M,16A-1pcs-white color		
Total for material and labor:	set	1
4.17. Procurement, delivery and installation of modular accessories, white color		
built-in PVC box 3M		
armature 3M		
decorative mask 3M - white color		
single-pole switch 1M - 3pcs - white color		
Total for material and labor:	set	1
4.18. Procurement, delivery and installation of modular accessories , white color		
built-in PVC box 4M		
armature 4M		
decorative mask 4M - white color		
single-pole switch 1M - 4pcs - white color		
Total for material and labor:	set	1
4.19. Procurement, delivery and installation of modular accessories, white color		
built-in PVC box 7M		
armature 7M		
decorative mask 7M - white color		
single-pole switch 1M - 7pcs - white color		
Total for material and labor:	set	1
4.20. Procurement, delivery and installation of socket protection against contact. Protectors are mounted on sockets located in room no. 9, and the color is defined by the interior project. Total for material and labor:		
	set	15
4.21. Dismantling of existing switches and sockets. Dismantled equipment must be stored in a place designated by the investor. Total for work:		
	flat rate	1

Total installation equipment:

5 INSTALLATION OF POTENTIAL EQUALIZATION

- 5.1. Make a galvanic connection of all metal masses in the building that belong to the electrical installation with a fine wire conductor of section H07Z-R 1x6mm². Total for material and labor:

m 250

- 5.2. Make a galvanic connection of all metal masses in the building that do not belong to the electrical installation with a halogen-free fine-wire conductor H07Z-R 1x16mm² (RACK cabinet, VIK equipment...). The item also includes HFT halogen free pipes through a concrete jacket. Total for material and labor:

m 150

Total equipotential bonding installations:

6 EXAMINATION

- 6.1. Examination of electrical installations of high current with obtaining a certificate.

flat rate 1

Total examination:

7 Creation of the project of the derived condition (maintenance)

flat rate 1

RECAPITULATION

- 1 DISTRIBUTION CABINETS AND POWER SUPPLY LINES
- 2 GENERAL ELECTRICAL INSTALLATION
- 3 ELECTRICAL LIGHTING INSTALLATION
- 4 INSTALLATION EQUIPMENT
- 5 INSTALLATION OF POTENTIAL EQUALIZATION
- 6 EXAMINATION
- 7 Creation of the project of the derived condition (maintenance)

TOTAL without VAT

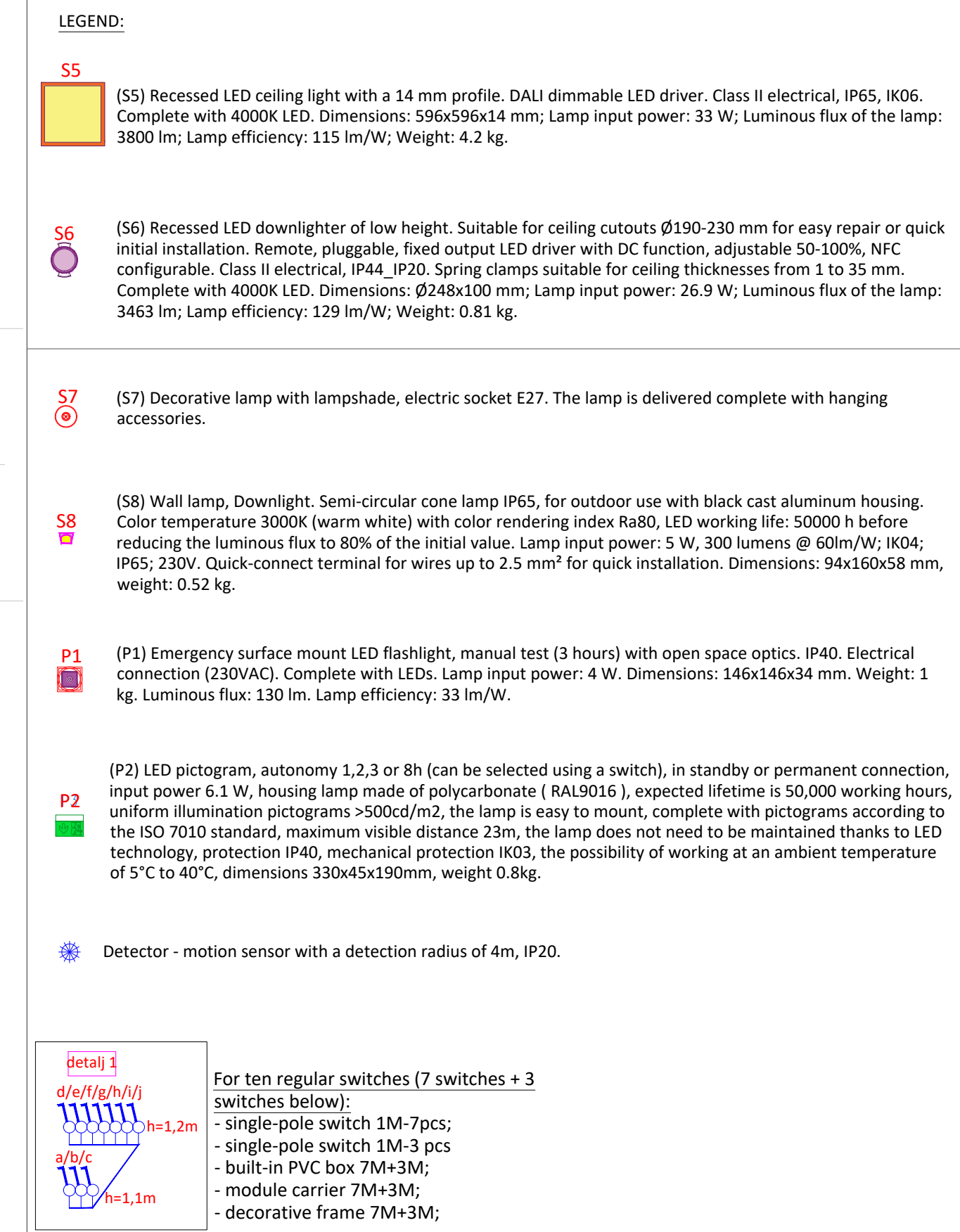
VAT AMOUNT (21%)

TOTAL with VAT

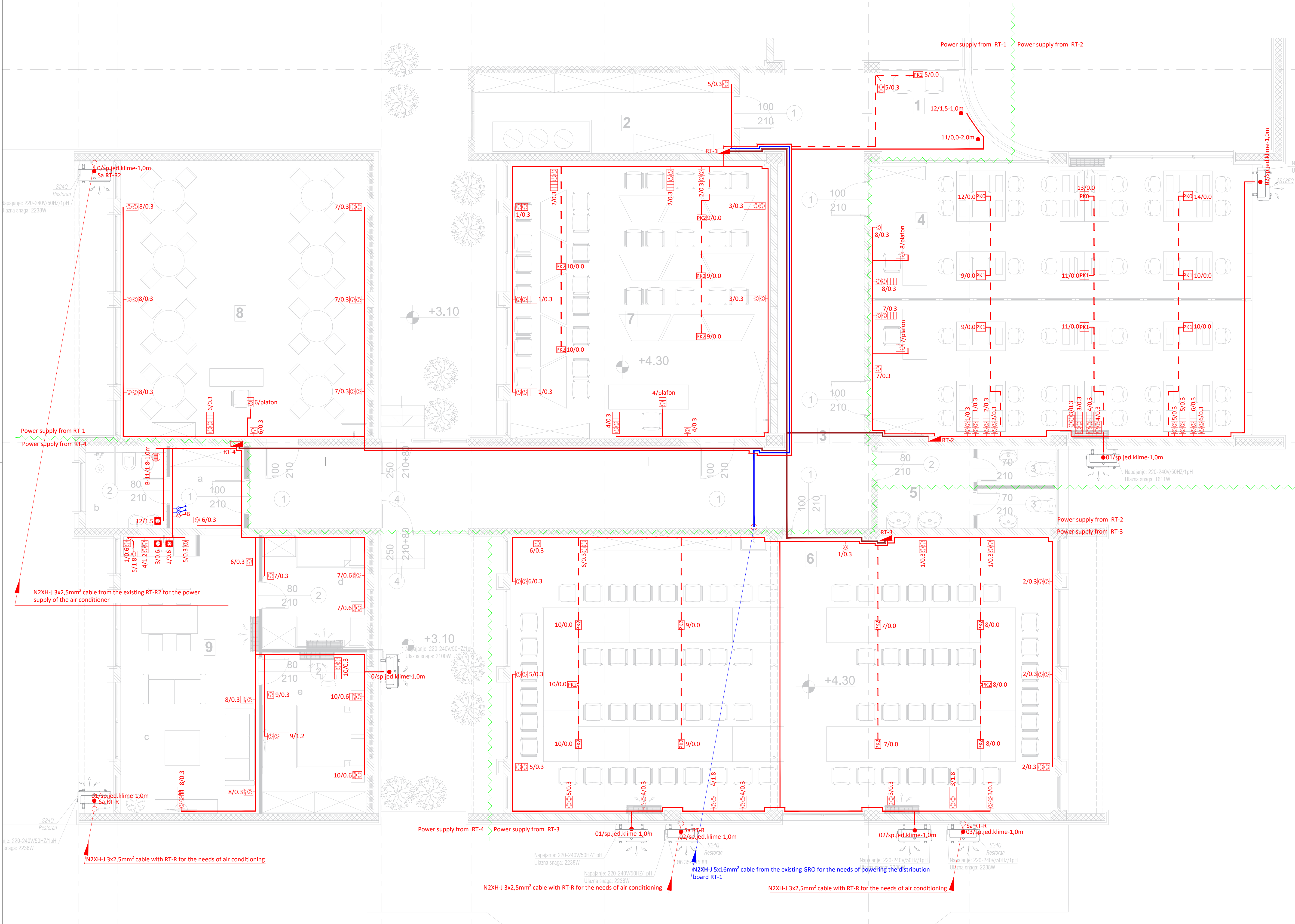
Responsible Engineer:

Slobodan Marković, dipl.inž.el.

GRAPHIC DOCUMENTATION



<p>NOTE:The switches are mounted at a height of 1.2 m from the finished floor</p>			
<p>DESIGNER:</p> <p>ENpro ing Inproing DOO hri. voljode Stanka Radonjica br.47, lamela 1, stan 43., Podgorica tel.: +382(0)67 215 992</p>		<p>INVESTOR: Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy</p>	
<p>Object: JU SREDNJA MJEŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora</p>		<p>Location: k. p. 1617/1, KO Budva, Opština Budva</p>	
<p>Leading designer: Zagorka Božović Pejvanović, dipl. ing. arh.</p>		<p>Type of technical documentation: Adaptation project of parts of the facility</p>	
<p>Authorized designer: Slobodan Marković, dipl.inž.el. br. lic. IUP 1077/7-1164/2</p>		<p>Part of technical documentation: Electrical engineering project-low voltage</p>	
<p>Assistant designer: Danilo Mijanović, spec.sci.el.</p>		<p>Enclosure: Spec of ground floor - Lighting</p>	<p>No. off attachment: 2</p>
<p>Drafting date and M.P</p>		<p>SCALE: 1:50</p>	
		<p>Page no.: 83</p>	
		<p>Date of revision and M.P</p>	



LEGEND:

PK0 - marking of the floor box:
- built-in housing 18M, metal, for installation in the floor or double floor.
- Floor box insert for accommodating 18M modules
- Floor box cover 18M, metal
For installation in a floor box:
- single-phase power socket 2P+E, 16A - 4 pieces;
- free modules for low current 1M - 4 pieces;
- blind modules - cover 1M - pc 2;

PK1 - marking of the floor box:
- built-in housing 2x7M, metal, for installation in the floor or double floor. Built-in dimensions 273x269.5mm, depth min. 83 mm. Adjustable height 83-128mm.
- Floor box insert for accommodating 2x7M modules
- Floor box cover 2x7M, metal, installation dimensions 265x265mm, depth min 17.5mm
For installation in a floor box:
- single-phase power socket 2P+E, 16A - 4 pieces;
- free modules for low current 1M - 4 pieces;
- blind modules - cover 1M - pc 2;

PK2 - marking of the floor box:
- built-in housing 7M, metal, for installation in the floor or double floor. Built-in dimensions 273x182.5mm, depth min. 83 mm. Adjustable height 83-128mm.
- Floor box insert for housing 7M modules
- Floor box cover 7M, metal, installation dimensions 265x178mm, depth min 17.5mm
For installation in a floor box:
- single-phase power socket 2P+E, 16A - 2 pieces;
- free modules for low current 1M - pc 2;
- blind modules - cover 1M - pc 1;

For 1 socket:
- single phase outlet 2P+E, 16A - white colour, 1pc;
- built-in PVC box Ø60;
- module support 2M;
- decorative frame 2M;

For 2 socket:
- single phase outlet 2P+E, 16A - white colour, 2pc;
- built-in PVC box 4M;
- module support 4M;
- decorative frame 4M;

For socket with IP protection:
- single phase outlet 2P+E, 16A - white colour, 1 pc;
- built-in PVC box Ø60;
- module support 2M;
- decorative and protective frame IP44;

For 1 socket:
- single phase outlet 2P+E, 16A - white colour, 1pc;
- built-in PVC box 3M;
- module support 3M;
- decorative frame 3M;

For 2 sockets:
- single-phase socket outlet 2P+E, 16A - pc 1;
- single-phase socket 2P, 16A 1M- 1 piece white;
- built-in PVC box 3M;
- 3M module carrier;
- decorative frame 3M;

For 2 sockets:
- single-phase socket outlet 2P+E, 16A - pc 2;
- blind module 1M - pc 2;
- built-in PVC box 7M;
- module carrier 7M;
- decorative frame 7M;

For 4 sockets:
- single-phase socket outlet 2P+E, 16A - pc 2;
- single-phase socket 2P, 16A 1M- 1 piece white;
- blind module 1M - 1 piece;
- built-in PVC box 7M;
- module carrier 7M;
- decorative frame 7M;

Bathroom switches of which the symbol red marks, switch 16A provided for controlling the electric water heater

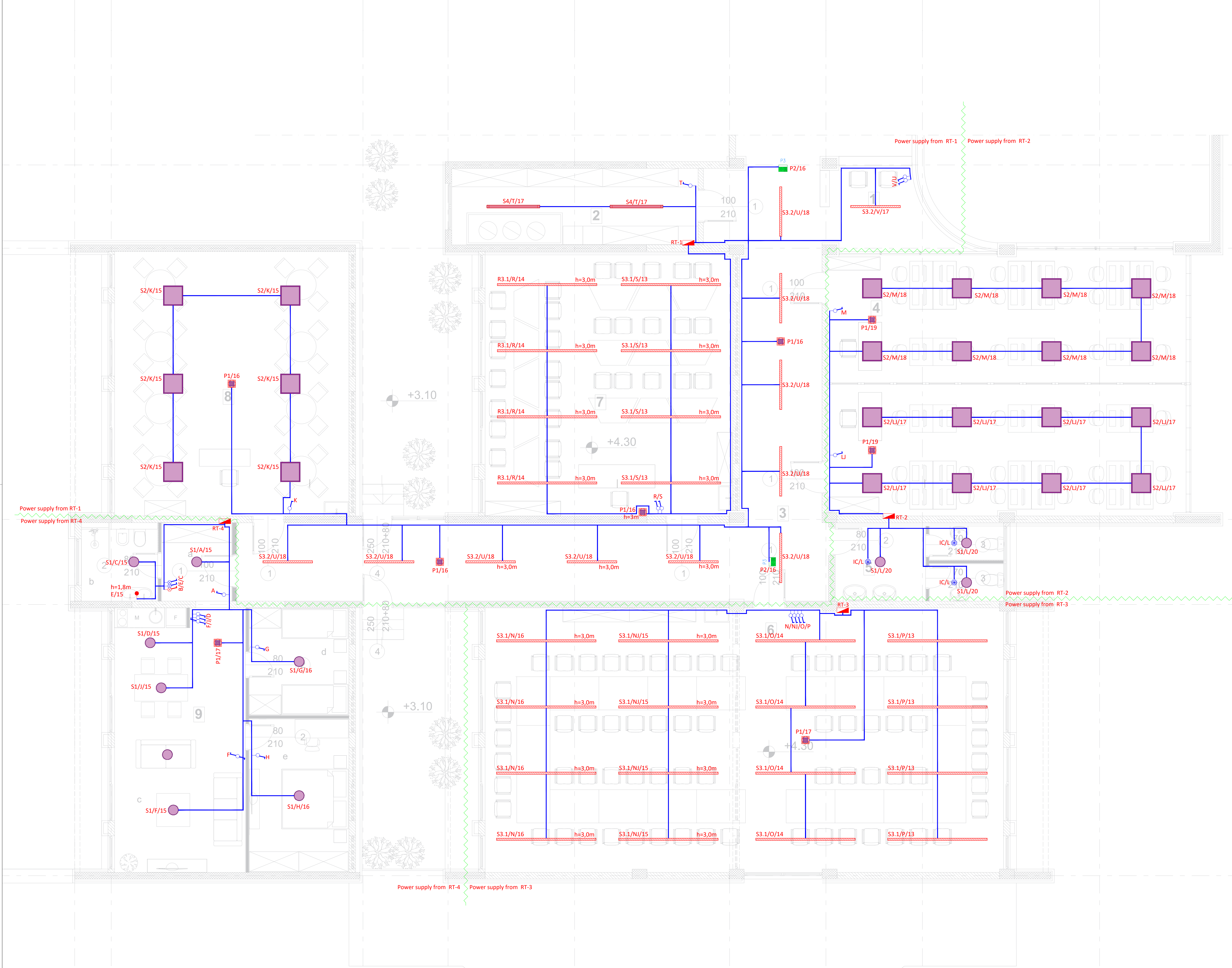
Single-phase outlet of the power cable type N2XH-j of the appropriate cross-section for supplying electricity, boiler, and all according to the single-pole scheme

Single-phase cable outlet type N2XH-j of the appropriate section, and all according to the single-pole scheme.

Their-phase cable outlet type N2XH-j of the appropriate section, and all according to the single-pole scheme.

number off electric circuit
number of electric circuit
mounting height off socket(from finished floor)
1/0.3
1/0.7-1.0m
number off electric circuit
mounting height of the cable outlet
length of the cable that needs to be left as a reserve

DESIGNER: ENpro ing Enproing DOO bul. vojvođe Stanka Radonjica br.47, Izabela 1, stan 43, Podgorica tel. +382(0)67 215 992		INVESTOR: Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy	
Object: JU SREDNJA MUŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora		Location: k. p. 1617/1, KO Budva, Opština Budva	
Leading designer: Zagorka Božović Pejano, dipl. ing. arh.		Type of technical documentation: Adaptation project of parts of the facility	
Authorized designer: Slobodan Marković, dipl.inž.el. br. lic. UPI 107/7-1164/2		Part of technical documentation: Electrical engineering project-low voltage	
Assistant designer: Danilo Miljanović, spec.sci.el.		Inclsure: Base floor - General consumption	
Drafting date and M.P		No. off attachment: 3	
		Page no. 84	
		Date of revision and M.P	



LEGEND:

S1

(S1) Surface mounted LED lamp. Diffuser: opal polycarbonate. Class II electrical, IP65, IK10. Complete with 4000K LED. Suitable for direct mounting on the wall or ceiling. Loop-in, loop-out is possible for cables up to 2.5 mm². BESSA compatible. Dimensions: 8307x58 mm; Lamp input power: 16.3 W; Luminous flux of the lamp: 1950 lm; Lamp efficiency: 120 lm/W; Weight: 0.98 kg.

S2

(S2) Recessed LED luminaire with excellent glare control and high efficiency for office and education. The 36 LED cells (arranged in a 6x6 pattern) each have a prismatic primary lens that allows for greater light output with low glare and user comfort. LED driver with fixed output. Class II electrical, IP40, Impact resistance: IK04. Body: sheet steel, white. Diffuser: prism structure. Complete with 4000K LED. UGR < 19 and L65 < 3000 cd/m² according to EN 12464. Dimensions: 596x596x32 mm; Lamp input power: 34 W; Luminous flux of the lamp: 4392 lm; Lamp efficiency: 129 lm/W; Weight: 2.1 kg. Lamp designed for surface mounting. For surface mounting, the lamp is installed in a surface housing.

S3.1

(S3.1) Surface lamp, suitable for surface, hanging and plaster installation. For one-time and continuous installation. Lamp wired with halogen-free conductors. Dimensions: 3000x72x88 mm; Lamp input power: 53 W; Luminous flux of the lamp: 5080 lm; Lamp efficiency: 96 lm/W; Weight: 6.3 kg.

S3.2

(S3.2) Surface-mounted lamp, suitable for surface, hanging and plaster installation. For one-time and continuous installation. Lamp wired with halogen-free conductors. Dimensions: 1500x72x88 mm; Lamp input power: 26.7 W; Luminous flux of the lamp: 2540 lm; Lamp efficiency: 95 lm/W; Weight: 3.2 kg.

S4

(S4) Surface-mounted lamp, suitable for surface, hanging and plaster installation. For one time and continuous installation. Lamp wired with halogen-free conductors. Dimensions: 1500x72x88 mm; Lamp input power: 26.7 W; Luminous flux of the lamp: 2540 lm; Lamp efficiency: 95 lm/W; Weight: 3.2 kg.

P1

(P1) Emergency surface mount LED flashlight, manual test (3 hours) with open space optics. IP40. Electrical connection (230VAC). Complete with LEDs. Lamp input power: 4 W. Dimensions: 146x146x34 mm. Weight: 1 kg. Luminous flux: 130 lm. Lamp efficiency: 33 lm/W.

P2

(P2) LED pictogram, autonomy 1,2,3 or 8h (can be selected using a switch), in standby or permanent connection, input power 6.1 W, housing lamp made of polycarbonate (RAL9016), expected lifetime is 50,000 working hours, uniform illumination pictograms >500cd/m2, the lamp is easy to mount, complete with pictograms according to the ISO 7010 standard, maximum visible distance 23m, the lamp does not need to be maintained thanks to LED technology, protection IP40, mechanical protection IK03, the possibility of working at an ambient temperature of 5°C to 40°C, dimensions 330x45x190mm, weight 0.8kg.

Detector

Detector - motion sensor with a detection radius of 4m, IP20.

For one single-pole switch:

- single-pole switch 2M-1pc;

- built-in PVC box 2M;

- module support 2M;

- decorative frame 2M;

For a single alternative switch:

- alternating switch 2M-1pc;

- built-in PVC box 2M;

- module support 2M;

- decorative frame 2M;

For two single-pole switches:

- single-pole switch 1M-2pcs;

- built-in PVC box 2M;

- module support 2M;

- decorative frame 2M;

For three switches with indic. lamp.:

- single-pole switch with indicator. lamp. 1M-3pcs; 10A-2pc, 16A-1pc;

- built-in PVC box 3M;

- 3M module carrier;

- decorative frame 3M;

For two normal and one alternating switch:

- single-pole switch 1M-2pcs;

- alternating switch 1M-1pc;

- built-in PVC box 3M;

- 3M module carrier;

- decorative frame 3M;

For four single-pole switches:

- single-pole switch 1M-4pcs;

- built-in PVC box 4M;

- module support 4M;

- decorative frame 4M;

oznaka svjetiljke

zona paljenja

S1/G/5

broj strujnog kruga

NAPOMENA: Prekidajući se montiraju na visini od 1,2 m od gotovog poda

DESIGNER:

ENpro ing

Enproing DOO
bul. vojvode Stanka Radonjica br.47,
Izabela 1, stan 43, Podgorica
tel. +382(0)67 215 992

Object:

JU SREDNJA MJEŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora

Leading designer:

Zagorka Božović Pejano, dipl. ing. arh.

Authorized designer:

Slobodan Marković, dipl.inž.el.
br. lic. UPI 107/7-1164/2

Assistant designer:

Daniilo Mijanović, spec.sci.el.

Drafting date and M.P

INVESTOR:

Western Balkan Six Chamber Investment Forum
Piazza della Borsa n. 14
34121 Trieste, Italy

Location:

k. p. 1617/1, KO Budva, Opština Budva

Type of technical documentation:

Adaptation project of parts of the facility

Part of technical documentation:

Electrical engineering project-low voltage

SCALE:

1:50

Inlosure:

Base floor - Lighting

No. off attachment:

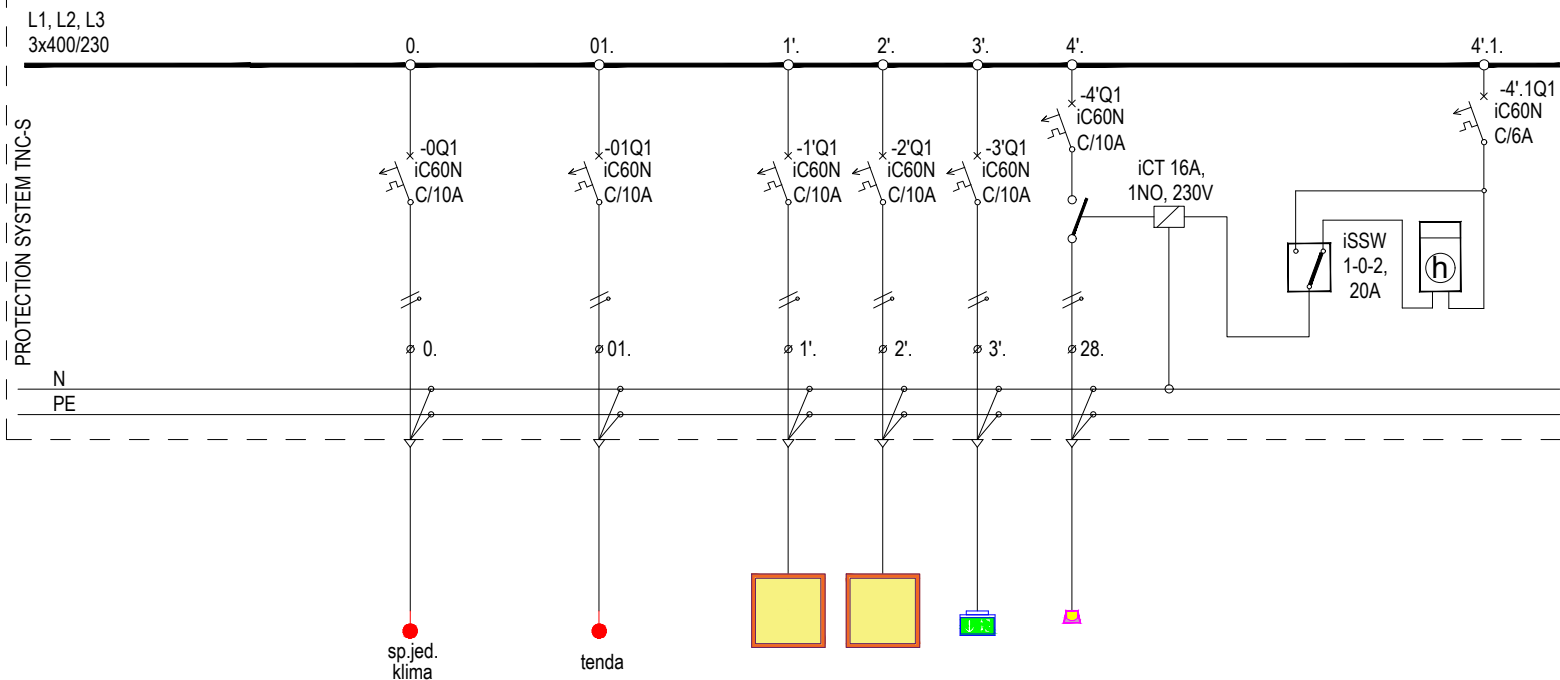
4

Page no.

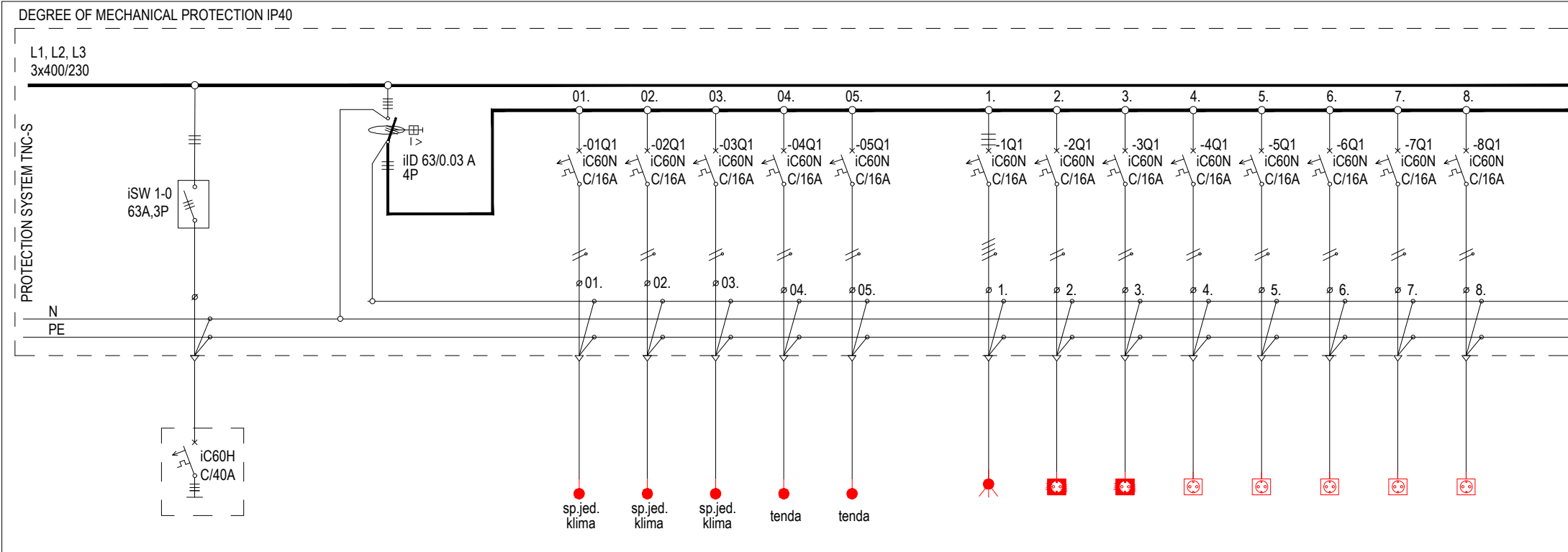
85

Date of revision and M.P

February, 2024. year

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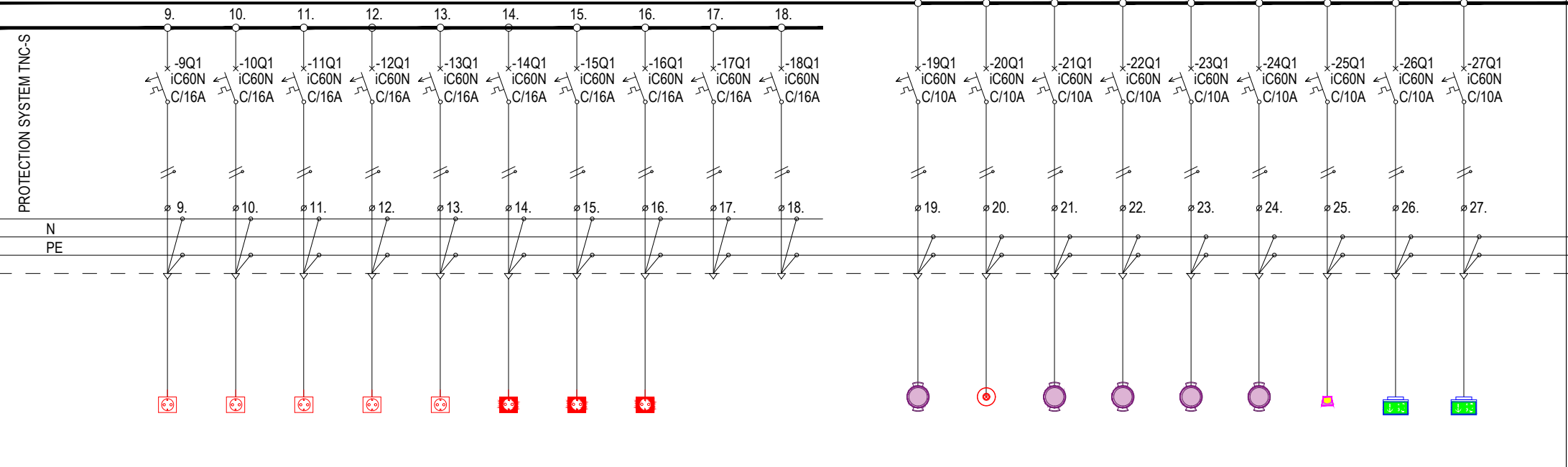
Drafting date and M.P:	Date of revision and M.P:	Designer:	Object:	JU SREDNJA MJEŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora	Location:	Attachment:				
		Leading designer:	Zagorka Božović Pejanović, dipl. ing. arh.							
		Investor:	Authorized designer:	Slobodan Marković, dipl.inž.el. br. lic. UPI 107/7-1164/2	Type of tehcnical documentation:	SINGLE-POLE DIAGRAM OF A PART OF EQUIPMENT TO BE INSTALLED IN A DISTRIBUTION BOARD RT-R2;				
			Assistant designer:	Danilo Mijanović, spec.sci.el.	Adaptation project of parts of the facility					
February, 2024.		<div><div>ENpro ing</div><div>Enproing DOO bul. vojvode Stanka Radonjića br.47, Jamela 1, stan 43., Podgorica tel: +382(0)67 215 992</div></div> <div><div>Western Balkan Six Chamber Investment Forum</div><div>Piazza della Borsa nr. 14</div><div>34121 Trieste, Italy</div></div>			Part of technical documentation:	Scale:	Format:	Revision:	No. of attachment:	Page no.:
					Electrical engineering project- low voltage		A4		6	87



EXCERPT	LABEL	Existing GRO					01.	02.	03.	04.	05.		1.	2.	3.	4.	5.	6.	7.	8.	
	CABLE TYPE	N2XH-J					N2XH-J	N2XH-J	N2XH-J	N2XH-J	N2XH-J		N2XH-J	N2XH-J	N2XH-J	N2XH-J	N2XH-J	N2XH-J	N2XH-J	N2XH-J	
CONSUMER INFORMATION	WIRES NO. AND CROSS SECTION	5x16					3x2,5	3x2,5	3x2,5	3x2,5	3x2,5		5x2,5	3x2,5	3x2,5	3x2,5	3x2,5	3x2,5	3x2,5	3x2,5	
	NAME/TYPE						priključak	priključak	priključak	priključak	priključak		priključak	priključak	priključak	priključak	priključak	priključak	priključak	priključak	
	ROOM						sp.jed.klime	sp.jed.klime	sp.jed.klime	tenda	tenda		šank	šank	šank	šank	šank	šank	šank	restoran	
	L1(kW)								2.238					2.0			1.0				0.8
	L2(kW)						2.238			0.5					2.0			1.0			
	L3(kW)							2.238			0.5					0.8			1.0		
	L1, L2, L3 (kW)												4.5								
	Pi (kW)	29.96																			
	fj=	0.5																			
	Pj(kW)	14.98																			

Drafting date and M.P:	Date of revision and M.P:	Designer:	Object:	JU SREDNJA MJEŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora	Location:	Attachment:				
		<div>ENpro ing</div> <div>Enproing DOO bul. vojvode Stanka Radonjića br.47, Iamela 1, stan 43., Podgorica tel: +382(0)67 215 992</div>	Leading designer:	Zagorka Božović Pejanović, dipl. ing. arh.	k. p. 1617/1, KO Budva, Opština Budva					
		Investor:	Authorized designer:	Slobodan Marković, dipl.inž.el. br. lic. UPI 107/7-1164/2	Type of tehcnical documentation:	SINGLE-POLE DISTRIBUTION BOARD RT-R;				
		<div>Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy</div>	Assistant designer:	Danilo Mijanović, spec.sci.el.	Part of tehcnical documentation:					
February, 2024.					Electrical engineering project- low voltage		A4		7(1/3)	88

DEGREE OF MECHANICAL PROTECTION IP40									
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Drafting date and M.P:	Date of revision and M.P:	Designer:	Object:	JU SREDNJA MJEŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora	Location:	Attachment:					
		<div>ENpro ing</div> <div>Enproing DOO bul. vojvode Stanka Radonjića br.47, Iamela 1, stan 43, Podgorica tel: +382(0)67 215 992</div>	Leading designer:	Zagorka Božović Pejanović, dipl. ing. arh.	k. p. 1617/1, KO Budva, Opština Budva	SINGLE-POLE DISTRIBUTION BOARD RT-R;					
			Investor:	Authorized designer:							Type of tehcnical documentation:
			Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy	Assistant designer:							Part of tehcnical documentation:
February, 2024.				Danilo Mijanović, spec.sci.el.	Electrical engineering project- low voltage	Scale:	Format:	Revision:	No. of attachment:	Page no.:	
							A4		7(2/3)	89	

DEGREE OF MECHANICAL PROTECTION IP40

L1, L2, L3
3x400/230

PROTECTION SYSTEM TNC-S

28. 28.1. 29. 30.

x-28Q1
iC60N
C/10A

x-28.1Q1
iC60N
C/6A

x-29Q1
iC60N
C/10A

x-30Q1
iC60N
C/10A

iCT 16A,
1NO, 230V

iSSW
1-0-2,
20A

h

28. 29. 30.

N
PE

[illegible]

Drafting date and M.P:	Date of revision and M.P:	Designer:	Object:	JU SREDNJA MJEŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora	Location:	Attachment: SINGLE-POLE DISTRIBUTION BOARD RT-R;									
		Leading designer:	Zagorka Božović Pejanović, dipl. ing. arh.		k. p. 1617/1, KO Budva, Opština Budva										
		Investor:	Authorized designer:	Slobodan Marković, dipl.inž.el. br. lic. UPI 107/7-1164/2	Type of tehcnical documentation:	Scale:					Format:	Revision:	No. of attachment:	Page no.:	
			Assistant designer:	Danilo Mijanović, spec.sci.el.	Part of tehcnical documentation:										Adaptation project of parts of the facility
February, 2024.		<div>ENpro ing</div> <div>Enproing DOO bul. vojvode Stanka Radonjića br.47, Iamela 1, stan 43., Podgorica tel: +382(0)67 215 992</div>									A4		7(3/3)	90	
		Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy													

The diagram illustrates a 400V/230V TN-C-S system. The main supply line consists of three phases (0, 01, 02) and a neutral line (N). A PE line is also shown. The system includes a main switch (iSW 1-0 63A, 3P) and a residual current device (iID 40/0.03 A 4P). The load side consists of three main distribution units (RT-2, RT-3, RT-4) and a series of smaller units (1-9). Each unit is protected by a circuit breaker (iC60N) and a residual current device (iC60H). The diagram also shows the connection of the PE line to the main switch and the distribution units.

Drafting date and M.P.:

DEGREE OF MECHANICAL PROTECTION IP40

L1, L2, L3
3x400/230

PROTECTION SYSTEM TNC-S

N
PE

10. 11. 12. 13. 14. 15. 16. 17. 18. 19.

x-10Q1 iC60N C/16A x-11Q1 iC60N C/16A x-12Q1 iC60N C/16A x-13Q1 iC60N C/10A x-14Q1 iC60N C/10A x-15Q1 iC60N C/10A x-16Q1 iC60N C/10A x-17Q1 iC60N C/10A x-18Q1 iC60N C/10A x-19Q1 iC60N C/10A

10. 11. 12. 13. 14. 15. 16. 17. 18. 19.

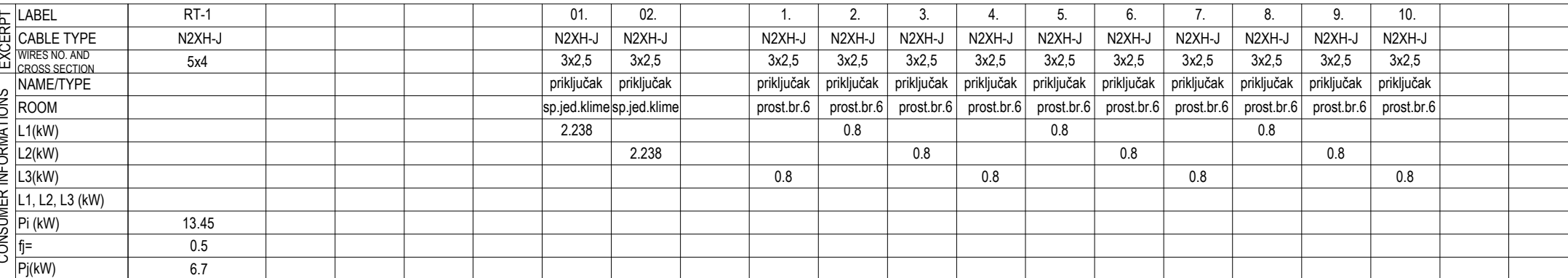
10. 11. 12. 13. 14. 15. 16. 17. 18. 19.

EXCERPT	LABEL	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.										
CABLE TYPE	N2XH-J	rezerva	rezerva	N2XH-J	N2XH-J	N2XH-J	N2XH-J	N2XH-J	N2XH-J	N2XH-J	rezerva										
WIRES NO. AND CROSS SECTION	3x2,5			3x1,5	3x1,5	3x1,5	3x1,5	3x1,5	3x1,5	3x1,5											
NAME/TYPE	priključak			osvjetljenje	osvjetljenje	osvjetljenje	osvjetljenje	osvjetljenje	osvjetljenje	osvjetljenje											
ROOM	prost.br.7																				
L1(kW)	0.8			0.22				0.1													
L2(kW)					0.22				0.15												
L3(kW)						0.2				0.27											
L1, L2, L3 (kW)																					
Pi (kW)																					
fj=																					
Pj(kW)																					

Drafting date and M.P.	Date of revision and M.P.	Designer:	Object:	Location:	Attachment:			
February, 2024.		ENproing Enproing DOO bul. vojvode Stanka Radonjića br.47, Iamela 1, stan 43., Podgorica tel: +382(0)67 215 992	JU SREDNJA MJEŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora	k. p. 1617/1, KO Budva, Opština Budva	SINGLE-POLE DISTRIBUTION BOARD RT-1;			
		Investor: Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy	Leading designer: Zagorka Božović Pejanović, dipl. ing. arh.	Type of tehcnical documentation: Adaptation project of parts of the facility				
			Authorized designer: Slobodan Marković, dipl.inž.el. br. lic. UPI 107/7-1164/2	Assistant designer: Danilo Mijanović, spec.sci.el.	Part of tehcnical documentation: Electrical engineering project- low voltage	Scale:	Format: A4	Revision:

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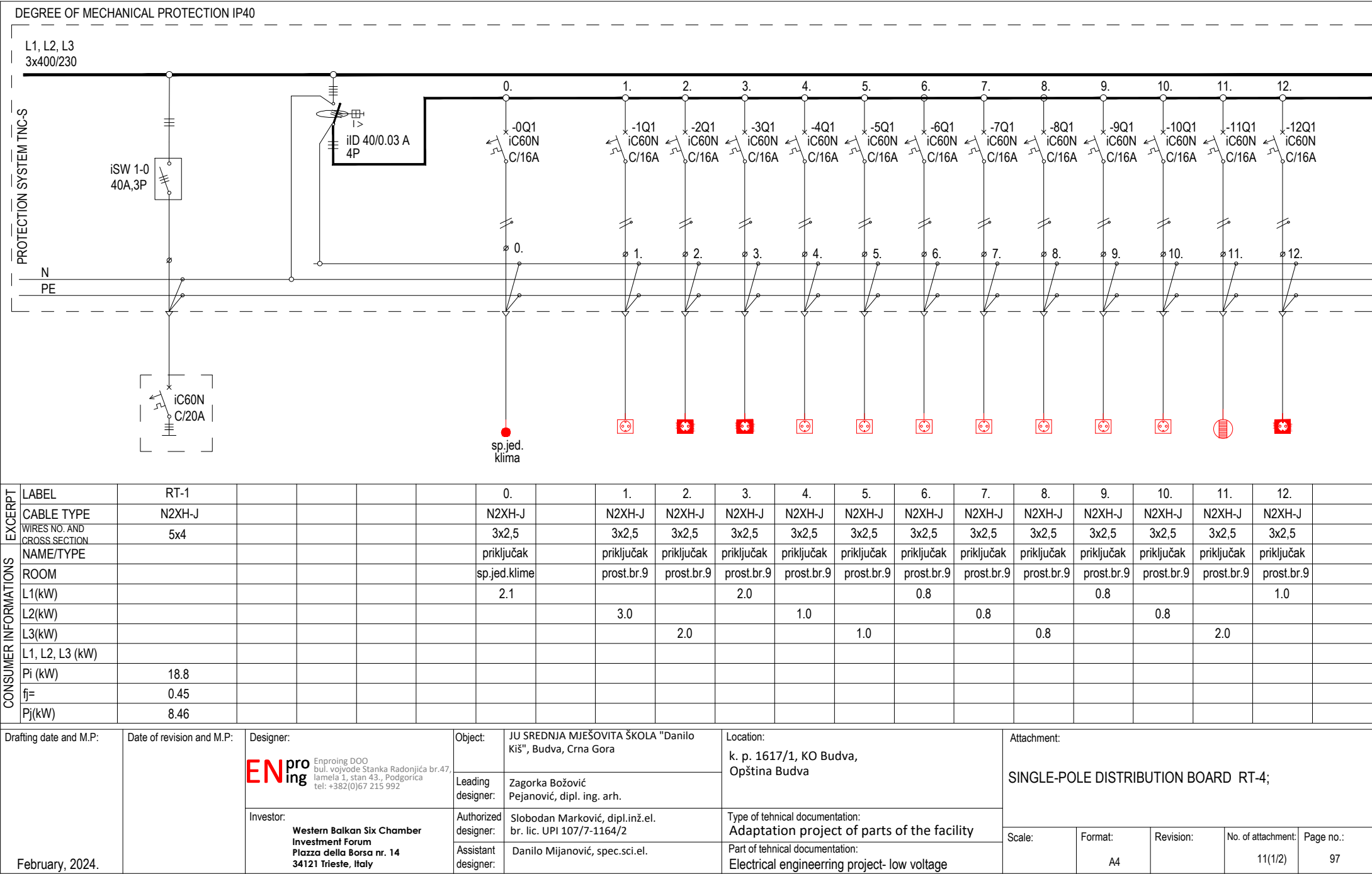
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		Leading designer:	Zagorka Božović Pejanović, dipl. ing. arh.						
		Investor: Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy	Authorized designer: Slobodan Marković, dipl.inž.el. br. lic. UPI 107/7-1164/2	Type of tehcnical documentation: Adaptation project of parts of the facility	Scale:	Format:	Revision:	No. of attachment:	Page no.:
February, 2024.			Assistant designer: Danilo Mijanović, spec.sci.el.	Part of tehcnical documentation: Electrical engineering project- low voltage		A4		9(2/2)	94



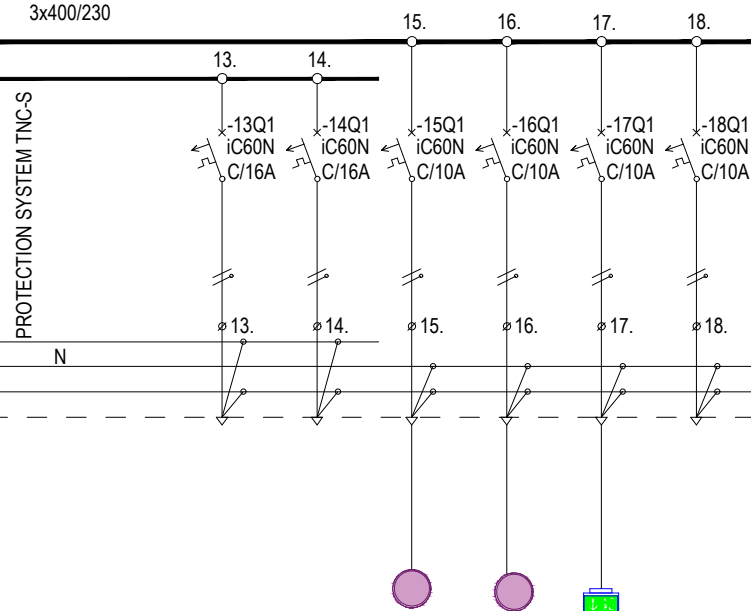
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February, 2024.		Investor: Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy	Leading designer: Zagorka Božović Pejanović, dipl. ing. arh.						
		Authorized designer: Slobodan Marković, dipl.inž.el. br. lic. UPI 107/7-1164/2	Assistant designer: Danilo Mijanović, spec.sci.el.	Type of tehcnical documentation: Adaptation project of parts of the facility	Scale:	Format: A4	Revision:	No. of attachment: 10(1/2)	Page no.: 95


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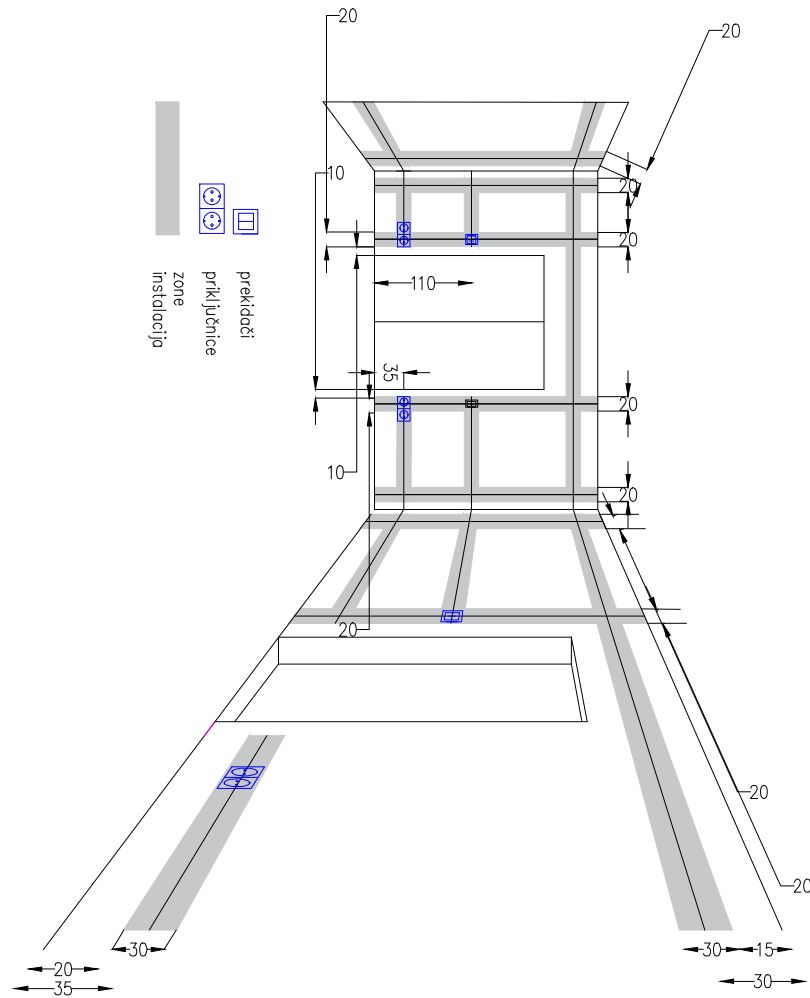
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February, 2024.		<div>ENproing</div> <div>Enproing DOO bul. vojvode Stanka Radonjića br.47, Iamela 1, stan 43., Podgorica tel: +382(0)67 215 992</div>	Leading designer:	Zagorka Božović Pejanović, dipl. ing. arh.	k. p. 1617/1, KO Budva, Opština Budva	SINGLE-POLE DISTRIBUTION BOARD RT-3;				
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		Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy	Assistant designer:	Danilo Mijanović, spec.sci.el.	Part of technical documentation:	Electrical engineering project- low voltage	Scale:	Format:	Revision:	No. of attachment:
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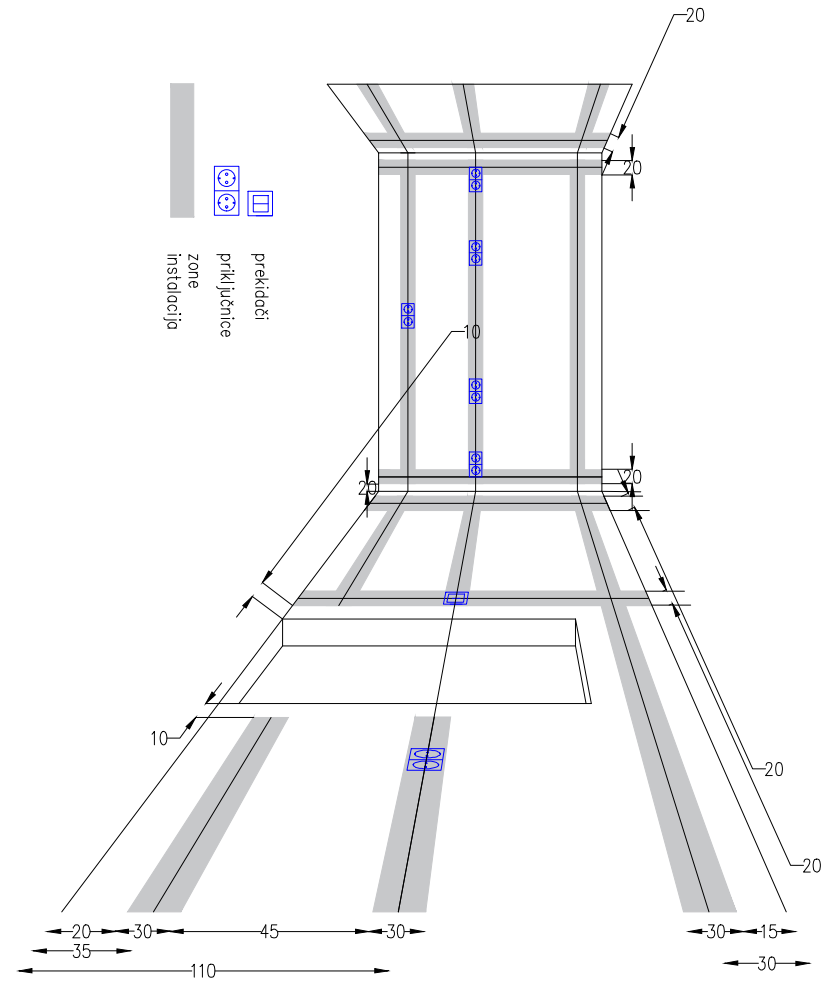
L1, L2, L3
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		 <div>Enproing DOO bul. vojvode Stanka Radonjića br.47, Iamela 1, stan 43., Podgorica tel: +382(0)67 215 992</div>	Leading designer:	Zagorka Božović Pejanović, dipl. ing. arh.	k. p. 1617/1, KO Budva, Opština Budva	SINGLE-POLE DISTRIBUTION BOARD RT-4;				
			Investor:	Authorized designer:	Type of technical documentation:					
			February, 2024.		<div>Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy</div>	Assistant designer:	Slobodan Marković, dipl.inž.el. br. lic. UPI 107/7-1164/2	Adaptation project of parts of the facility	Scale:	Format:
				Danilo Mijanović, spec.sci.el.	Part of technical documentation: Electrical engineering project- low voltage		A4		11(2/2)	98



STAMBENE
PROSTORIJE



KUHINJE

Drafting date and M.P:	Date of revision and M.P:	Designer:	Object:	JU SREDNJA MJEŠOVITA ŠKOLA "Danilo Kiš", Budva, Crna Gora	Location:	INSTALLATION ZONES					
		<div>ENproing<div>Enproing DOO bul. vojvode Stanka Radonjića br.47, lamela 1, stan 43., Podgorica tel: +382(0)67 215 992</div></div>	Leading designer:	Zagorka Božović Pejanović, dipl. ing. arh.							
		Investor:	Authorized designer:	Slobodan Marković, dipl.inž.el. br. lic. UPI 107/7-1164/2	Type of tehcnical documentation:						Adaptation project of parts of the facility
		<div>Western Balkan Six Chamber Investment Forum Piazza della Borsa nr. 14 34121 Trieste, Italy</div>	Assistant designer:	Danilo Mijanović, spec.sci.el.	Part of technical documentation:	Electrical engineering project- low voltage	Scale:	Format:	Revision:	No. of attachment:	Page no.:
								A4		12	99