

3.2.25 HYDRANT NETWORK

3.2.25.1 Procurement and Laying of Galvanized Water Pipes

Procurement and laying of galvanized water pipes with all the required barrel fittings on the piping network. The item includes hanging of pipes on the wall and the structure. This item also implies all the required materials for sealing of pipe joints and anti-corrosion protection of the pipeline. Calculated per m' of finished pipeline.

3.2.25.1.1 Ø 50 mm

3.2.25.1.2 Ø 65 mm

3.2.25.1.3 Ø 80 mm

3.2.25.2 Procurement and Installation of Heat Insulation for Pipes

Procurement and installation of heat insulation for pipes of POLYURETHANE or other adequate foam insulating material. Calculated per m'.

3.2.25.2.1 Ø 50 mm

3.2.25.2.2 Ø 65 mm

3.2.25.2.3 Ø 80 mm

3.2.25.3 Procurement, Transport and Mounting of the Complete Wall-Mounted Fire Hydrant

Procurement, transport and mounting of the complete wall-mounted fire hydrant. The hydrant is to consist of Inox box, of standard dimensions of 50x50 cm, with a lock. The cabinet is to accommodate a reel with Trevira hose of Ø50 mm with adequate nozzle fitted to the hose end. The other hose end is to be fitted to the hydrant – the hose valve. The supply riser pipe to be accommodate next to the hydrant box. At the end of the pipe, a slanting hose valve with the wheel handle of Ø50 mm is to be fitted, included in the rate. The item includes procurement and fixing of rawl plus for screws and suspension of the hydrant. Calculated per piece of complete hydrant, mounted and tested.

3.2.25.4 Procurement and Installation of the Booster Pump Unit

Procurement and installation of the booster pump unit, having characteristics: Q=7.5 l/s, H=70 m. The unit is to be provided with the control cabinet and all the required parts for its automatic operation. Calculated per piece of complete installed unit.

VOLUME 3 – SECTION 3 – ELECTRICAL ENGINEERING TECHNICAL SPECIFICATIONS

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3.3.0 PREFACE

Scope of the electrical works includes the following sections:

1. Electrical Power Installations,
2. Telecommunication and signalling installations
3. Automatic fire detection & alarm system

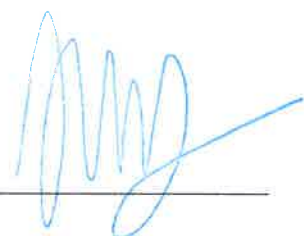
General technical requirements shall apply to all elements of the electrical works described further in this chapter. If not otherwise described further in separate sessions for electrical works, these general technical requirements shall prevail.

Before starting the works, for the purpose of execution of works, it is necessary to create a Design for Construction (PZI) compliant with all other professions. During the works execution, the Contractor is liable to adhere to the Design, while for the works that are not included in this Design, the standard technical rules and regulations for these types of works shall be applicable.

All testing shall be the liability of the Contractor. Materials that do not comply with the technical specifications, rules and standards must not be installed and shall be removed from the site at the Contractor's cost. In doubtful cases, the material shall be sent for testing to an authorized institution/approved laboratory whose result will be valid.

Upon the completion of all the works, the Contractor has to examine and test the installations in accordance with the existing regulations. The obtained test and measuring results have to correspond to the Rulebook (Official Gazette no. 53/88, 54/88) and Official Gazette FRY no. 28/95.

If the test shows that the installation is not functional, the Contractor shall be obliged to bring the installation in a functional condition at his own expense.



3.3.1 ELECTRIC POWER INSTALLATIONS

3.3.1.1 Dismantling of the existing power supply installations

3.3.1.1.1 Dismantling of the existing HVAC installation

Dismantling of the existing electrical installations of HVAC consumers including power installation for pumps, heating and cooling equipment.

Payment made as a lump sum.

3.3.1.1.2 Dismantling of existing lights and sockets

Disconnecting of existing lights from the ceilings in the facility, switches, power sockets, network and phone sockets.

Payment made as a lump sum.

3.3.1.1.3 Disconnecting of local switch boards

Disconnecting of local boards throughout the facility and disassembling of such boards.

Payment made per piece.

3.3.1.1.4 Disconnecting of main distribution board

Disconnecting of distribution board and disassembling of such cabinets.

Payment made per piece.

3.3.1.2 Power supply of the building

Supply of the building with electricity shall be planned according to the technical requirements of the “EPS Distribucija”.

3.3.1.2.1 Cable connecting box KPK

Procurement, delivery and installation of KPK cable connecting box made of pickled steel sheet with fuse bases 400A, for wall mounting, with doors and key. The KPK cabinet contains following equipment:

- Safety fuses 400A – 3 pcs.
- A set of copper busbars for “N
- Engraved nameplate with arrow showing danger and mark of the power utility company – 1pc
- All material required for proper functioning

Payment made per piece.

3.3.1.2.2 Treatment of the building section of the facade around the KPK

After mounting the KPK, that section of the facade of the building shall be treated, so that the appearance of the façade remains unchanged.

Payment made per m².

3.3.1.2.3 Cable 2xN2XH-J 4x95mm²

Procurement, delivery and installation of cable N2XH-J 4x95mm², from KPK to GRO, with connections on both ends. Cables should be laid inside the wall and on perforated cable trays PCT 200.

Payment made per m’.

3.3.1.3 Distribution boards and switchboards

Switchboards should meet following conditions:

- outfit of switchboards must not perturb aesthetic norms
- must be wall mounted
- doors must have latch with key
- all built-in clips must have access from front side
- each board must be equipped with a sufficient busbar and earthing bar

In normal work, all clips and supplied equipment parts must be protected from touch.

For all switchboards manufacturer will provide labels for identification of parts, current circles, functions, etc. Manufacturer and contractor are liable to permanently mark each switchboard according to the Final Design.

Before functioning of cables (wires) at clips, contractor must identify each wire in the cable (if they are not labelled) by appropriate engineering method. This identification is necessary for later disposition of lights by phases.

At the switchboard doors must be placed single-pole layout with all current circles labelled.

3.3.1.3.1 Main Distribution board GRO

Procurement, delivery and installation of the distribution board GRO with doors and a lock with a key of approximate dimensions 2000x1600x400mm (HxWxD). The cabinet shall be fabricated in three parts. The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP66 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet GRO:

- 4-pole surge arrester, 230/400V, 50/60Hz, $I_{max}=40\text{kA/pole}$. $U_p=1.7\text{kV}$, $i_n=20\text{kA/pole}$, 4 modules, equipped with built-in thermal protection, in compliance with the standard IEC EN 61643-1 – 1pc
- 3-pole compact protection switch with an electronic protection device, $i_n=630\text{A}$, 70kA, of cut-off power of $I_{cs}=0,75 \times I_{cu}$, thermal overload protection of $I_r=0,4-1 \times I_n$, $t_r=3-30\text{s}$, $I_{sd}=1,5-10 \times I_r$, $t_{sd}=0-500\text{ms}$, $I_g=0,2-1 \times I_n$, $t_g=0,1-1\text{s}$, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, of a capacity of connection of a full cross section of up to 300mm² or 2x240mm², of the width of the bus-bar and shoes of 32mm, in compliance with the standard IEC EN 60947-2 – 1pc
- phase monitoring relay 3(N)~400/230V AC, tolerance: from -30% to +30% U_n , rated consumption: 8 VA (0.8 W), rated frequency: 48-63 Hz, in compliance with the standard IEC EN 60947-3. – 1pc
- disconnector for knife-blade fuses, 630A, 3-pole, of rated operating voltage 690V~ or 440V-, insulation voltage 800V, peak pulse voltage of 6kV, the maximum current of short circuit with knife-blade fuses of 50kA, with the protection against accidental contact of energized parts, control of fuses through a transparent window, checking of voltage through a small slot, with a cover for tamper proofing, in compliance with the standard IEC EN 60947-3. -1pc
- disconnector for knife-blade fuses, 160A, 3-pole, of rated operating voltage of 690V~ or 250V-, insulation voltage 800V, peak pulse voltage of 6kV, the maximum current of short circuit with knife-blade fuses of 50kA, power dissipation per pole with the fuse of 9W, with the protection against accidental contact of energized parts, control of fuses through a transparent window, checking of voltage through a small slot, in compliance with the standard IEC EN 60947-3 – 2pcs
- knife-blade fuse, 1-pole, of nominal current of 630A, rated operating voltage of 500V~, cut-off power of 120kA, type gG (IEC)/ gL (VDE), with an indicator, size 3, with the selectivity ratio of 1.6, in compliance with the standard IEC EN 60269-1 and -2, VDE 0636-21 – 3pcs
- knife-blade fuse, 1-pole, of nominal current of 160A, rated operating voltage 500V~, cut-off power of 120kA, type gG (IEC)/ gL (VDE), with an indicator, size 00, with the selectivity ratio of 1.6, in compliance with the standard IEC EN 60269-1 and -2, VDE 0636-21 – 6pcs.
- MCB 3-pole 400V, 125A, I_{ks} 10kA, in compliance with the standard IEC 60947-2 – 2pcs
- MCB 3-pole 400V, 40A, I_{ks} 10kA, in compliance with the standard IEC 60947-2 – 12pcs

- MCB 3-pole 400V, 32A, Iks 10kA, in compliance with the standard IEC 60947-2 – 3pcs
- MCB 3-pole 400V, 25A, Iks 10kA, in compliance with the standard IEC 60947-2 – 10pcs
- MCB 3-pole 400V, 20A, Iks 10kA, in compliance with the standard IEC 60947-2 – 2pcs
- Copper insulated bus bar, N and P bus bars, scrow type terminals
- DIN rails 35 mm
- serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.2 Distribution board RO-POD II

Procurement, delivery and installation of the distribution board RO POD II with doors and a lock with a key of approximate dimensions 600x600x300mm(HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP66 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

3-pole compact protection switch with a thermomagnetic protection device, in=32A, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc

MCB 1-pole 230V, 2A, Iks 6kA, in compliance with the standard IEC 60898 – 4pcs

MCB 1-pole 230V, 10A, Iks 6kA, in compliance with the standard IEC 60898 – 6pcs

MCB 1-pole 230V, 16A, Iks 6kA, in compliance with the standard IEC 60898 – 12pcs

Signal lamp, green, 230V – 3pcs

Copper insulated bus bar, N and P bus bars, scrow type terminals

DIN rails 35 mm

Serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.3 Distribution board RO-POD I

Procurement, delivery and installation of the distribution board RO POD I (bricked in) with doors and a lock with a key of approximate dimensions 1200x600x300mm_(HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP55 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet shall be fabricated in two parts; one segment for power supply of consumers from the grid, and the other one for the Diesel-electric generating set power supply of emergency lighting, operating socket outlets, and other consumers to be powered from the Diesel-electric generating set. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, in=50A, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- 3-pole compact protection switch with a thermomagnetic protection device, in=25A, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 2pcs
- residual current protection device, 4-pole, in= 25A, Id= 30mA, 6kA, in compliance with the standard EN 61008-1 – 1pc

- MCB 1-pole 230V, 2A, Iks 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, Iks 6kA, in compliance with the standard IEC 60898 – 27pcs
- MCB 1-pole 230V, 16A, Iks 6kA, in compliance with the standard IEC 60898 – 15pcs
- MCB 1-pole 230V, 20A, Iks 6kA, in compliance with the standard IEC 60898 – 21pcs
- Signal lamp, green, 230V – 3pcs
- Copper insulated bus bar, N and P bus bars, scrow type terminals
- DIN rails 35 mm
- serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.4 Distribution board RO-PR

Procurement, delivery and installation of the distribution board RO PR (bricked in) with doors and a lock with a key of approximate dimensions 1200x600x300mm (HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP55 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet shall be fabricated in two parts; one segment for power supply of consumers from the grid, and the other one for the Diesel-electric generating set power supply of emergency lighting, operating socket outlets, and other consumers to be powered from the Diesel-electric generating set. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

the required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=50A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=25A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 2pcs
- residual current protection device, 4-pole, $I_n=25A$, $I_{\Delta n}=30mA$, 6kA, in compliance with the standard EN 61008-1 – 1pc
- MCB 1-pole 230V, 2A, Iks 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, Iks 6kA, in compliance with the standard IEC 60898 – 36pcs
- MCB 1-pole 230V, 16A, Iks 6kA, in compliance with the standard IEC 60898 – 20pcs
- MCB 3-pole 400V, 16A, Iks 6kA, in compliance with the standard IEC 60898 – 2pcs
- Signal lamp, green, 230V – 3pcs
- Copper insulated bus bar, N and P bus bars, scrow type terminals
- DIN rails 35 mm
- serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.5 Distribution board RO-I

Procurement, delivery and installation of the distribution board RO I (bricked in) with doors and a lock with a key of approximate dimensions 1200x600x300mm (HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP55 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet shall be fabricated in two parts; one segment for power supply of consumers from the grid, and the other one for the Diesel-electric generating set power supply of emergency lighting, operating socket outlets, and other consumers to be powered from the Diesel-electric generating set. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=63A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=25A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 2pcs
- residual current protection device, 4-pole, $I_n= 25A$, $I_{\Delta n}= 30mA$, 6kA, in compliance with the standard EN 61008-1 – 1pc
- MCB 1-pole 230V, 2A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 37pcs
- MCB 1-pole 230V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 58pcs
- MCB 3-pole 400V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 1pc
- Signal lamp, green, 230V – 3pcs
- Copper insulated bus bar, N and P bus bars, scrow type terminals
- DIN rails 35 mm
- serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.6 Distribution board RO-II

Procurement, delivery and installation of the distribution board RO II (bricked in) with doors and a lock with a key of approximate dimensions 1200x600x300mm (HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP55 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet shall be fabricated in two parts; one segment for power supply of consumers from the grid, and the other one for the Diesel-electric generating set power supply of emergency lighting, operating socket outlets, and other consumers to be powered from the Diesel-electric generating set. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=63A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=25A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 2pcs
- residual current protection device, 4-pole, $I_n= 25A$, $I_{\Delta n}= 30mA$, 6kA, in compliance with the standard EN 61008-1 – 1pc
- MCB 1-pole 230V, 2A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 41pcs
- MCB 1-pole 230V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 68pcs
- MCB 3-pole 400V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 3pc
- Signal lamp, green, 230V – 3pcs
- Copper insulated bus bar, N and P bus bars, scrow type terminals
- DIN rails 35 mm
- serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.7 Distribution board RO-III

Procurement, delivery and installation of the distribution board RO III (bricked in) with doors and a lock with a key of approximate dimensions 1200x600x300mm (HxWxD). The cabinet shall be fabricated of twice pickled

sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP55 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet shall be fabricated in two parts; one segment for power supply of consumers from the grid, and the other one for the Diesel-electric generating set power supply of emergency lighting, operating socket outlets, and other consumers to be powered from the Diesel-electric generating set. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=63A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=25A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 2pcs
- residual current protection device, 4-pole, $I_n=25A$, $I_{\Delta n}=30mA$, 6kA, in compliance with the standard EN 61008-1 – 1pc
- MCB 1-pole 230V, 2A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 41pcs
- MCB 1-pole 230V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 66pcs
- MCB 3-pole 400V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 3pc
- Signal lamp, green, 230V – 3pcs
- Copper insulated bus bar, N and P bus bars, screw type terminals
- DIN rails 35 mm
- Serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.8 Distribution board RO-IV

Procurement, delivery and installation of the distribution board RO IV (bricked in) with doors and a lock with a key of approximate dimensions 1200x600x300mm (HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP55 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet shall be fabricated in two parts; one segment for power supply of consumers from the grid, and the other one for the Diesel-electric generating set power supply of emergency lighting, operating socket outlets, and other consumers to be powered from the Diesel-electric generating set. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=63A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=25A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 2pcs
- residual current protection device, 4-pole, $I_n=25A$, $I_{\Delta n}=30mA$, 6kA, in compliance with the standard EN 61008-1 – 1pc
- MCB 1-pole 230V, 2A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 43pcs
- MCB 1-pole 230V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 66pcs
- MCB 3-pole 400V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 3pc
- Signal lamp, green, 230V – 3pcs

- Copper insulated bus bar, N and P bus bars, scREW type terminals
- DIN rails 35 mm
- Serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.9 Distribution board RO-pot

Procurement, delivery and installation of the distribution board RO pot (bricked in) with doors and a lock with a key of approximate dimensions 1200x600x300mm(HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP55 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet shall be fabricated in two parts; one segment for power supply of consumers from the grid, and the other one for the Diesel-electric generating set power supply of emergency lighting, operating socket outlets, and other consumers to be powered from the Diesel-electric generating set. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=63A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=25A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 2pcs
- residual current protection device, 4-pole, $I_n=25A$, $I_{\Delta n}=30mA$, 6kA, in compliance with the standard EN 61008-1 – 1pc
- MCB 1-pole 230V, 2A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 34pcs
- MCB 1-pole 230V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 37pcs
- MCB 3-pole 400V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 1pc
- Signal lamp, green, 230V – 3pcs
- Copper insulated bus bar, N and P bus bars, scREW type terminals
- DIN rails 35 mm
- Serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.10 Distribution board RO-HID

Procurement, delivery and installation of the distribution board RO HID with doors and a lock with a key of approximate dimensions 600x600x300mm (HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP66 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

the required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=25A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- motor protection switch, 3-pole, $I_n=2.5A$, adjustment range: from 1.6A to 2.5A, in compliance with the standards IEC EN 60947-1, IEC EN 60947-2, IEC EN 60947-4-1 – 2pcs
- MCB 1-pole 230V, 2A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 4pcs

- MCB 1-pole 230V, 16A, Iks 6kA, in compliance with the standard IEC 60898 – 3pcs
- Signal lamp, green, 230V – 3pcs
- Copper insulated bus bar, N and P bus bars, scew type terminals
- DIN rails 35 mm
- Serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.11 Distribution board RO-TP

Procurement, delivery and installation of the distribution board RO TP with doors and a lock with a key of approximate dimensions 600x600x300mm (HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP66 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, $I_n=32A$, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- motor protection switch, 3-pole, $I_n=2.5A$, adjustment range: from 0.16A to 0.25A, in compliance with the standards IEC EN 60947-1, IEC EN 60947-2, IEC EN 60947-4-1 – 1pcs
- rotary cam switch, 1-pole, positions 0-1, AC21, of the maximum current of 16A, rated operating voltage of 230V~, IP40. The selector switch with a visible position of the handle, fixing with a bolt on the door of the distribution cabinet, with 1 contact, contacts with positive opening and double breaking per pole, in compliance with the standard IEC EN 60947-3 – 1pc
- motor protection switch, 3-pole, $I_n=16A$, adjustment range: from 2.5A to 4A, in compliance with the standards IEC EN 60947-1, IEC EN 60947-2, IEC EN 60947-4-1 – 4pcs
- the rotary cam switch, 3-pole, positions 1-0-2, AC21, of the maximum current of 20A, rated operating voltage of 400V~, IP40. The selector switch with a visible position of the handle, fixing with a bolt on the door of the distribution cabinet, with 6 contacts, contacts with positive opening and double breaking per pole, in compliance with the standard IEC EN 60947-3 – 5pcs
- the isolation transformer, single-phase, 230/24V~, of the power of 63VA, with protection from overload and short circuit. In case of overload, the power supply shall be switched off and enable cooling off of the transformer prior to its repeated switching on. Mounting on DIN bus bar, 4 modules, in compliance with the standard IEC EN 61558-2-6 – 1pc
- MCB 3-pole 400V, 10A, Iks 6kA, in compliance with the standard IEC 60898 – 5pcs
- Fuse gG 10x38mm, 0.25A, 200V – 5pcs
- MCB 1-pole 230V, 2A, Iks 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, Iks 6kA, in compliance with the standard IEC 60898 – 2pcs
- MCB 1-pole 230V, 16A, Iks 6kA, in compliance with the standard IEC 60898 – 2pcs
- MCB 3-pole 400V, 20A, Iks 6kA, in compliance with the standard IEC 60947-2 – 1pcs
- Signal lamp, green, 230V – 5pcs
- Signal lamp, red, 230V – 5pcs
- Copper insulated bus bar, N and P bus bars, scew type terminals
- DIN rails 35 mm
- Serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.12 Distribution board RO-DEA

Procurement, delivery and installation of the distribution board RO DEA with doors and a lock with a key of approximate dimensions 600x600x300mm(HxWxD). The cabinet shall be fabricated of twice pickled sheet

metal of thickness not below 1.5mm, of RAL7035 colour, IP66 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- MCB 1-pole 230V, 2A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 4pcs
- Signal lamp, green, 230V – 4pcs
- Copper insulated bus bar, N and P bus bars, screw type terminals
- DIN rails 35 mm
- Serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.3.13 Distribution board RO-S

Procurement, delivery and installation of the distribution board RO S(bricked in) with doors and a lock with a key of approximate dimensions 1200x600x300mm (HxWxD). The cabinet shall be fabricated of twice pickled sheet metal of thickness not below 1.5mm, of RAL7035 colour, IP55 protection class, in compliance with the standards IEC EN 60529, IK10, and IEC EN 62262. The cabinet shall be fabricated in two parts; one segment for power supply of consumers from the grid, and the other one for the Diesel-electric generating set power supply of emergency lighting, operating socket outlets, and other consumers to be powered from the Diesel-electric generating set. The cabinet must possess a self-adhesive pocket for accommodation of the design documentation.

The required supply equipment has to be installed inside the cabinet. The following equipment shall be installed in the cabinet:

- 3-pole compact protection switch with a thermomagnetic protection device, I_n=200A, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 1pc
- disconnector for knife-blade fuses, 160A, 3-pole, of rated operating voltage of 690V~ or 250V-, insulation voltage 800V, peak pulse voltage of 6kV, the maximum current of short circuit with knife-blade fuses of 50kA, power dissipation per pole with the fuse of 9W, with the protection against accidental contact of energized parts, control of fuses through a transparent window, checking of voltage through a small slot, in compliance with the standard IEC EN 60947-3 – 2pcs
- knife-blade fuse, 1-pole, of nominal current of 160A, rated operating voltage 500V~, cut-off power of 120kA, type gG (IEC)/ gL (VDE), with an indicator, size 00, with the selectivity ratio of 1.6, in compliance with the standard IEC EN 60269-1 and -2, VDE 0636-21 – 6pcs.
- 3-pole compact protection switch with a thermomagnetic protection device, I_n=25A, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 2pcs
- 3-pole compact protection switch with a thermomagnetic protection device, I_n=32A, 25kA, the maximum operating voltage of 690V~, with the voltage shutdown trigger of 230V~, in compliance with the standard IEC EN 60947-2 – 2pcs
- MCB 1-pole 230V, 2A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 4pcs
- MCB 1-pole 230V, 10A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 43pcs
- MCB 1-pole 230V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 66pcs
- MCB 3-pole 400V, 16A, I_{ks} 6kA, in compliance with the standard IEC 60898 – 3pcs
- Signal lamp, green, 230V – 3pcs
- Copper insulated bus bar, N and P bus bars, screw type terminals
- DIN rails 35 mm
- Serial terminals and small installation material

Payment made per piece of described distribution board.

3.3.1.4 Cables and cable trays

All cables must be halogen-free. The main supply cables through vertical ducts shall be ducted within the electrical niches on the corresponding cable trays, and penetrations between the floors should be protected using a firestop compound. The same fire protection is to be applied to all the passages of cable racks between fire zones. On evacuation routes, cable racks are to be particularly protected against fire.

The cables shall be laid along the PCT, and partially in the wall under the mortar.

All systems which are to operate in case of fire are to be powered cables type NHXH-FE180 with the functionality in fire for 90min.

All cables and wires shall be supplied with sufficient length to enable cutting, convenient maintenance and the installation free of mechanical tension. The cables shall be installed in partial lengths according to the requirements. There shall be no cuts or extensions within the lengths between start and end of each connection. At both ends the cables shall be identified permanently with clearly legible and long lasting special cable labels.

Cables shall be laid upon cable trays suitable for indoor installation according to made of 1 mm galvanized sheet steel for indoor mounting. The dimensions shall be:

- Height 40 mm up to 800 mm, as required
- Width 100 mm up to 400 mm, as required
- Following material shall be included in an adequate quantity:
 - Adjustable telescope connections 0- 200 mm
 - Adjustable angle connections 45°-90°
 - T-shaped connections
 - Cross-connections
 - Vertical branches
 - Vertical branches 90° twisted
 - Connecting pieces for width reduction
 - Partitions
 - Covers for the entire length of the gutters
 - Mounting cantilevers

If signalling and power cables are laid upon the same cable tray they shall be separated by suitable partitions. Plastic inserts to protect the cable insulation shall cover sharp edges. All mounting, adjustment and mounting materials shall be also included.

Cables for installation of sockets in offices and classrooms shall be laid in trunkings of required dimensions for sockets installation. The trunkings shall be carried out so to contain two separate compartments, one for power supply and ICT cables.

3.3.1.4.1 Cable trays

Procurement, delivery and mounting of galvanized steel cable racks – the PCT. Cable racks shall be completed with covers, supports (wall and ceiling – according to the requirements for mounting of the PCT), screws, rawl plugs, steel "U" profiles, with all the required angular and connecting elements. Cable racks must have the certificate of mechanical resistance and fire resistance. Cables in the PCT rack shall be bundled at every 1.5m. The types of ceiling and wall mounted cable racks have been planned in compliance with the standards DIN EN 10147 FS and DIN EN ISO 1461. Payment made per m².

3.3.1.4.1.1 PCT-50

3.3.1.4.1.2 PCT-100

3.3.1.4.1.3 PCT-200

3.3.1.4.2 Grounding of cable trays

Trays shall be earthed using copper braids or conductors of P/F-16 mm², of an average length of 30cm, with shoes of 16 mm², complete with galvanized bolts, nuts, and tooth lock washers. Each route (section) of the PCT

shall be separately connected using conductor P/F-16mm² with the PE bus-bars of the associated distribution cabinets

Payment made per m'.

3.3.1.4.3 Parapet cable trunking with two compartments

Procurement, delivery and installation of metal parapet trunking 185x55 mm, length 2 m, with two compartments, one (upper) for power supply cables, and the other for ICT cables. Complete with bases and front cover.

Payment made per piece.

3.3.1.4.4 PVC floor cable trunking with two compartments

Procurement, delivery and installation of PVC floor trunking 185x55 mm, length 2 m, with two compartments, one for power supply cables, and the other for ICT cables, IP40. Complete with bases and front cover.

Payment made per piece.

3.3.1.4.5 Power supply cables

Procurement, delivery and installation of halogen free power supply cables. All distribution cabinets shall be powered from the main distribution cabinet, the GRO. In the entire building, copper cables with halogen-free elements, in compliance with the standard DIN VDE 0276. Cables shall be laid in cable trays and partly under the mortar. Cable should be connected on both ends. Payment shall be made per m' of installed power supply cables.

3.3.1.4.5.1 NHXHX-J FE180/E90 5x6mm²

3.3.1.4.5.2 N2XH-J 5x4mm²

3.3.1.4.5.3 N2XH-J 5x6mm²

3.3.1.4.5.4 N2XH-J 5x10mm²

3.3.1.4.5.5 N2XH-J 5x16mm²

3.3.1.4.5.6 N2XH-J 4x35mm²

3.3.1.4.5.7 N2XH-J 4x50mm² + N2XH-J 1x25mm²

3.3.1.4.5.8 N2XH-J 4x95mm² + N2XH-J 1x50mm²

3.3.1.4.6 Power supply cables for lighting installation

Procurement, delivery and installation of cable, installation of the distribution installation boxes, making of all necessary connections in the installation boxes for making of bulb points. The price also includes other small installation materials. The cables should be laid in PCT cable trays and above the suspended ceilings and in the walls below the mortar. Average length of the cable per bulb location is 7 m. Payment shall be made per m'.

3.3.1.4.6.1 N2XH-J 3x1.5mm²

3.3.1.4.6.2 N2XH-J 5x1.5mm²

3.3.1.4.7 Power supply cables for socket outlets

Procurement, delivery and installation of cable for installation of socket outlets, in compliance with the standard DIN VDE 0276. They shall be partly laid in cable racks, and partly in walls underneath the plaster and partly in the floor of office premises – from walls to workplaces where worktables are in the centre of the room. This item also includes distribution/junction boxes and connection. Payment shall be made per m'.



3.3.1.4.7.1 N2XH-J 3x2.5mm²

3.3.1.4.7.2 N2XH-J 5x2.5mm²

3.3.1.4.8 Power supply cables for heating substation and hydrocel

Procurement, delivery and installation of cable for installation of socket outlets and direct connections of boilers and pumps, halogen-free cables have been planned, in compliance with the standard DIN VDE 0276. They shall be partly laid in halogen-free cable raceways, and partly on the walls on clips. This item also includes distribution/junction boxes and connection. Payment shall be made per m'.

3.3.1.4.8.1 N2XH-J 3x2.5mm²

3.3.1.4.8.2 N2XH-J 5x2.5mm²

3.3.1.4.9 Power supply cables for HVAC installation

Procurement, delivery and installation of cable for installation of ventilation and air-conditioning, in compliance with the standard DIN VDE 0276. They shall be partly laid in cable racks, and partly in walls underneath the plaster. This item also includes distribution/junction boxes and connection of all the consumers, ventilation and air-conditioning. Payment shall be made per m'.

3.3.1.4.9.1 N2XH-J 3x1.5mm²

3.3.1.4.9.2 N2XH-J 3x2.5mm²

3.3.1.4.10 Power supply cables for central units of telecommunication installations

Procurement, delivery and installation of cable for central units of the installations of the structural cable system, the alarm system, the exact time system, the multimedia system etc, N2XH-J 3x2.5mm², in compliance with the standard DIN VDE 0276. They shall be partly laid in cable racks, and partly in walls underneath the plaster. This item also includes distribution/junction boxes and connection of all the consumers.

Payment made per m'.

3.3.1.4.11 Fire protection of cables using fire resistant coats

Procurement, delivery and installation of fire protective coat. It shall be executed at all the places where cables and cable racks shall transit from one fire zone to another.

Coating of cables and cable racks shall be executed at 1m of the length on both sides of the cable penetration between the fire protection zones. with the fire-resistant coats, relevant certificates must also be submitted.

Payment made per kg.

3.3.1.4.12 Grounding in the heating substation

Procurement, delivery and installation of galvanized steel strip Fe/Zn 25x4mm on wall supports for a ring that shall be made of for connecting boilers and pumps. Connections of the equipment shall be executed to the ring using copper braids or conductors P/F-6mm², of an average length of 2m, complete with galvanized bolts, nuts, and tooth lock washers.

Payment made per piece/complete set.

3.3.1.4.13 Grounding box PS49 with connation to GSIP

Procurement, delivery and installation of P/Y 1x4mm² in the wall for earthing in toilets. The connections with the metal parts must be done with copper clamping rings, i.e. cable lugs with elastic washers, with delivery and installation of the box for equipotential bonding PS49, equipped with multi-pole terminal blocks for connecting of protective lines. The box PS49 with distribution board has to be connected with a conductor P/Y 1x6mm² to GSIP. Average length of the line P-Y 1x6mm² is 20m.

Payment made per piece/complete set.

3.3.1.4.14 Grounding busbar GSIP

Procurement, delivery and installation of GSIP made from pickled steel sheet, wall mounted, with doors and keys. For the connecting of the GSIP cabinet with the grounding, use the existing terminal coming from the ground. In the GSIP cabinet, the following equipment:

Copper busbar (30x5x250) mm for “grounding” to which grounding and all metal masses of the facility are to be connected.

Payment made per piece/complete set.

3.3.1.5 Lights

The building shall be illuminated with lighting fixtures suitable to the internal installation directives and the properties of the buildings. In the internal sections of the building the type and number of the lighting fixtures depend on the properties of the section, the lighting intensity required for that section and the type of the lighting needed.

The lighting of any part of the plant shall meet relevant Serbian standards and regulations concerning lighting and safety of working.

The offices, classrooms, corridors shall be illuminated with LED fixtures. Other fixture types shall be chosen in required places.

The toilets shall be illuminated with waterproof fixtures.

Furthermore, the Contractor shall install an emergency lighting system according to the relevant Serbian standards and regulations. The emergency lighting fittings shall be supplied by batteries for at least 3 hours at total power failure. They shall be installed at least along the escape routes. Escape routes shall be marked with the prescribed signs.

The building shall be illuminated with lighting fixtures suitable to the internal installation directives and the properties of the buildings. In the internal sections of the building the type and number of the lighting fixtures depend on the properties of the section, the lighting intensity required for that section and the type of the lighting needed.

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The offices, classrooms, corridors shall be illuminated with LED fixtures. Other fixture types shall be chosen in required places.

The toilets shall be illuminated with waterproof fixtures.

Furthermore, the Contractor shall install an emergency lighting system according to the relevant Serbian standards and regulations. The emergency lighting fittings shall be supplied by batteries for at least 3 hours at total power failure. They shall be installed at least along the escape routes. Escape routes shall be marked with the prescribed signs.

Lighting in public spaces (halls, staircases) is managed via the lighting panel or a central supervision and control system (CSNU) with the option of alternative manual or remote control.

3.3.1.5.1 Surface mounted LED luminaire

Procurement, delivery and installation of the surface mounted LED luminaire with electronic power supply, integrated presence sensor for on / off control. The total input power of the product is 11.5 W, Efficiency 78lm / W. The body and diffuser lamps are made of polycarbonate (PC). Lamp is Electric Class I, IP65, Mechanical Protection IK10, 4000K, the total flux of 900lm, colour rendering index CRI < 80, 50.000 work hours to decrease the luminous flux at 70% of rated value at a temperature of 25°C, measuring Ø230 to 101 mm.

Payment made per piece.

3.3.1.5.2 Compact IP66, dust and moisture proof LED luminaire

Procurement, delivery and installation of a compact IP66, dust and moisture proof LED luminaire. Electronic - fixed output control gear. Class I electrical, IK10. Canopy: fully recyclable aluminium painted white. Diffuser: Polycarbonate (PC) with linear prisms. Toggles: stainless steel. for surface, BESA or suspended mounting. Quick-fix brackets supplied for surface mounting. Mounting kits for conduit, chain suspension and catenary suspension are available as accessories. with integral motion sensor for on/off control. Complete with 4000K LED. Luminaire efficiency: 100%, Luminaire efficacy: 122.06 lm/W, Classification: A31↓92.3%↑7.7%, CIE Flux Codes: 43 73 91 92 100, UGR 4H 8H (20%, 50%, 70%), C0/C90: 24.5/21.7, System power: 34W, Length: 735mm, Width: 180mm, Height: 95mm.

Payment made per piece.

3.3.1.5.3 A slim, wall mounted, edge lit LED luminaire with asymmetrical light distribution

Procurement, delivery and installation of A slim, wall mounted, edge lit LED luminaire with asymmetrical light distribution. Electronic, DALI dimmable control gear. Body: white Polycarbonate (PC). Diffuser: opal Polycarbonate (PC). Class II electrical, IP65, IK10. Complete with 4000K LED. Dimensions: O350x46mm, Total power: 25.8W, Luminaire luminous flux: 1909lm, Luminaire efficacy: 74lm/W. Luminaire efficiency: 100%, Luminaire efficacy: 74.07lm/W, Classification: C11↓58.5%↑41.5%, CIE Flux Codes: 20 49 75 59 100, UGR 4H 8H (20%, 50%, 70%), C0/C90: 31.3/23.4

Payment made per piece.

3.3.1.5.4 Modular LED recessed luminaire with lens optic

Procurement, delivery and installation of the modular LED recessed luminaire with lens optic. Total power: 29W, Slave luminaire for DALI control (DALI only) with LED converter; LED service life lasts 50.000h before luminous flux is reduced to 85% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 3740 lm, Luminaire efficacy: 129lm/W. Colour rendering Ra>80, colour temperature 4000 K. Light control via square lens optic for glare-free light distribution with UGR<16 and L65<1500cd/m² to EN 12464:2011; low dirt sensitivity and simple cleaning; Luminaire with external electrical connection; Installation as pure lay-in luminaire for modular ceilings with visible grid system; Luminaire wired with halogen-free leads; Dimensions: 673x673x38mm, Luminaire efficiency: 100%, Luminaire efficacy: 128.97 lm/W, Classification: A60 ↓100.0%↑0.0%, CIE Flux Codes: 82 98 100 100 100, UGR 4H 8H (20%, 50%, 70%), C0/C90:16.0/16.0, System power: 29W.

Payment made per piece.

3.3.1.5.5 LED ceiling-recessed luminaire with lens optic

Procurement, delivery and installation of the LED ceiling-recessed luminaire with lens optic. Total power: 9.7W, DALI controllable luminaire with LED converter; LED service life lasts 50.000 h before luminous flux is reduced to 85% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 1110lm, Luminaire efficacy: 114lm/W. Colour rendering Ra>80, colour temperature 4000K. Light control via square lens optic for maximum luminaire efficiency, perfect glare reduction and batwing light distribution. Luminaire housing of Polycarbonate (PC) enamelled, white; Installation as pure lay-in luminaire for modular ceilings with visible grid system; fixing clips provided for tool-free installation in ceilings of thickness 1-25mm. with strain relief and plug-in terminal. Luminaire wired with halogen-free leads; Dimensions: 170x170x38mm. Luminaire efficiency: 100% Classification: A60↓100.0%↑0.0% CIE Flux Codes: 81 98 100 100 100, UGR 4H 8H (20%, 50%, 70%), C0/C90: 18.9 / 18.9, System power: 9.7 W.

Payment made per piece.

3.3.1.5.6 LED ceiling-recessed luminaire

Procurement, delivery and installation of the LED ceiling-recessed luminaire "Stable White"; maximum light quality thanks to specially designed reflector, lamp(s): 10W LED840, VERY wideflood distribution characteristic; reflector: smooth, aluminium-sputtered, highly reflective, iridescence-free (51 °); Colour

rendering Ra>80, colour temperature 4000K (neutral white); Chromaticity tolerance (initial MacAdam technical characteristics): 3; Luminaire luminous flux: 663lm, Luminaire efficacy: 66lm/W; service life: 50.000h at 80% luminous flux; includes control unit Slave (emergency) luminaire for DALI control (DALI system only); modular, high quality optical unit consisting of reflector and LED light chamber integrated in optimised thermal management of die-cast aluminium; reflector/trim made of high-quality, UV-resistant Polycarbonate (PC); white cover ring; mounting surround of die-cast aluminium; luminaire unit can be fitted quickly without tools using twist-and-lock mechanism; luminaire wired with halogen-free leads; power connection: 5-pole terminal; mains voltage: 220-240V / 0/50/60Hz, for use with 220V DC central battery; tool-free quick installation using antislip spring clips in ceilings of thickness 1-25mm; ceiling cutout: 68mm, recess depth: 110mm; weight: 0.31 kg. Luminaire efficiency: 85.5% Luminaire efficacy : 66.26 lm/W, Classification : A70↓100.0%↑0.0%, CIE Flux Codes : 91 100 100 100 85, UGR 4H 8H (20%, 50%, 70%), C0/C90: 20.9/20.9.

Payment made per piece.

3.3.1.5.7 LED ceiling-recessed luminaire (pre-assembled luminaire)

Procurement, delivery and installation of LED ceiling-recessed luminaire (pre-assembled luminaire); "Stable White" LED luminaire, symmetric wide-beam light distribution with maximum luminaire efficiency and optimum photometric properties; EN12464-compliant with UGR<19 (aluminized reflector type) for office applications; lamp(s): 16W LED840; Colour rendering Ra>80, colour temperature 4000 K (neutral white); Chromaticity tolerance (initial MacAdam): 3; Luminaire luminous flux: 1792lm, Luminaire efficacy: 112 lm/W; service life: 50.000h at 80% luminous flux; includes separate control unit Slave luminaire for DALI control (DALI only); high-quality reflector unit fixed to modular LED lighting chamber by twist-and-lock mechanism; high-efficiency LED lighting chamber is integrated in optimised, passive thermal management system of diecast aluminium; reflector: smooth, highly reflective aluminized finish, iridescence-free; reflector/trim made of high-quality, UV-resistant Polycarbonate (PC); white cover ring; mounting ring of Glass fibre-reinforced polycarbonate (PC), grey; luminaire unit can be fitted quickly without tools using twist-and-lock mechanism; luminaire wired with halogen-free leads; power connection: 5-pole connector terminal, loop-in/loop-out possible; mains voltage: 220-240V / 0/50/60Hz, for use with 220V DC central battery; tool-free quick installation using antislip spring clips in ceilings of thickness 1-40mm; ceiling cutout: 200mm, recess depth: 129mm. Luminaire efficiency: 89.6%, Luminaire efficacy: 112lm/W Classification : A60↓100.0%↑0.0%, CIE Flux Codes : 90 100 100 100 90, UGR 4H 8H (20%, 50%, 70%), C0/C90: 17.6/17.6.

Payment made per piece.

3.3.1.5.8 Decorative diffuse LED Circular luminaire with opal cover

Procurement, delivery and installation of the Decorative diffuse LED Circular luminaire with opal cover for surface-mounting to ceilings/walls; total power: 89.9W, DALI controllable luminaire with LED converter; LED service life lasts 50.000h before luminous flux is reduced to 90% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 12.500lm, Luminaire efficacy: 139 lm/W. Colour rendering Ra>80, colour temperature 4000K. Aluminium housing in white enamelled finish. Plastic cover, opal in polymethylmethacrylate with frosted surface, fixed to frame. Wall mounting is possible. Low indirect component for ceiling/wall illumination, emphasising the floating appearance. Includes electronic LED converter for DALI control. Luminaire wired with halogen-free leads. Dimensions: Ø870x85mm. Classification: A43↓97.8%↑2.2%, CIE Flux Codes: 47 79 95 98 100, UGR 4H 8H (20%, 50%, 70%), C0/C90: 23.0/23.0.

Payment made per piece.

3.3.1.5.9 Highly efficient direct/indirect LED pendant luminaire with segmented lens optic

Procurement, delivery and installation of the highly efficient direct/indirect LED pendant luminaire with segmented lens optic; single direct light segments separately controllable in 3 groups; preset luminaire patterns and brightness sequences between single segments can be called and set via Litecom communication system. Indirect and direct component can be controlled separately; light guided directly via 14 single lens modules. Luminaire with symmetric light distribution and opal framing. Total power: 105W, Slave luminaire for DALI control (DALI only) with LED converter; LED service life lasts 50.000h before luminous flux is reduced to

80% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 9650 lm, Luminaire efficacy: 92lm/W. Colour rendering Ra>80, colour temperature 4000K. Glare control to EN 12464-1 and UGR<19 for DSE workstations; uniform indirect light distribution optimised for suspension height of at least 50 cm; enclosed optical system includes protective cover for LED modules to prevent damage from electrostatic discharge. Elegant luminaire housing of extruded aluminium section with die-cast aluminium end pieces in silver eloxal; cord suspension kit comprising 1x ceiling rose and 1xcord and transparent cable each of length 1000mm; transparent power lead, cord suspension and ceiling rose are pre-assembled; cord suspension longitudinally adjustable; including multi-channel, DC voltage-compliant DALI converter. Automatic anti-panic emergency lighting with DC operation. Luminaire wired with halogen-free leads; Dimensions: 2103x103x58mm

Payment made per piece.

3.3.1.5.10 Flat and modular LED pendant luminaire with lens optic

Procurement, delivery and installation of the Flat and modular LED pendant luminaire with lens optic. Total power: 25W, Slave luminaire for DALI control (DALI only) with LED converter; LED service life lasts 50.000 h before luminous flux is reduced to 85% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 3062lm, Luminaire efficacy: 122lm/W. Colour rendering Ra>80, colour temperature 4000 K. Light control via square lens optic for glare-free light distribution with UGR<16 and L65<1000cd/m² to EN 12464:2011; low dirt sensitivity and simple cleaning; flat sheet steel luminaire housing with powder coated finish in white; luminaire housing with visible luminaire height of 41mm; Cord suspension kit comprising 1 ceiling rose and 2 cords 1000mm each with 1 transverse cord Luminaire wired with halogen-free leads; Dimensions: 1348x238x41mm, weight: 6.8 kg. Classification: B63↓70.0%↑30.0%, CIE Flux Codes: 82 98 100 70 100, UGR 4H 8H (20%, 50%, 70%) C0 / C90: 11.5/ 11.5.

Payment made per piece.

3.3.1.5.11 Flat and modular LED surface-mount luminaire with lens optic.

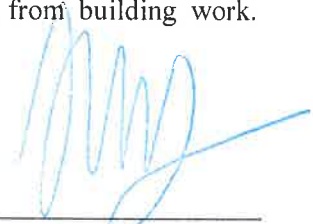
Procurement, delivery and installation of the Flat and modular LED surface-mount luminaire with lens optic. Total power: 29W, Slave luminaire for DALI control (DALI only) with LED converter; LED service life lasts 50.000h before luminous flux is reduced to 85% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 3740lm, Luminaire efficacy: 129lm/W. Colour rendering Ra>80, colour temperature 4000K. Light control via square lens optic for glare-free light distribution with UGR<16 and L65<1500 cd/m² to EN 12464:2011; low dirt sensitivity and simple cleaning; flat sheet steel luminaire housing with powder coated finish in white; luminaire housing with visible luminaire height of 52mm; Luminaire wired with halogen-free leads; Dimensions: 600x600x52mm

Payment made per piece.

3.3.1.5.12 LED surface-mounted wall washer with asymmetric reflector optic

Procurement, delivery and installation of the LED surface-mounted wall washer with asymmetric reflector optic for wall and panel lighting; total power: 40W, DALI controllable luminaire with LED converter; LED service life lasts 50.000h before luminous flux is reduced to 85% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 4400 lm, Luminaire efficacy: 110 lm/W. Colour rendering Ra>80, colour temperature 4000K. Direct asymmetric beam characteristic in traverse direction to luminaire; light control based on matt anodised reflector optic with defined asymmetric wall washer light emission for homogeneous wall/panel lighting with soft edge transitions, and no light towards rear; efficient primary optic for homogeneous resolution of LED light points and outstanding quality of light; slender surface-mount housing of roll-formed sheet steel, white, stove-enamelled, 5-pole plug-in terminal block; luminaire ready for connection, Luminaire wired with halogen-free leads. Supply includes foil protecting from building work. Dimensions: 1203x130x61mm.

Payment made per piece.



3.3.1.5.13 LED Safety luminaire for anti-panic lighting

Procurement, delivery and installation of the LED Safety luminaire for anti-panic lighting, with min. 0.5 lx as specified in EN 1838; ceiling recessed; Luminaire with local battery supply for 3h emergency lighting for maintained or non-maintained mode, automatic or central testing of emergency lighting function; room height 2.2 to 5 m; high power LED, cool white; optimum thermal management via heat sink; gear box for installation in ceiling recess made of PC; lens made of polycarbonate (PC); luminaire housing made of die-cast aluminium in powder coated white finish, RAL 9016; luminaire can be installed quickly without tools; tool-free maintenance; through-wiring plug-in terminals for wire cross-sections up to 2.5 mm²; ball-proof design; luminaire ; power supply: 230V AC, 220V DC; rotary switch for mechanical address-setting; degree of protection: IP40, class of protection: SC2; non-maintained and maintained mode possible

Payment made per piece.

3.3.1.5.14 Decorative diffuse LED Circular luminaire with opal cover

Procurement, delivery and installation of the decorative diffuse LED Circular luminaire with opal cover for pendant installation. Total power: 28.2W, DALI controllable luminaire with LED converter; LED service life lasts 50.000 h before luminous flux is reduced to 90% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 3690lm, Luminaire efficacy: 131lm/W. Colour rendering Ra>80, colour temperature 4000K. Aluminium housing in white enamelled finish. Plastic cover, opal in polymethylmethacrylate with frosted surface, fixed to frame. Includes electronic LED converter for DALI control. Luminaire wired with halogen-free leads Dimensions: Ø590x85mm, Classification: A43↓97.1%↑2.9%, CIE Flux Codes: 47 78 95 97 100, UGR 4H 8H (20%, 50%, 70%), C0/C90: 21.6 / 21.6.

Payment made per piece.

3.3.1.5.15 Surface mounted LED luminaire with a local anti-panic battery with autonomy for 3h

Procurement, delivery and installation of the surface mounted LED luminaire with a local anti-panic battery with autonomy for 3h. Installation is possible in standby and continuous mode. Body of the luminaire is made of polycarbonate. Ingress Protection IP42. The total input power of lamp 4.5W, the total luminous flux of 49lm, the efficiency of 11lm/W, Lamp has CE and ENEC certification.

Payment made per piece.

3.3.1.5.16 Multifunctional sensor with sensor functionality of the presence of the infrared receiver

Procurement, delivery and installation of the multifunctional sensor with sensor functionality of the presence of the infrared receiver. A maximum of 3 individually adjustable control groups can be implemented depending on the system. The sensor is intended for the implementation of the DALI Luxmate system. The sensor can be set ceiling or recessed ceiling. IP40 protection.

Payment made per piece.

3.3.1.5.17 Radio receiver for a wireless connection with the ON / OFF switch

Procurement, delivery and installation of the Radio receiver for a wireless connection with the ON / OFF switch. Average diameter range in buildings 10 m. Mounting is possible as surface and as recessed in ceiling. IP40 protection.

Payment made per piece.

3.3.1.6 Socket outlets and installation material

Socket outlets shall be carried out with conductors N2XH-J 5x2.5 mm² for three-phase sockets and N2XH-J 3x2.5 mm² for single-phase sockets.

In all the office premises, single-phase socket outlets with protective contacts shall be envisaged. In all the offices, sufficient number of general purpose socket outlets should be planned and for them, grid power supply should be provided. In “special-use” offices (courtrooms, advisors, lecture-halls and auditoriums for special

training), sufficient number of socket outlets with continuous power supply (from the UPS units) should be planned.

The socket outlets should be planned to be installed in two-section parapet aluminium conduit or as modular ones, fitted in the wall of the room. As required, individual fitting of socket outlets in the wall should also be planned. Water heater and hand drier in the toilet shall be partially carried out with cable laying along the PCT above suspended ceilings, and partially in the wall under the mortar. Heater switch on shall be conducted with a toggle switch.

In all offices there are 4 working places. For every working place there should be 3 socket outlets and 3 RJ45 outlets.

In auditoriums for trainings there should be:

- in hall next to doors 1 socket outlet and one RJ45 outlet
- on ceiling 1 socket outlet and one RJ45 outlet
- on front and back wall 1 socket outlet and one RJ45 outlet in the centre (height 3m), 1 socket outlet and one RJ45 outlet in both corners (height 2,5m)
- on the centre of the wall opposite from window 1 socket outlet and one RJ45 outlet (height 2m)
- on the walls 4 sets of 3 socket outlet and 3 RJ45 outlets (height 1m). Distance between sets cca 1,5m.

In computer classrooms there should be sets of 3 socket outlets and 3 RJ45 outlets for every working place.

3.3.1.6.1 Socket outlet 16 A 250 V, 2P+PE

Procurement, delivery and installation of the socket outlet 16 A 250 V, 2P+PE, including carrier mechanism and frame.

Payment made per piece.

3.3.1.6.2 Double socket outlet 16 A 250 V, 2P+PE

Procurement, delivery and installation of the double socket outlet 16 A 250 V, 2P+PE, including carrier mechanism and frame.

Payment made per piece.

3.3.1.6.3 Single-phase socket outlet (2P+PE), 16A, 250V with a lid

Procurement, delivery and installation of the single-phase socket outlet (2P+PE) 16A, 250V with the installation box for mounting into full wall.

Payment made per piece.

3.3.1.6.4 Three-phase socket outlet

Procurement, delivery and installation of the carrier mechanism and frame for socket outlets for the assembly into the wall.

Payment made per piece.

3.3.1.6.5 On-wall socket outlets (2P+PE), 16A, 250V

Procurement, delivery and installation of the on-wall socket outlets (2P+PE), 16A, 250V, IP55, grey, in compliance with the standard NF EN 60695 2-1

Payment made per piece.

3.3.1.6.6 Three phase on-wall socket outlets 16A, 400V

Procurement, delivery and installation of the three phase on-wall socket outlet IP55, grey, in compliance with the standard NF EN 60695 2-1.

Payment made per piece.

3.3.1.6.7 Operating plug-in set 6M

Procurement, delivery and installation of the operating plug-in set 6M, consisting of 1 single-phase earthed socket outlet 2M, white (grid), 1 single-phase earthed socket outlet 2M, green (Diesel-electric generating set), 1 single-phase earthed socket outlet 2M, red (UPS), complete with the outlet box for plaster 6M, flange 6M and mask 6M, white, of IP20 protection class, for fitting into the wall, white, in compliance with the standard IEC 60884-1.

Payment made per piece.

3.3.1.6.8 Operating plug-in set 4M

Procurement, delivery and installation of the operating plug-in set 4M, consisting of 3 RJ45 sockets and 1 antenna socket to be specified in the bill of quantities of the design of telecommunication and signalling installations, complete with the outlet box for plaster 4M, flange 4M and mask 4M, white, of IP20 protection class, for fitting into the wall, white, in compliance with the standard IEC 60603-7.

Payment made per piece.

3.3.1.6.9 KIP socket

Procurement, delivery and installation of the KIP socket. It shall be mounted underneath the wash basins in the sanitary block.

Payment made per piece.

3.3.1.6.10 Power operating plug-in set 4M

Procurement, delivery and installation of the power operating plug-in set 4M, consisting of 2 single-phase earthed socket outlets, size 2M, white (grid), complete with the outlet box for plaster 4M, flange 4M and mask 4M, white, of IP20 protection class, for fitting in the wall, white, in compliance with the standard IEC 60603-7.

Payment made per piece.

3.3.1.6.11 Antenna operating plug-in set 2M

Procurement, delivery and installation of antenna operating plug-in set 2M, consisting of 1 computer socket RJ45, size 1M, and 1 antenna receptacle socket, size 1M, complete with the outlet box for plaster 2M, flange 2M and mask 2M, white, of IP20 protection class, for fitting in the wall, white, in compliance with the standard IEC 60603-7

Payment is made per piece.

3.3.1.6.12 Operating plug-in set 2M

Procurement, delivery and installation of operating plug-in set 2M, consisting of 2 computer socket RJ45, size 1M, size 1M, complete with the outlet box for plaster 2M, flange 2M and mask 2M, white, of IP20 protection class, for fitting in the wall, white, in compliance with the standard IEC 60603-7.

Calculated per piece of flange and mask.

3.3.1.6.13 Mini distribution column

Procurement, delivery and installation of mini distribution column, vertical distribution of power current and ICT cables through separated sections of the column, the white telescopic column with adjustable height and 4 partitions, with two fixing bases with protective cap, 68mm high, power supply via floor, equipped with modules, with 3 partitions, each 3 with modules with power socket outlets at an angle of 45°, 3x 2P+E, consisting of 1 single-phase earthed socket outlet 2M, white (grid), 1 single-phase earthed socket outlet 2M, green (Diesel-electric generating set), and 1 single-phase earthed socket outlet 2M, red (UPS), 1 partition with 6 computer RJ45 sockets of category 6 at an angle of 45°. Payment includes cable and socket outlet and is made per socket outlet position.

Calculated per piece/complete set.

3.3.1.6.14 Lighting control system

Procurement, delivery and installation of lighting control system. The system shall enable local and central management of DALI-based lighting fixtures and other equipment by way of system interface that also provides the options of reconfiguration of groups of lighting fixtures, presentation of the current state, analysis of consumption, etc. of electricity, control of maintenance of the light flow, control depending on the incident daylight, time adjustment and control with the switched on internal calendar, and the system error alarm. The system shall consist of the central processor for automation and control of the lighting in the complete building, by LITECOM CCD s Ethernet connection (TCP/IP) for individual control of up to 3x64 DALI compatible control units, 100 LM-bus units, special DALI sensors and DALI control units, output relay modules, universal modules for retrieval of events-activation of light scenery and adjustment of the light intensity through conventional instantaneous push-buttons, presence sensors, multifunctional control units for local control and setting into operation, configuration and management of the installation through Luxmate bus, and all the other required modules and software for full functionality of the lighting control system.

Payment per piece/complete set.

3.3.1.6.15 Touch panel for the lighting control system

Procurement, delivery and installation touch panel for the lighting control system.

Payment is made per piece.

3.3.1.6.16 Indicator switching set 3M

Procurement, delivery and installation of indicator switching set 3M, consisting of 3 single-pole switches with indication (two with the light on/off marking and one with the fan on/off marking), size 1M, of IP20 protection class, with the outlet box 2M, for fitting into the wall, with flange 1M and mask 1M, white, in compliance with the standard IEC 60669-2-1.

Payment is made per piece.

3.3.1.6.17 On wall single pole switch

Procurement, delivery and installation of single-pole wall-mounted switch, of 250V 16A, IP55-IK07 protection classes, for wall mounting, grey, in compliance with the standard NF EN 60695 2-1.

Payment is made per piece.

3.3.1.6.18 On wall serial switch

Procurement, delivery and installation of serial wall-mounted switch, of 250V 16A, IP55-IK07 protection classes, for wall mounting, grey, in compliance with the standard NF EN 60695 2-1.

Payment is made per piece.

3.3.1.6.19 On wall two-way switch

Procurement, delivery and installation of to-way wall-mounted switch, of 250V 16A, IP55-IK07 protection classes, for wall mounting, grey, in compliance with the standard NF EN 60695 2-1.

Payment is made per piece.

3.3.1.6.20 Toilet aspirator

Procurement, delivery and installation of toilet aspirator, 15W, 250V~, Ø100mm, intended for ventilation of sanitary blocks, for the purpose of preventing the spreading of moisture and unpleasant odours. It shall produce no interferences in radio and TV receivers. The housing and blades shall be made of proper quality plastic material. The motor of the aspirator shall possess thermal protection preventing the motor overheating.

Payment is made per piece.

3.3.1.7 Stand by power supply

For the provision of the standby supply of the building with electricity, a Diesel electric generating set (DEA) is planned.

3.3.1.7.1 Concrete base for the Diesel-electric generating set

Fabrication of concrete base for the Diesel-electric generating set. Dimensions of the based shall be 3000x2000x300mm, concrete class MB30. During the fabrication, anchors shall be built in, which are to be delivered by the manufacturer of the Diesel-electric generating set.

Payment made per m³.

3.3.1.7.2 Diesel-electric generating set – the DEA 200kVA

Procurement, delivery and installation of the DEA 200kVA (stand by), U=400V, 50Hz, in compliance with the standard ISO 8528-1. The Diesel-electric generating set has been planned for automatic start-up in case of grid power supply outage and, therefore, it should contain the following equipment:

- The ATS cabinet that may be within the DEA or separately, for mounting on the wall of the room, equipped with:
- A microprocessor controller with alphanumeric display, which shall perform the function of monitoring and protection of the Diesel-electric generating set,
- Monitoring of grid voltage, management of switches for automatic grid/Diesel-electric generating set switching in case of outage of the grid voltage
- Evacuation of combustion gases is to be ensured
- Continuous maintenance of storage batteries is to be ensured, so that the DEA could always be ready for the start-up

Payment made per piece/complete set.

3.3.1.8 UPS

3.3.1.8.1 UPS unit, 3-phase, 120kVA

Delivery and installation of 120kVA 400V Integrated parallel UPS Start-up 5x8 with following characteristics:

- Output: Output power capacity 108.0 kW / 120.0 kVA, Max Configurable Power (Watts) 108.0 kW / 120.0 kVA, Nominal Output Voltage 400V 3PH, Neutral Output Current 174A, Output Voltage
- Note Configurable for 380 : 400 or 415 V 3 Phase nominal output voltage, Efficiency at Full Load 93.2 %Output Voltage Distortion Less than 2%, Output Frequency (sync to mains) 50/60 Hz +/- 3 Hz user adjustable +/- 0.1, Output Frequency (not synced) 50/60 Hz +/-1 Hz, Other Output Voltages 380, 415, Load Crest Factor 3 : 1, Topology Double Conversion Online, Waveform type Sine wave, Overload Operation 10 minutes @ 125% and 60 seconds @ 150%, Maximum Output Current 480, Output Voltage THD < 1% linear load and < 2.5% nonlinear load, Output Voltage Tolerance +/- 2% static and 100% load step, Bypass Built-in Maintenance Bypass, Built-in Static Bypass, Optional External Bypass
- INPUT: Nominal Input Voltage 400V 3PH, Input frequency 45 - 65 Hz, Input Connections Hard Wire 4-wire (3PH + G), Hard Wire 4-wire (3PH + N), Input voltage range for main operations 323 - 437 (380V),340 - 460 (400V), 353 - 477 (415V)V, Input voltage adjustable range for mains operation 250 - 470V,Efficiency at Full Load 93.2 %, Input Total Harmonic Distortion Less than 3% for full load, Type of Input Protection Required 3-pole breaker, Other Input Voltages 380, 415, Maximum Short Circuit Withstand (Icw) 30.0kAmps, Maximum Input Current 173.0A, Input Power Factor at Full Load 1.0
- Batteries & Runtime: Battery type No internal battery - uses external battery system, Typical recharge time 10hour(s), Nominal Battery Voltage 432V, Expected Battery Life (years) 8 – 10
- Communications & Management: Pre-Installed SmartSlot™ Cards AP9635, Control panel Multi-function LCD status and control console, Emergency Power Off (EPO) Yes, Available SmartSlot™ Interface

- Physical: Maximum Height 1900mm, 190.0CM, Maximum Width 712mm, 71.2CM, Maximum Depth 850mm , 85.0CM, Net Weight 520.0KG, Shipping weight 540.0KG, Shipping Height 2030mm , 203.0CM, Shipping Width 980mm , 98.0CM, Shipping Depth 960mm , 96.0CM
- Environmental: Operating Temperature 0 - 40 °C, Operating Relative Humidity 0 - 95 %, Operating Elevation 0-999.9meters, Storage Temperature -20 - 45 °C, Storage Relative Humidity 0 - 95 %, Storage Elevation 0-12000meters, Audible noise at 1 meter from surface of unit 61.4dBA, Online thermal dissipation 28362.0BTU/hr, Protection Class IP20
- Conformance: Approvals CE, EN/IEC 62040-3, IEC 62040-1- 2, IEC 62040-2, ISO 9001, TUV, VDE,

Standard warranty 1-year on-site repair or replace with factory authorized Start-Up, 1 year (parts only)

Max Bypass Input Current 173.0A

Payment made per piece/complete set.

3.3.1.8.2 Battery module cabinet

Delivery and installation of battery module cabinet for 120kVA 400V Integrated parallel UPS Start-up 5x8 with following characteristics:

- Batteries & Runtime: Battery type Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leakproof, Battery mounting Enclosed battery cabinet, Battery Placement Battery cabinet, Battery manufacturer EXIDE/YUASA, Expected Battery Life (years) 8 - 10, Battery blocks per string 30
- Physical: Maximum Height 1900mm, 190.0CM, Maximum Width 1430mm, 143.0CM, Maximum Depth 820mm, 82.0CM, Net Weight 1890.0KG, Shipping weight 1930.0KG, Shipping Height 1930mm , 193.0CM, Shipping Width 1560mm , 156.0CM, Shipping Depth 838mm , 83.8CM, Colour Grey Units per Pallet 1.0
- Environmental: Operating Temperature 0 - 40 °C, Operating Relative Humidity 5 - 90 %, Operating Elevation 0-999.9meters, Storage Temperature -20 - 45 °C, Storage Relative Humidity 5 - 90 %, Storage Elevation 0-9000meters
- Conformance: Approvals ISO 14001, ISO 9001, TUV Standard warranty 1-year repair or replace.

Payment made per piece/complete set.

3.3.1.9 Heating of gutters

For melting of ice in the initial phase, in order to protect the space from accidental wounding of passers-by, it shall be necessary to carry out the installation for heating of gutters, which shall include the procurement, delivery of materials, and installation according to the instructions of the producer of equipment, the required cabling and connections of heating cables, controllers and temperature and moisture sensors shall be executed, in compliance with the standards EN 50 081-2, EN 50 082-2, EN 60 730-1, and EN 60 730-2-9. The gutter heating system shall consist of the following equipment:

3.3.1.9.1 Heating section

Heating cables within the section shall serve for the following types of protection:

- from water freezing in the gutters and downpipes also serving for protection of those systems
- from piling up of snow and ice on the roof
- from water dripping down the facades of the buildings
- from creation of icicles. Heating cables shall have series resistance of 0.65Ω/m, 27W/m, total power of 1493W, 230V, with the cold end 3 metres long.

Payment made per m'.

3.3.1.9.2 Plastic distancer for horizontal gutter sections

Procurement, delivery and installation of the plastic distancer for horizontal gutter sections.

Payment made per piece.

3.3.1.9.3 Plastic distancer for vertical gutter sections

Procurement, delivery and installation of the plastic distancer for vertical gutter sections.

Payment made per piece.

3.3.1.9.4 Digital controller of snow and ice melting, combined

Procurement, delivery and installation of the combined digital controller of snow and ice melting.

Payment made per piece.

3.3.1.9.5 Combined gutter sensor for detection of moisture and temperature

Procurement, delivery and installation of the combined gutter sensor for detection of moisture and temperature

Payment made per piece.

3.3.1.10 Lightning protection installation

Lightning protection shall be carried out with early streamer emission lighting rod.

3.3.1.10.1 Grounding

The fabrication of the earthing electrode shall include the following works:

- Breaking up of the concrete surface of the pavement, for a trench in the shape of an equilateral triangle of the sides of 3m each,
- Excavation of earth for laying of the strip of the lightning arrester earthing electrode
- Laying of galvanized steel strip Fe/Zn-25x4mm in excavated trench and connection with the lightning arrester down conductors using strip - strip cross-pieces
- Diving and connection of steel probes of Ø50mm.

Payment made per piece/complete set.

3.3.1.10.2 Main down conductors of galvanized steel strip

Procurement, delivery and installation of the strip Fe/Zn-25x4mm, and they shall be laid from the lightning rod to the earthing electrode. They shall consist of the following:

- Galvanized steel strip Fe/Zn-25x4mm
- Supports for the roof ridge and for roofing tiles
- Strip cross-pieces.

Payment made per m'.

3.3.1.10.3 ESE lightning rod, $\Delta t=60\mu s$

Procurement, delivery and installation of the ESE lightning conductor (rod with early streaming emission), with $\Delta t=60\mu s$, together with the delivery and installation of the pipe $h=6$ m, (5m above the highest point of the roof) for carrying of lightning rods.

Payment made per piece/complete set

3.3.1.10.4 Lightning strike counter

Procurement, delivery and installation of the lightning strike counter.

Payment made per piece.

3.3.1.10.5 Warning board "DANGER – HIGH VOLTAGE!"

Procurement, delivery and installation of the warning board "DANGER – HIGH VOLTAGE!".

Payment made per piece.

3.3.1.10.6 Earth lead

Procurement, delivery and installation of earth lead shall be executed with the earthing electrode using galvanized steel strip Fe/Zn 25x4mm and they shall be mechanically protected.

Payment made per piece.

3.3.1.10.7 Test joint box

Procurement, delivery and installation of test joint box. At 1.7m from the ground level, the joint of the down conductor and the earth lead conducted from the earthing electrode shall be made on the down conductors of the lightning arrester

Payment made per piece.

3.3.1.11 Other works

3.3.1.11.1 Metering and testing installations

Upon the completion of the works, the following measuring and testing foreseen by the law have to be conducted:

- metering and testing of electric installations - Test Certificate
- metering and testing of lightning protection - Test Certificate

Payment made as a lump sum.



3.3.2 TELECOMMUNICATION AND SIGNALING INSTALLATIONS

The ICT installation shall entirely be executed according to the technical description, drawings and the international standard ISO/IEC 11801.

The material used for installation of the system has to be of top quality and has to meet the following SRPS standards N.C2, N.C4, N.C6.

Prior the works commencement, the Contractor is liable to precisely determine and mark position of all designed system elements (socket outlets, distribution boards, active equipment, cable channels, etc.).

The Contractor should precisely determine the places where the designed system is connected to the existing system, as well as determine and carry out the connections for electrical system.

As for the cable laying of computing networks, the cables of cable category 6 or higher in accordance with ISO/IEC standard, attested for the operation of over 650MHz shall be used.

Global topological structure of a network is a star topology (multiple star). Each connection is point-to-point connection.

Each point having more SF/UTP cables is called communication node. The communication node may be main for the entire network, main for one location, main for one building or locally.

Active network equipment is installed in the communication node and patch panels in the distribution board of adequate size.

The communication nodes are placed in the areas with office conditions.

The Racks which are wall-mounted must be provided with certain reinforcement and wall-fixing openings. The fixing to the wall shall be carried out with adequate rawl plugs and screws.

The climate conditions in the rooms where the active equipment is placed shall comply with the requests of the equipment manufacturers.

S/FTP cables end at the cabinet panel, or RJ45 socket-outlets. In cabinet of shielded cables they shall be earthed in a prescribed manner.

S/FTP cable shall not be interrupted or continued.

S/FTP cable is pulled through the trunking, through the conduits placed on the wall, through the canals of the floor distribution or is fixed to the wall with clamps.

At pulling through and fixing, the S/FTP cable must not be twisted, knot-tied, pressed hard or damaged in any other manner. The mechanical strain on the S/FTP cables during pulling through or placing must not exceed the values set forth in the technical specifications of cables of the relevant manufacturer (tensile force at pulling through, bending radius, etc.).

S/FTP cables are installed either vertically or horizontally. Diagonal laying is not allowed.

S/FTP cable must not be placed and pulled through near the sources of heat (heating pipelines, radiators, ovens, heaters). If such a placement cannot be avoided, then it must be properly insulated from the heat.

S/FTP cable must not be placed near devices, objects or sources that can damage the cable.

According to the ISO/IEC 11801 standard, the maximum cable length in the link of floor distribution must not exceed 90 m. The link is defined as the part of the cable system from one socket at the bridging panel to the wall socket.

The elements of the cable distribution (cases for placement of the passive and active equipment, on-wall canals if such exist, sockets) are placed in a manner to secure the network functionality, at the same time not disturbing the activities arising from the purpose of the room, the spatial aesthetics (harmonisation with the interior arrangement), etc.

The sockets should be placed 20-40 cm from the floor. If the spatial requests demand that the cable canals be placed on the wall at the level of the table desktops (80-100 cm from the floor), the sockets can be built-in in the canals.

On the side of RJ socket extra cable is left in the length of 10 cm, and on the patch panel side 30-100 cm of extra cable is left depending on where the patch panel is being mounted (in the wall housing or cable rack).

Immediately after the cable laying is completed each cable should be marked on both ends with the same number.

Cable numbers should be taken in accordance with the sockets numbers, so that all numbers are increased clockwise looking from the entrance door of the room.

After laying of cables S/FTP, the cables should be tested to interruption and short circuit. All correct cables should be ended with the sockets or at the patch panel in accordance with the design documentation. In the event there is an interruption or short circuit cable should be taken out and replaced.

Immediately after the placement, all functional cables must be plugged in the socket, i.e. at the patch panel, according to the project documentation.

To connect the wall socket and the terminal equipment (computer), i.e. to switch the patch panel and the active equipment, suitable bridging cables of a prescribed length must be used.

At the direct in-wall placement, the parallel placing of the structural distribution cables and the power supply cables must be performed at a minimum distance of 20 cm, or 10 cm if the structure system cable is shielded.

The cables of the structural cable system can be placed together with the power supply cable through plastic canals with separating rib or the partitioned floor distribution canals.

The crossing of the cables of the structural cable system and the power supply cables must be performed at 90° angle.

After all works on the installation of cables and passive network equipment for the structural distribution are complete, the following measurements and tests must be performed: link length (max. 90m), the attenuation per pair, the cross-talk level, the loop DC resistance (max. 25 Ohm), the impedance, the attenuation vs. cross-talk ratio. The instruments for installation measuring and testing must be attested by the authorised institution and the attestation must not be older than 12 months.

The requested measuring results (according to the ISO/IEC 11801 standard) for category 6 cables are presented in the following table:

f [MHz]	1	16	100
Return Loss (min) [dB]	17	17	10
Insertion Loss (max) [dB]	4	9,1	24
NEXT (min) [dB]	60	43,6	30,1
PS NEXT (min) [dB]	57	40,6	27,1
ACR (min) [dB]	56	34,5	6,1
PC ACR (min) [dB]	53	31,5	3,1
ELFEXT (min) [dB]	57,4	33,3	17,4
PS ELFEXT (min) [dB]	54,4	30,3	14,4
Prop. Delay (max) [μs]	0,580	0,553	0,548

Requested mechanical properties of the cables:

- wire diameter: 0.4 to 0.8 mm
- temperature at installation: 0°C to 50°C
- working temperature: -20°C to 60°C
- minimal binding radius at installation: according to the manufacturer's catalogue data

- minimal binding radius after installation:
 - 25mm for cables with diameter less than 6 mm
 - 50mm for cables with diameter greater than 6 mm

3.3.2.1 Central Monitoring

3.3.2.1.1 Software licence for central monitoring and control of the technical protection systems

Procurement, supply and installation of the basic software for central monitoring and control of the technical protection security system. The following systems shall be integrated at software level (fire alarm, access control, intrusion alarm system, video surveillance). Software is with following features:

- Device overview software for display of all peripheral devices (detectors, controllers, cameras...), internal virtual devices (operators, servers) with their type, location and condition
- Action management software for management and control through one button press, one icon click or through detector address selection in device overview
- Display action plans software, for message display with action plans and recommendations in case of alarm. All messages are in HTML format to allow text overview, bitmap file overview, video materials overview.
- Alarm document software
- Display site plans for displaying maps in AutoCAD-DWF format. In map all peripheral devices (detectors, controllers, cameras) are drawn as links
- Graphical navigation software, for navigation and zoom in case of alarm
- Display misc. documents for display of additional HTML documents
- Multi-client software for allowing and denying access to software application regarding access rights
- Installation disc with engine software
- Security system integration disc with complete documentation including user manuals in PDF format
- Activation key file(s)
- Security system integration installation manual
- USB dongle key
- 1 operator license
- Logbook
- Alarm message management
- 1 OPC server license
- Operator working station position
- Configuration software
- User administration

Payment made per piece.

3.3.2.1.2 Licence for fire alarm system

Procurement, supply and installation of the basic software for central monitoring and control of the technical protection security system. The following systems shall be integrated at software level (fire alarm, access control, intrusion alarm system, video surveillance). Software is with following features:

- Device overview software for display of all peripheral devices (detectors, controllers, cameras...), internal virtual devices (operators, servers) with their type, location and condition
- Action management software for management and control through one button press, one icon click or through detector address selection in device overview
- Display action plans software, for message display with action plans and recommendations in case of alarm. All messages are in HTML format to allow text overview, bitmap file overview, video materials overview.
- Alarm document software

- Display site plans for displaying maps in AutoCAD-DWF format. In map all peripheral devices (detectors, controllers, cameras) are drawn as links
- Graphical navigation software, for navigation and zoom in case of alarm
- Display misc. documents for display of additional HTML documents
- Multi-client software for allowing and denying access to software application regarding access rights
- Installation disc with engine software
- Security system integration disc with complete documentation including user manuals in PDF format
- Activation key file(s)
- Security system integration installation manual
- USB dongle key
- 1 operator licence
- Logbook
- Alarm message management
- 1 OPC server licence
- Operator working station position
- Configuration software
- User administration.

Payment made per piece.

3.3.2.1.3 Licence for the access control system

Procurement, supply and installation of the software access control engine with following features:

- Door type management according to building.
- Cards and controllers activation
- Temporary manual or automatic card block
- Card print and user definition
- Zones, floors, corridors and rooms determination for user groups with allowed and denied access
- User groups determination
- All data and reports storage
- Alarm management, access denied, sabotage, unauthorized entry, break and entry, etc with building maps display, room plans, and action plan
- Interconnection to video surveillance system License included in basic packet:
- 1000 cards
- 50 visitors
- 128 entrances

Payment made per piece.

3.3.2.1.4 Licence for video surveillance system

Procurement, supply and installation of the software video engine for integration with video surveillance system with following features:

- Advanced video verification for enhancing intrusion and fire detection as well as access control and intercom
- Direct command and control of video devices from the central map viewer
- Hyperlinks between, for example, intrusion alarms in the event log and correlated video recordings on DVRs
- Direct integration of live or archive video in action plans and access control engine video verification.

Payment made per piece.

3.3.2.1.5 Licence for anti-burglary system

Procurement, supply and installation of the alarm management software with following features:

- Four-layer management for AutoCAD drawings
- Software for system events timing management.
- Software for manual operator alarm, through one button press, one icon click or through detector address selection in device overview
- Software for different alarm scenario management and message distribution.

Payment made per piece.

3.3.2.1.6 Work station for the software of central monitoring and control of the technical protection systems

Procurement, supply, installation and connection of the work station for the software of central monitoring and control of the technical protection systems with minimal following characteristics:

- Processor Intel Xeon E5-1650 v4(3.6 GHz, 15 MB cache, 2400 MHz memory speed, Six-Core, HT, Turbo),
- Memory 8 GB (2 x 4 GB) DDR4 2400 ECC Registered Memory,
- AMD FirePro W7100 (8 GB, 4 x Display Ports, max. resolution 4096 x 2160 at 24 bpp 60 Hz)
- 2 x PCI Express Gen3 x16, 1 x PCI Express Gen3 x8, 1 x PCI Express Gen2 x4, 1 x PCI Express Gen2 x1, 1 x Legacy PCI slots
- Windows 10, 64-bit OS.

Payment made per piece.

3.3.2.1.7 Programming of the fire alarm system and the software for graphical visualization and control

Programming of the fire alarm system and the software for graphical visualization and control.

Payment made as a lump sum.

3.3.2.1.8 Commissioning of the system, training of users

Commissioning of the system, training of users of the system.

Payment made as a lump sum.

3.3.2.2 Anti-burglar system

Anti-burglar system within the building shall be carried out with anti-burglar panel located in the ground floor. The system shall be divided (partitioned) in accordance with the user's requests upon putting it into operation. Separate partition shall be manual emergency buttons that operate in 24 hours, so called, buzzer mode and have signalization.

3.3.2.2.1 Anti-burglar Alarm panel

Procurement, supply, installation and connection of Anti-burglary modular Control Panel with following characteristics:

- Supports up to 8 LSN Gateways, with up to 127 devices each
- Supports up to 500 areas, 1500 addresses, and 996 users
- Certification according EN50131; EN 55022; EN 50130-4, together with the connecting, programming and successful commissioning.

Payment made per piece.

3.3.2.2.2 Power supply 150 W for control panel 220VAC/12VDC

Procurement, delivery, installation and connecting of power supply 220VAC/12VDC, 3A, including a housing, connected to RS485 busbar for the transmission to the anti-burglary central control unit of information on errors

in the feeder and the connected battery, including 12V 26Ah battery which provides autonomous operation in case of grid power supply outage.

Payment made per piece.

3.3.2.2.3 LCD coder

Procurement, supply, installation and connection of the control unit for controlling the system for anti-burglary detection with the following characteristics:

- Colour display touchscreen 5.7 "(14cm) 320x240 pixels
- With a built-in speaker volume adjustable
- Plastic housing in IP30 protection
- Operating Temperature: -10° C to 55° C, together with the connecting, programming and successful commissioning.

Payment made per piece.

3.3.2.2.4 I/O expansion module

Procurement, supply, installation and connection of an I/O expansion module with the following characteristics:

- Standard LSN
- The connection detector zones 6 (conventional detectors and the terminals for monitoring)
- The connection to the output 4
- Contact Tamper
- Power of LSN loop 15V DC to 33 V DC
- Operating Temperature: 0 ° C to 55 ° C.

Payment made per piece.

3.3.2.2.5 Anti-burglar detector

Procurement, supply, installation and connection of PIR detector with the following characteristics:

- Standard LSN
- Wide angle coverage of 11m x 11m
- Use the temperature environments, such as floors and walls as well as the reference value
- Setting the sensitivity
- IP41 protection and IK02
- Operating Temperature: -10 ° C to 55 ° C.

Payment made per piece.

3.3.2.2.6 Magnetic contact for doors

Procurement, supply, installation and connection of magnetic contact with the following characteristics:

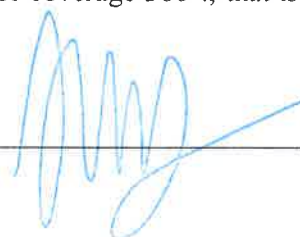
- Miniature design
- 9.5 mm diameter
- White colour
- Operating Temperature: 7.2 ° C to -95.56 ° C "

Payment made per piece.

3.3.2.2.7 Glass break detector

Procurement and assembly of the acoustic glass-break detector, range 8m and angle of coverage 360°, that is connected to panel via bus and address element.

Payment made per piece.



3.3.2.2.8 Panic buttons

Procurement, supply, installation and connection of panic push button with a key for resetting.

Payment made per piece.

3.3.2.2.9 Alarm horn strobe

Procurement, supply, installation and connection of siren with the following characteristics:

- The possibility of independent power using the built-in rechargeable 12V DC battery autonomy 72h
- The volume of 90dB
- LED Bulb
- Tamper switch
- Aluminium housing IP43 IK08
- Operating Temperature: -25 ° C to 70 ° C

Payment made per piece.

3.3.2.2.10 Cable J-H(St)H 2x2x0.8 mm

Delivery and laying of cables J-H(St)H 2x2x0.8 mm. Cables are laid inside the flexible hoses in the wall below the plaster. Flexible hoses included.

Payment made per m'.

3.3.2.2.11 Cable J-H(St)H 5x2x0.8 mm

Delivery and laying of cables J-H(St)H 5x2x0.8 mm. Cables are laid inside the flexible hoses in the wall below the plaster. Flexible hoses included.

Payment made per m'.

3.3.2.2.12 Cable S/FTP installation cable Cat 6a

Procurement, supply and installation of S/FTP installation cable Cat6a with the following characteristics:

- Cable is S/FTP, with LSOH sleeve
- Cable is Cat6a, performance up to 600MHz
- Fire resistance according to IEC 60332-1 standard
- Cable must fulfil all requirements according to ISO/IEC 11801 standard
- Characteristic impedance of the cable 100Ω
- Usage temperature: - 20 to + 60°C
- in compliance with the standards: EN 50173, EN 52288 i IEC 61156-5.

Payment made per m'.

3.3.2.2.13 Cable N2XH 3x1.5mm²

Delivery and laying of cables N2XH 3x1.5mm². Cables are laid inside the flexible hoses in the wall below the plaster.

Payment made per m'.

3.3.2.2.14 Halogen-free ribbed hose, dimensions Ø32/24mm

Delivery and laying of halogen-free ribbed hose dimensions Ø32/24mm, envisaged for wall-mounting or in suspended ceilings with clips

Payment made per m'.



3.3.2.2.15 Programming and commissioning of the entire system

Programming and commissioning of the entire system, training of users

Payment made as a lump sum.

3.3.2.3 Fabrication of electrical installations, Security guard control system

3.3.2.3.1 Security guard control system

Procurement, delivery and installation of security guard control system – Full set.

The unit shall record the time and date of each registered security guard tour. 9V battery shall be included. Sound signalling of the readings and poor battery operation. Memory capacity for 3000 security guard tours and unlimited number of control points. Connection to the computer over USB port. The set shall include 5 control points and software for the administration in the Serbian language

Programming and commissioning of the entire system, training of users

Payment made per piece/complete set.

3.3.2.3.2 Control points

Procurement, delivery and installation of security guard control system control points.

Payment made per piece.

3.3.2.4 Time and attendance system

3.3.2.4.1 Time and attendance terminal

Procurement, delivery and installation of time and attendance terminal to track and monitor when employees start and stop work, including the following characteristics:

- Terminal is intended for indoor installation
- Integrated interface for connection to LAN
- Integrated 1.3Mpix camera
- 8 programmable function keys
- Display for printout of all relevant information, TFT 3.5"
- Integrated web-server
- MIFARE card reading
- Memory storage of 200,000 events in autonomous mode of operation, without login to the server.

Programming and commissioning of the entire system, training of users.

Payment made per piece.

3.3.2.4.2 Software for time and attendance terminal

Procurement, delivery and installation of software for time and attendance terminal for 200 users:

- Operation control possible from unlimited number of terminals
- Application of one of the standard and common databases envisaged for processing of huge quantities of data
- Offers the option of using data archiving and subsequent reloading of data from archive files
- Offers the option of working with unlimited number of clients
- Intuitive interface in the Serbian language
- Application of open database, accessible by software for financial management or corresponding interface to financial management software

The server shall be supplied with the license for one client and with the license for three terminals.

Payment made per piece/complete set.

3.3.2.4.3 Server for the time and attendance software

Procurement, delivery and installation of server for the time and attendance software, processor Intel Quad-Core Xeon, 4GB RAM, two hard disks of 1TB each in RAID 1 configuration, Win 7 professional, envisaged for 1U rack mount chassis.

Payment made per piece.

3.3.2.5 Fabrication of electrical installations for the time and attendance system

3.3.2.5.1 Master clock

Procurement, delivery and installation of Master clock for distribution of information to all slave clock on the busbar; accuracy 2ppm, including GPS module for synchronization, together with LCD display 4x20 characters for wall-mounting. Programming and commissioning of the entire system.

Payment made per piece.

3.3.2.5.2 Local one-sided clock

Procurement, delivery and installation of local time one-sided clock, 6-digit LED segment display 57mm. Wall-mounted.

Payment made per piece.

3.3.2.5.3 Local double-sided clock

Procurement, delivery and installation of Local time double sided clock, 2x6-digit LED segment display 57mm. Ceiling-mounted.

Payment made per piece.

3.3.2.5.4 Cable J-H(St)H 2x2x0.8mm

Delivery and laying of cables J-H(St)H 2x2x0.8 mm. Flexible hoses included.

Payment made per m'.

3.3.2.5.5 Cable N2XH 3x1.5mm²

Delivery and laying of cables N2XH 3x1.5mm².

Payment made per m'.

3.3.2.5.6 Halogen-free ribbed hose, dimensions Ø32/24mm

Delivery and laying of halogen-free ribbed hose dimensions Ø32/24mm, envisaged for wall-mounting or in suspended ceilings with clips

Payment made per m'.

3.3.2.5.7 Programming and commissioning of the entire system

Programming and commissioning of the entire system, training of users, delivery of functional test certificate.

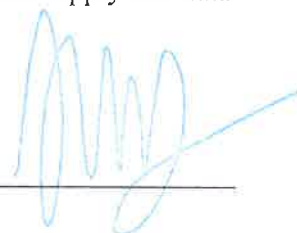
Payment made as a lump sum.

3.3.2.6 Video surveillance system

The JA shall be equipped with IP video surveillance system that use network cables for power supply and data transfer.

Characteristics of video surveillance system via network:

- simultaneous surveillance, recording and review of recorded material



- quick access to every camera, at any time, regardless of the distance, regardless of the fact weather someone else is using the same camera and regardless of the user's location
- control room" is located everywhere and always
- access to certain information and levels shall be controlled via password
- easy and cost-effective upgrade of the system
- great quality of recorded material (Full HD 1920x1080px@25fpsmax)
- simple recording of copies at distant locations (data safety)
- each image contains location, date and time
- easy and simple print of any image to the paper
- advanced control algorithms (pre-alarm recording, masking of certain areas, automatic recording...)
- integration with the alarm and access control systems

The adequate configuration of routers provides security guards to have the access to all cameras.

The network video system is extremely flexible, cameras can be moved freely inside the network and the system can be expanded by additional network cameras. This may be carried out easily regardless of the fact weather the new cameras are placed at the same place or new location so that they communicated via the Internet.

The cable SF/UTP CAT6A shall be laid from the video centre to each camera for transfer of video signal. The services for cameras inside the building shall be placed in the corrugated hose 16 mm² buried in the wall at the installation place, and they shall be power supplied via network cable, standard 802.3af (Power over Ethernet).

3.3.2.6.1 Outdoor day/night compact camera

Procurement, supply, installation and connection of IP bullet "Day / Night" camera for outdoor use with IR illuminator, IP66, IK08, manual varifocal lens (AVF) 2.7-12mm f1.4, IDNR, H.264 "quadstreaming" cloud services, free applications for surveillance camera, ROI, motion / tamper / audio detection, 1080p with the following characteristics:

- 1 / 2.9 "HD CMOS sensor, the resolution of 1936 x 1097 pixels, 2.1MP
- Video compression H.264 (ISO / IEC 14496-10) and M-JPEG
- The configurable multiple H.264 and JPEG streams, with an adjustable bandwidth and frequency picture
- Definition standards - compatibility with the SMPTE 274M-2008 standard: 1920x1080p resolution at 25 and 30 frames per second, progressive scan images, colour display by the ITU-R BT.709, 16: 9 aspect ratio
- The lens is 2.7 mm to 12 mm, auto Varifocal (AVF) with IR correction, a high-resolution
- (3200 K, has a reflectivity of 89% of the scene, F1.4, 30 IRE) in lx colour 0.07, 0.05 discoloured lx (IR with 0.0 lx)
- Dynamic Range min. 76 dB WDR
- The automatic iris control, a motorized adjustment of the focal length
- An infrared illuminator, 4x LED 850nm, the visibility in the dark to 30m
- Hybrid mode: simultaneous streaming via analogue BNC connectors
- Protocols: IPv4, IPv6, UDP, TCP, HTTP, HTTPS, RTP / RTCP, IGMP V2 / V3, ICMP, ICMPv6, RTSP, FTP, Telnet, ARP, DHCP, APIPA (Auto-IP, link local address) SNMP, 802.1x, DNS, DNSv6, DDNS, SMTP, iSCSI, UPnP (SSDP), DiffServ (QoS), LLDP, SOAP, Dropbox, CHAP, digest authentication
- Data Encryption: 1.2 TLS, SSL, DES, 3DES
- Video motion analysis: Motion detection +, Silent VCA, programmable alarm and detection
- Audio full duplex / half duplex; 1 x mono input, 1 x mono output; audio alarm
- 1 alarm input, 1 relay output
- Directly iSCSI recording; recording on SD memory card: Continuous recording alarm / event / on schedule, Internal 10s RAM recording before alarm

- Power supply: 24 VAC / +12 VDC, Power-over-Ethernet 48 VDC nominal IEEE 802.3af (802.3at type 1)
- The working temperature range: -30 ° C to +60 ° C
- Supplied with a box for external mounting on the wall / ceiling

Payment made per piece.

3.3.2.6.2 DOME anti-vandal day/night camera

Procurement, supply, installation and connection of IP dome "Day / Night" camera for indoor installation with IR illuminator, varifocal lens 3-10mm F1.3, IDNr, H.264 "quadstreaming" cloud services, free applications for surveillance camera, ROI, motion / tamper / audio detection 1080p with the following characteristics:

- 1 / 2.7 "HD CMOS sensor, resolution 1920 x 1080-pixel HD
- Video compression H.264 (ISO / IEC 14496-10) and M-JPEG
- The configurable multiple H.264 and JPEG streams, with an adjustable bandwidth and frequency picture
- Definition standards - compatibility with the SMPTE 274M-2008 standard: 1920x1080p resolution at 25 and 30 frames per second, progressive scan image, 16: 9 aspect ratio
- The lens 3 to 10 mm and varifocal with IR correction, a high-resolution
- (3200 K, has a reflectivity of 89% of the scene, 30 IRE) in lx colour 0.24, 0.05 discoloured lx (IR with 0.0 lx)
- Dynamic Range min. 76 dB WDR
- The automatic iris control, a motorized adjustment of the focal length
- Adjustable IR illuminator, 10x LED 850nm, the visibility in the dark to 15m
- Hybrid mode: simultaneous streaming via analogue SMB connectors
- Protocols: IPv4, IPv6, UDP, TCP, HTTP, HTTPS, RTP / RTCP, IGMP V2 / V3, ICMP, ICMPv6, RTSP, FTP, Telnet, ARP, DHCP, APIPA (Auto-IP, link local address) SNTP, SNMP, 802.1x, DNS, DNSv6, DDNS, SMTP, iSCSI, UPnP (SSDP), DiffServ (QoS), LLDP, SOAP, Dropbox, CHAP, digest authentication
- Data Encryption: 1.2 TLS, SSL, DES, 3DES)
- Video motion analysis: Motion detection, tamper alarm
- Audio full duplex / half duplex; 1 x mono input, 1 x mono output; audio alarm
- 1 alarm input, 1 relay output
- Directly iSCSI recording; recording on SD memory card: Continuous recording alarm / event / on schedule, Internal 10s RAM recording before alarm
- Power: 12 VDC, Power-over-Ethernet 48 VDC nominal IEEE 802.3af (802.3at type 1)
- The working temperature range: -20 ° C to +50 ° C
- Includes a bracket for internal assembly in / on a ceiling

Payment made per piece.

3.3.2.6.3 Network video recorder (NVR)

Procurement, supply, installation and connection of a network video recorder (NVR), "All-in-one" solution for recording, viewing and managing video surveillance system with the following characteristics:

- Maximum support up to 128 cameras
- Comes with 32 pre-installed licenses for cameras + additional licenses for total 64 cameras
- The built-in storage capacity 64TB (8x8TB SATA 3) in the RAID 5 configuration,
- Microsoft Windows preinstalled Storage Server 2012 operating system R2 which is located at 2 x 120 GB HDD RAID-1
- Quad Core Intel Xeon processor E3-1275 V3
- Memory installed 8 GB, DDR3-1666 ECC UNB (1 x 8 GB)
- 2 gigabit Ethernet ports
- 2-redundant "hot swap" power of 740W

- Installation in a 19 "rack, 2U
- Operating Temperature: -10 ° C to 35 ° C

Payment made per piece.

3.3.2.6.4 Client station

Procurement, supply, installation and connection of the work station for video surveillance system with minimal following characteristics:

- Processor Intel Xeon E5-1650 v4(3.6 GHz, 15 MB cache, 2400 MHz memory speed, Six-Core, HT, Turbo),
- Memory 8 GB (2 x 4 GB) DDR4 2400 ECC Registered Memory,
- AMD FirePro W7100 (8 GB, 4 x Display Ports, max. resolution 4096 x 2160 at 24 bpp 60 Hz)
- 2 x PCI Express Gen3 x16, 1 x PCI Express Gen3 x8, 1 x PCI Express Gen2 x4, 1 x PCI Express Gen2 x1, 1 x Legacy PCI slots
- Windows 10, 64-bit OS.

Payment made per piece.

3.3.2.6.5 Professional LED display envisaged for constant current operation

Procurement, supply, installation and connection of a professional LED monitor 42 " with the following characteristics:

- Full HD 1080p resolution, 16: 9 aspect ratio
- 4000: 1 contrast
- The response of 8ms
- Lighting of 500 cd / m²
- Viewing angle 178 ° Horizontal/Vertical
- Display Colours 1,073 million
- Connectors Composite video: two (2) BNC (1 in, 1 out), 1x DVI-D, 1x HDMI, 1x VGA, 1x components (Y, Pb, Pr), 1x Y / C (S-video), 5x Audio ports (2 Audio input RCA (right / left), 1 Audio input phone jack, 1 Audio Output: RCA (right / left) loudspeaker 1)
- VESA standard 400x400mm
- Operating Temperature: 0 ° C to 50 ° C
- Wall mount bracket

Payment made per piece.

3.3.2.6.6 Monitor 27"

Procurement, supply, installation and connection of a professional LED monitor 27 " with the following characteristics:

- Full HD 1080p resolution, 16: 9 aspect ratio
- 3000: 1 contrast
- The response of 12ms
- Lighting of 300 cd / m²
- Viewing angle 178 ° Horizontal/Vertical
- Display Colours 16.7 million
- Connectors Composite video: two (2) BNC (1 in, 1 out), 1x DVI-D, 1x HDMI, 1x VGA, 1x components (Y, Pb, Pr), 1x Y / C (S-video), 5x Audio ports (2 Audio input RCA (right / left), 1 Audio input phone jack, 1 Audio Output: RCA (right / left) loudspeaker 1)
- VESA standard 100x200mm
- Operating Temperature: 0 ° C to 50 ° C

Payment made per piece.

3.3.2.6.7 Cable S/FTP cat. 6a halogen-free

Procurement, supply and installation of S/FTP installation cable Cat6a with the following characteristics:

- Cable is S/FTP, with LSOH sleeve
- Cable is Cat6a, performance up to 600 MHz
- Fire resistance according to IEC 60332-1 standard

Cable must fulfil all requirements according to ISO/IEC 11801 standard

- Characteristic impedance of the cable 100Ω
- Usage temperature: – 20 to + 60°C
- In compliance with the standards: EN 50173, EN 52288 i IEC 61156-5.

Payment made per m'.

3.3.2.6.8 Halogen-free ribbed hose, dimensions Ø20/13.5mm

Delivery and laying of halogen-free ribbed hose dimensions Ø20/13.5mm, envisaged for wall-mounting or in suspended ceilings with clips.

Payment made per piece.

3.3.2.6.9 Gigabit 8-port POE switch for connecting IP cameras

Gigabit 8-port POE switch for connecting IP cameras with the following characteristics:

- Minimum 8 10/1000/1000T ports
- Minimum 2 SFP combo ports
- PoE budget minimum 75W
- Switching capacity minimum 20 Gbps
- Web-based configuration

Payment made per piece.

3.3.2.6.10 Gigabit 16-port POE switch for connecting IP cameras

Gigabit 16-port POE switch for connecting IP cameras with the following characteristics:

- Minimum 16 10/1000/1000T ports
- Minimum 2 SFP combo ports
- PoE budget minimum 185
- Switching capacity minimum 32Gbps
- Web-based configuration

Payment made per piece.

3.3.2.6.11 IP dome „Day/Night” camera for indoor/outdoor installation

Delivery and installation of IP dome "Day / Night" camera for indoor/outdoor installation with auto varifocal lens 3-9mm F1.2, IDNr, H.264 "quadstreaming" cloud services, starlight technology, IP66, IK10, ROI, Built-in Intelligent Video Analytics 1080p with the following characteristics:

- 1 / 2.8 "HD CMOS sensor, resolution 1920 x 1080 pixel HD
- Video compression H.264 and M-JPEG
- The configurable multiple H.264 and JPEG streams, with an adjustable bandwidth and frequency picture
- Definition standards - compatibility with the SMPTE 274M-2008 standard: 1920x1080p resolution at 25 and 30 frames per second, progressive scan image, 16: 9 aspect ratio
- The lens 3 to 9 mm and auto varifocal (AVF) with IR correction, a high-resolution
- (3200 K, has a reflectivity of 89% of the scene, 30 IRE) in lx colour 0.0075, 0.0011 discoloured lx

- Dynamic Range min. 120 dB WDR
- The automatic iris control, a motorized adjustment of the focal length
- Hybrid mode: simultaneous streaming via analogue SMB connectors
- Protocols: IPv4, IPv6, UDP, TCP, HTTP, HTTPS, RTP / RTCP, IGMP V2 / V3, ICMP, ICMPv6, RTSP, FTP, Telnet, ARP, DHCP, APIPA (Auto-IP, link local address) SNTP, SNMP, 802.1x, DNS, DNSv6, DDNS, SMTP, iSCSI, UPnP (SSDP), DiffServ (QoS), LLDP, SOAP, Dropbox, CHAP, digest authentication
- Data Encryption: 1.2 TLS, SSL, DES, 3DES)
- Intelligent Video Analytics with face detection
- Audio full duplex / half duplex; 1 x mono input, 1 x mono output; audio alarm
- 1 alarm input, 1 relay output
- Directly iSCSI recording; recording on SD memory card: Continuous recording alarm / event / on schedule, Internal 10s RAM recording before alarm
- Power: 12 VDC, Power-over-Ethernet 48 VDC nominal IEEE 802.3af (802.3at type 1)
- The working temperature range: -30 ° C to +50 ° C
- Includes a Surface mount box

Payment made per piece.

3.3.2.6.12 Programming and commissioning of the entire system

Programming and commissioning of the entire system, training of users and supply of user manuals

Payment made as a lump sum.

3.3.2.7 Computer networks

RACK cabinets equipped with passive and active components necessary for structured cabling are situated in server room and on every floor. There are also RACKS in training rooms and classrooms due to number of RJ45 outlets

The backbone is carried out on the basis of Layer3 switches connected so to form a ring topology network of the bandwidth 10Gbps. Each RACK cabinet is equipped with 24 and 48-port Layer2 switches, for connecting customers to the network. L2 switches may be connected in two ways: so called stacking method via multiple 1Gbps links via LACP protocol (IEEE 802.3ad), which is decided by the Client on the basis of his own needs.

Labelling of communication equipment shall be carried out in compliance with the standard EIA/TIA-606. This standard is made so to unify method of labelling and classification of telecommunication infrastructure. Each horizontal cable has to be labelled at both ends. Identification sticker has to be placed at each module on the patch panel, i.e. at each module (connection point) of the socket outlet.

Network socket outlets shall be carried out in such manner so that each workplace includes three double shielded socket outlets RJ45 cat. 6A for SF/UTP cables with protective cover. The socket outlets shall be installed in the trunkings. Each socket outlet must have identification sticker.

3.3.2.7.1 Cable S/FTP cat. 6a halogen-free

Procurement, delivery and installation of S/FTP installation cable Cat6a with the following characteristics:

- Cable is S/FTP, with LSOH sleeve
- Cable is Cat6a, performance up to 600MHz
- Fire resistance according to IEC 60332-1 standard
- Cable must fulfil all requirements according to ISO/IEC 11801 standard
- Characteristic impedance of the cable 100Ω
- Usage temperature: – 20 to + 60°C
- In compliance with the standards: EN 50173, EN 52288 i IEC 61156-5

Payment made per m'.

3.3.2.7.2 Halogen-free flexible ribbed conduits

Procurement, supply and installation of Halogen-free flexible ribbed conduits laid in gypsum wall, suspended ceiling, PCT rack or screeded bed. Payment made per m'.

3.3.2.7.2.1 Halogen-free flexible ribbed conduits Ø 16 mm

3.3.2.7.2.2 Halogen-free flexible ribbed conduits Ø 25 mm

3.3.2.7.2.3 Halogen-free flexible ribbed conduits Ø 34 mm

3.3.2.7.3 Ceiling-mounted open cable tray PCT 200/60

Procurement, supply and installation of ceiling-mounted open cable tray, made of perforated steel sheet, additionally galvanized, for cable mounting, PCT 200/60 for medium loads, type MKS, with all necessary installation material.

Payment made per m'.

3.3.2.7.4 Modular single telecommunication socket with 1xRJ-45 module

Supply and installation of modular single telecommunication socket with the following characteristics:

- With 1xRJ-45 module
- With all necessary fitting on-wall elements (surface mounting box, frame, support element, blind masks, etc.)
- Modules are Cat6a, STP
- In line with standard EIA/TIA-568-B.2, EN 50173 i NF C 20730
- Modules has to be tested for PoE standards 802.3af and 802.3at (do 50W), with up to 2500 on-load connections / disconnections
- In accordance with all requests defined by ISO/IEC 11801 standard
- Conductors supported: single-wire: 0.5 to 0.65 mm, AWG 22 to 25 or multiple-wire: AWG 26

Payment made per piece.

3.3.2.7.5 Modular double telecommunication socket with 2xRJ-45 module

Supply and installation of modular double telecommunication socket with the following characteristics:

- With 2xRJ-45 module
- With all necessary fitting on-wall elements (surface mounting box, frame, support element, blind masks, etc.)
- Modules are Cat6a, STP
- In line with standard EIA/TIA-568-B.2, EN 50173 i NF C 20730
- Modules has to be tested for PoE standards 802.3af and 802.3at (do 50W), with up to 2500 on-load connections / disconnections
- In accordance with all requests defined by ISO/IEC 11801 standard
- Conductors supported: single-wire: 0.5 to 0.65 mm, AWG 22 to 25 or multiple-wire: AWG 26

Payment made per piece.

3.3.2.7.6 Modular triple telecommunication socket with 3xRJ-45 module

Supply and installation of modular triple telecommunication socket with the following characteristics:

- With 3xRJ-45 module
- With all necessary fitting on-wall elements (surface mounting box, frame, support element, blind masks, etc.)
- Modules are Cat6a, STP
- In line with standard EIA/TIA-568-B.2, EN 50173 i NF C 20730
- Modules has to be tested for PoE standards 802.3af and 802.3at (do 50W), with up to 2500 on-load connections / disconnections

- In accordance with all requests defined by ISO/IEC 11801 standard
- Conductors supported: single-wire: 0.5 to 0.65 mm, AWG 22 to 25 or multiple-wire: AWG 26

Payment made per piece.

3.3.2.7.7 Wall mounted 19" Rack cabinet

Supply and installation of wall mount 19" rack cabinet with the following characteristics:

- Dimensions: 12U, 600x600
- Pivoting body allowing access to rear of the cabinet
- Reversible pivoting direction
- Fitted with a glass curved front door made of screen printed safety glass
- Fitted with 2 x 19" uprights, marked with the units and allowing depth (Depth adjusting aid) adjustment. Perforations to be 9.5 x 9.5 mm
- With pivoting side panels, tool-free removal from inside
- Top and bottom perforations for natural ventilation
- Removable side panels
- Top and bottom cable entries
- Protection index IP 20 according to IEC 60529
- Protection index against mechanical shocks: IK 08 according to IEC 62262
- Compliance with IEC 60950-1 standard
- Compliance with EIA 310-D standard

Payment made per piece/complete set.

3.3.2.7.8 Free-standing 19" Rack cabinet 33U

Supply and installation of free-standing 19" rack cabinet with the following characteristics:

- Dimensions: 33U, 600x600
- With reversible curved front door made of safety glass
- Removable side and rear panels
- All four sides equipped with lock with the key
- Equipped with 4 x 19" uprights with depth adjustment
- Uprights with dual marking of the units (U) – First one indicates no. of U from the top, and other one from the bottom of the cabinet
- Equipped with Roof plate with 3 fan units and power cord with minimal length of 2.5m
- Equipped with thermostat temperature adjustment range from 5 to 60°C
- Equipped with 2 PDU units with eight 2P+E sockets
- Equipped with levelling feet adjustable from the inside
- Load capacity: minimum 300kg
- Protection index: IP20 in accordance with IEC EN 60529 and IK08 in accordance with IEC EN 62262
- Resistance to shock acceleration and vibration in accordance with IEC 61587-1 standard
- Corrosion resistance: Class C2 according to EN ISO 12944-2 and 3K3 according to IEC EN 60721-3-3
- Equipped with 1 fixed shelf

Payment made per piece/complete set.

3.3.2.7.9 Free-standing 19" Rack cabinet 42U

Supply and installation of free-standing 19" rack cabinet with the following characteristics:

- Dimensions: 42U, 800x800
- With reversible curved front door made of safety glass
- Removable side and rear panels
- All four sides equipped with lock with the key

- Equipped with 4 x 19" uprights with depth adjustment
- Uprights with dual marking of the units (U) – First one indicates no. of U from the top, and other one from the bottom of the cabinet
- Equipped with Roof plate with 3 fan units and power cord with minimal length of 2.5m
- Equipped with thermostat temperature adjustment range from 5 to 60°C
- Equipped with 2 PDU units with eight 2P+E sockets
- Equipped with levelling feet adjustable from the inside
- Load capacity: minimum 300kg
- Protection index: IP20 in accordance with IEC EN 60529 and IK08 in accordance with IEC EN 62262
- Resistance to shock acceleration and vibration in accordance with IEC 61587-1 standard
- Corrosion resistance: Class C2 according to EN ISO 12944-2 and 3K3 according to IEC EN 60721-3-3
- Equipped with 1 fixed shelf

Payment made per piece/complete set.

3.3.2.7.10 Open frame Server Rack 58U

Supply and installation of free-standing open frame server rack 58U with the following characteristics:

- Depth 733mm
- Height 2743mm
- Width 609mm
- Material: Solid Steel
- Universal square holes
- Dell, HP, IBM, Cisco compatible
- 1360 kg capacity
- Meets EIA, 19" standards
- Top for Rack with cable pass through
- Vertical Cable Organizer (x2 per rack)
- Button mount adapter for Rack
- Buying kit for open frame rack
- With side panels for last two racks in the row
- With vertical Rack PDU 2G, Switched, ZeroU, 32A, 230V, (21) C13 & (3) C19 for enabling advanced, user-customizable power control and active monitoring (x2 per rack)
- With feature-rich 48 Port Console Server that simplifies out-of-band management for your network, server and power infrastructure in data centres with 48 serial Cisco Straight pinout, dual power supply, 2Gbe Ethernet, 4GB flash

Payment made per piece/complete set.

3.3.2.7.11 Modular patch panel

Supply, installation and connection in the rack cabinet of a modular patch panel with the following characteristics:

- Panel is modular, 1HU for mounting in 19" rack cabinet
- Equipped with quick fixing mechanism
- Equipped with rear cable guide
- Automatic grounding of each connector is ensured
- Panel is supplied with 24 modules, STP Cat6, shielded
- Modules are attached without need for specific tools
- Supplied with plastic label holders in the front for proper port identification
- Modules are tested for PoE standard 802.3af and 802.3at (up to 50W), with 2500 connecting / disconnections
- Compliance with the standards: ISO/IEC 11801, CENELEC EN 50173-1, ANSI/EIA/TIA 568-B.2-1

- Certificate issued by the relevant independent laboratory (3P, GHMT or similar) must be submitted for confirmation of compliance with the characteristics according to the mentioned standards

Payment made per piece.

3.3.2.7.12 In rack cable tray for horizontal mounting of cables

Supply, installation and connection in the rack cabinet of a cable tray for horizontal mounting of cables

Payment made per piece.

3.3.2.7.13 Patch cables S/FTP, minimum category 6a, 1m length, LSOH

Supply, installation and connection of Patch cables with the following characteristics:

- Cable type is S/FTP, minimum category 6a, 1m length, LSOH
- Characteristic impedance 100Ω
- Minimal bending radius when laying of 24 mm
- Fire resistant in accordance with the IEC 60332-1 standard
- Compliance with the standards: ISO/IEC 11801, CENELEC EN 50173-1, ANSI/EIA/TIA 568-C

Payment made per piece.

3.3.2.7.14 Patch cables S/FTP, minimum category 6a, 2m length, LSOH

Supply, installation and connection of Patch cables with the following characteristics:

- Cable type is S/FTP, minimum category 6a, 2m length, LSOH
- Characteristic impedance 100Ω
- Minimal bending radius when laying of 24 mm
- Fire resistant in accordance with the IEC 60332-1 standard
- Compliance with the standards: ISO/IEC 11801, CENELEC EN 50173-1, ANSI/EIA/TIA 568-C

Payment made per piece.

3.3.2.7.15 Patch cables S/FTP, minimum category 6a, 3m length, LSOH

Supply, installation and connection of Patch cables with the following characteristics:

- Cable type is S/FTP, minimum category 6a, 3m length, LSOH
- Characteristic impedance 100Ω
- Minimal bending radius when laying of 24 mm
- Fire resistant in accordance with the IEC 60332-1 standard
- Compliance with the standards: ISO/IEC 11801, CENELEC EN 50173-1, ANSI/EIA/TIA 568-C

Payment made per piece.

3.3.2.7.16 Patch cables S/FTP, minimum category 6a, 5m length, LSOH

Supply, installation and connection of Patch cables with the following characteristics:

- Cable type is S/FTP, minimum category 6a, 5m length, LSOH
- Characteristic impedance 100Ω
- Minimal bending radius when laying of 24 mm
- Fire resistant in accordance with the IEC 60332-1 standard
- Compliance with the standards: ISO/IEC 11801, CENELEC EN 50173-1, ANSI/EIA/TIA 568-C

Payment made per piece.

3.3.2.7.17 IP telephony system for minimum 150 users

Supply, installation, connection of, and commissioning of the IP telephony system for up to 150 users, with the following characteristics

- Licenses for minimum 150 users included
- Minimum of 300 supported devices
- Supported telephony functions: Caller ID, Call Transfer, call forward, Indication of busy / free extensions, Call park, Call waiting, Call ,on hold Paging options, switching and call diverting etc.
- Auto Attendant with IVR system included
- Least Cost Routing with time profiles - Defining the routing rule for certain periods during the day or week
- Music on hold - from external source or internal wav file
- Voicemail included for all users in the system
- Minimum of 24 voicemail ports
- Number of users for IM and Presence functionality: minimum 150
- Forwarding voicemail to e-mail and receiving a notification via mail on a received voice message
- Paging: Minimum for 50users/groups
- Provisioning for minimum 150 users
- Supported Cisco Unified Applications or appropriate

Payment made per piece/complete set.

3.3.2.7.18 IP telephone set colour display

Supply, installation, connection and commissioning of the IP telephone set with the following characteristics:

- 5 inch colour display
- Compatibility with the CUCM Call Processing System, Business Edition 6000
- Support for G.711a, G.711u, G.729a, G.722 and iLBC codecs
- Full-duplex speakerphone
- Dedicated keys for accessing voice mail and phone settings
- Support for XML services
- Speakerphone and mute buttons
- 4 programmable soft key buttons
- the ability to power the phone via Ethernet according to the PoE 802.3af standard
- Internal switch with 10 / 100BASE-T or Ethernet RJ-45 ports, one for uplink

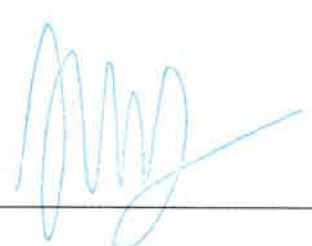
Connection to another Ethernet device (such as a PC)

- Support for 802.1Q standard or appropriate
- Support for 802.1P standard or appropriate
- Volume Adjustment Button
- 5 programmable liner keys
- the ability to set different ringtones
- Support for DHCP and TFTP protocols
- Support for SIP signalling protocol
- the ability for the phone to receive information from the switch on which VLAN to use for voice traffic,

and which for the other ethernet port

- Possibility of supplying the IP phone with a configuration and setting the desired version firmware via TFTP server
- A manufacturer's warranty of at least 24 months

Payment made per piece.



3.3.2.7.19 IP telephone set black and white display

Supply, installation, connection and commissioning of the IP telephone set with the following characteristics:

- Black and white backlit display
- Compatibility with the CUCM Call Processing System, Business Edition 6000
- Support for G.711a, G.711u, G.729a, G.722 and iLBC codecs
- Full-duplex speakerphone
- Dedicated keys for accessing voice mail and phone settings
- Minimum 16 additional answering machine liners
- Support for XML services
- Speakerphone and mute buttons
- 4 programmable soft key buttons
- the ability to power the phone via Ethernet according to the PoE 802.3af standard
- Internal switch with 10 / 100BASE-T or Ethernet RJ-45 ports, one for uplink

Connection to another Ethernet device (such as a PC)

- Support for 802.1Q standard or appropriate
- Support for 802.1P standard or appropriate
- Volume Adjustment Button
- 4 programmable line buttons
- the ability to set different ringtones
- Support for DHCP and TFTP protocols
- Support for SIP signalling protocol
- The ability for the phone to receive information from the switch on which VLAN to use for voice traffic, and which for the other ethernet port
- Possibility of supplying the IP phone with a configuration and setting the desired version firmware via TFTP server
- The manufacturer's warranty is at least 24 months

Payment made per piece.

3.3.2.7.20 IP telephone set black and white display min of 3 inches

Supply, installation, connection and commissioning of the IP telephone set with the following characteristics:

- A black and white backlit display with a minimum of 3 inches
- Compatibility with the CUCM Call Processing System, Business Edition 6000
- Voice codec: G.711a / μ , G.722, G.729a and iLBC codec
- Full-duplex speakerphone
- Dedicated keys for accessing voice mail and phone settings
- Dedicated Hold / Resume, Transfer and Conference buttons
- 4 programmable soft key buttons
- Speakerphone, Headset and Mute buttons
- Support for XML services
- the ability to power the phone via Ethernet according to the PoE 802.3af standard or the corresponding
- Internal switch with two 10 / 100BASE-T or Ethernet RJ-45 ports, one of which serves as a uplink connection to another Ethernet device (such as a PC)
- Support for 802.1Q standard or appropriate
- Support for 802.1P standard or appropriate
- Volume Adjustment Button
- 2 programmable line buttons
- the ability to set different ringtones
- Support for DHCP and TFTP protocols
- Support for SIP signalling protocol



- the ability for the phone to receive information from the switch on which VLAN to use for voice traffic, and which for the other ethernet port
- Possibility of supplying the IP phone with a configuration and setting up the desired firmware version via TFTP server
- A manufacturer's warranty of at least 24 months

Payment made per piece.

3.3.2.7.21 Analog gateway/adapter

Supply, installation, connection and commissioning of an analog gateway/adapter:

- Stand-alone device
- Interfaces: Minimum 4xRJ11 ports and minimum 4x10/100Base Tx (RJ45)
- Supported codecs: G711A/μ, G.723.1, G.729A/B
- Supported protocols SIP V2.0 (RFC 3261, 3262, 3264), SDP, RTP/RTCP, STUN, ARP/RARP, SNTP, DHCP, PPPoE, TFTP, HTTP, DNS, VLAN 802.1p/802.1q, REFER (RFC 3215)
- DTMF mode: Signal/RFC2833/INBAND
- Echo cancelation (G.168)
- Voice Activity detection (VAD)
- Fax: T.38/Pass-through/Modem FAX mode
- Web interface for configuration
- Firmware upgrade via TFTP protocol

Payment made per piece.

3.3.2.7.22 24-port POE switch

Supply, installation, connection and commissioning of a 24-port POE switch with the following characteristics:

- Stackable
- With minimum 24 10/100/1000 Ethernet ports
- Supported IEEE 802.3at (PoE +) power on all ports
- 715W AC power supply, minimum 435W PoE power
- With a minimum of one slot for adding a network module

Performance:

- Switching capacity minimum 92 Gb / s
- Stacking bandwidth minimum of 480 Gb / s
- Minimum 32 000 MAC addresses
- A minimum of 24,000 IPv4 routes
- Minimum 4 GB DRAM memory
- Minimum 2GB flash memory
- Speed of packet forwarding is minimum 68.4 Mpps
- Jumbo frame minimum 9198 bytes
- Mean time between failures (MTBF): 269450
- Incorporated module with 2 SFP + slots
- Two SFP + modules for multimode optics are included
- Includes cables for stacking of minimum length of 1m

Integration of wireless controllers (wireless):

- Incorporated license for minimum 5 AP wireless access points and the possibility of expansion up to a minimum of 50
- Number of clients per switch / stack: minimum 2000
- WLANs per line: minimum 64
- Wireless bandwidth per switch: minimum 20 Gb / s

- Supported characteristics:
- Automatic configuration of the network port depending on the connected device
- Automatic configuration of QoS parameters depending on detected network traffic
- The ability of the automatic configuration of switch when connecting to the network
- The ability to automatically update the software when connecting to the network
- Control Plane Policing
- IEEE 802.3az Energy Efficient Ethernet
- The possibility that a switch does not hand PoE over a specific port at defined time intervals
- IGMP v1, v2
- IGMP Snooping
- Full insight into wireline and wireless traffic information to enable insight from where the traffic flows, what is the type of traffic, when it is realized and the display of network traffic in real-time. It is necessary to have an insight into the entire traffic that goes through the switch
- Identification of wired and wireless users that generate the highest network traffic and application of the policy to restrict network traffic
- Dynamic ARP Inspection
- IP Source Guard
- the ability to create access lists that are activated at certain time intervals
- Per port enabling / disabling of unknown unicast / multicast flooding
- Unicast MAC filtering
- Support for routing protocols: OSPF, BGPv4, RIP and IS-ISv4
- Wireless QoS
- The ability for the switch to terminate the CAPWAP protocol from the wireless access point according to IETF RFC 5415, i.e. to control and manage wireless access points
- DHCP Snooping
- IP SLA
- A manufacturer's warranty of minimum 3 years
- Service support that supports next business day replacement and direct access to technical support (TAC) of equipment manufacturers for a year

Payment made per piece.

3.3.2.7.23 48-port POE switch

Supply, installation, connection and commissioning of a 48-port POE switch with the following characteristics:

- Stackable
- With minimum 48 10/100/1000 Ethernet ports
- Supported IEEE 802.3at (PoE +) power on all ports
- 715W AC power supply, minimum 435W PoE power
- With a minimum of one slot for adding a network module

Performance:

- Switching capacity minimum 176 Gb / s
- Stacking bandwidth minimum of 480 Gb / s
- Minimum 32 000 MAC addresses
- A minimum of 24,000 IPv4 routes
- Minimum 4 GB DRAM memory
- Minimum 2GB flash memory
- Packet forwarding speed of minimum 130.95 Mpps
- Jumbo frame minimum 9198 bytes
- Mean time between failures (MTBF): 241050
- Incorporated module with 2 SFP + slots

- Two SFP + modules for multimode optics are included
- Includes cables for stacking of minimum length of 1m

Integration of wireless controllers (wireless):

- Incorporated license for minimum 5 AP wireless access points and the possibility of expansion up to a minimum of 50
- Number of clients per switch / stack: minimum 2000
- WLANs per line: minimum 64
- Wireless bandwidth per switch: minimum 40 Gb / s
- Supported characteristics:
 - Automatic configuration of the network port depending on the connected device
 - Automatic configuration of QoS parameters depending on detected network traffic
 - The ability of the automatic configuration of switch when connecting to the network
 - The ability to automatically update the software when connecting to the network
- Control Plane Policing
- IEEE 802.3az Energy Efficient Ethernet
- The possibility that a switch does not hand PoE over a specific port at defined time intervals
- IGMP v1, v2
- IGMP Snooping
- Full insight into wireline and wireless traffic information to enable insight from where the traffic flows, what is the type of traffic, when it is realized and the display of network traffic in real-time. It is necessary to have an insight into the entire traffic that goes through the switch
- Identification of wired and wireless users that generate the highest network traffic and application of the policy to restrict network traffic
- Dynamic ARP Inspection
- IP Source Guard
- The ability to create access lists that are activated at certain time intervals
- Per port enabling / disabling of unknown unicast / multicast flooding
- Unicast MAC filtering
- Support for routing protocols: OSPF, BGPv4, RIP and IS-ISv4
- Wireless QoS
- The ability for the switch to terminate the CAPWAP protocol from the wireless access point according to IETF RFC 5415, i.e. to control and manage wireless access points
- DHCP Snooping
- IP SLA
- A manufacturer's warranty of minimum 3 years
- Service support that supports next business day replacement and direct access to technical support (TAC) of equipment manufacturers for a year

Payment made per piece.

3.3.2.7.24 Layer 3 switch with 24 ports

Supply, installation, connection and commissioning of Layer 3 switch with 24 ports with the following characteristics:

- Stackable
- With a minimum of 24 SFP + slots
- 715W AC power supply
- With a minimum of one slot for adding a network module

Performance:

- Switching capacity minimum 640 Gb / s
- Stacking bandwidth minimum of 480 Gb / s

- Minimum 32 000 MAC addresses
- A minimum of 24,000 IPv4 routes
- Minimum 4 GB DRAM memory
- Minimum 4 GB flash memory
- The forwarding speed of the packet is minimum 454.55 Mpps
- Jumbo frame minimum 9198 bytes
- Mean time between failures (MTBF): 307,990
- Incorporated module with 4 SFP + slots
- Includes 24 SFP + modules for multimode optics
- Includes cables for stacking of minimum length of 1m

Supported features:

- Automatic configuration of the network port depending on the connected device
- Automatic configuration of QoS parameters depending on detected network traffic
- The ability of the automatic configuration of switch when connecting to the network
- The ability to automatically update the software when connecting to the network
- Control Plane Policing
- IEEE 802.3az Energy Efficient Ethernet
- The possibility that a switch does not hand PoE over a specific port at defined time intervals
- IGMP v1, v2
- IGMP Snooping
- Full insight into wireline and wireless traffic information, to enable insight from where the traffic flows, what is the type of traffic, when it is realized and display of network traffic in real-time. It is necessary to have an insight into the entire traffic that goes through the switch
- Identification of wired and wireless users that generate the highest network traffic and application of the policy to restrict network traffic
- Dynamic ARP Inspection
- IP Source Guard
- Support for Advanced Routing Protocols Advanced IP Unicast Routing Protocols (Open Shortest Path First (OSPF), EIGRP, Border Gateway Protocol Version 4 (BGPv4)
- Support for Protocol-Independent Multicast (PIM) for IP multicast routing
- The ability to create access lists that are activated at certain time intervals
- Per port enabling / disabling of unknown unicast / multicast flooding
- Unicast MAC filtering
- Support for routing protocols: OSPF, BGPv4, RIP and IS-ISv4
- Wireless QoS
- The ability for the switch to terminate the CAPWAP protocol from the wireless access point according to IETF RFC 5415, i.e. to control and manage wireless access points
- DHCP Snooping
- IP SLA
- A manufacturer's warranty of minimum 3 years
- Service support that supports next business day replacement and direct access to technical support (TAC) of equipment manufacturers for a year

Payment made per piece.

3.3.2.7.25 Fibre optic cable with 8 fibres

Procurement, supply and installation of Fibre optic cable with the following characteristics:

- Standard OM3 50/125 µm,
- With LSOH coating
- For outdoor/indoor mounting
- With glass aramid fibre for rodent protection

- Compliant with standards: IEC 60794, IEC 60332-1, IEC 60332-3-24, IEC 61034-2, IEC 60754-1 and IEC 60754-2, RoHS
- With 8 fibres

Payment made per m'.

3.3.2.7.26 Fibre optic patch panel with 24xMM 50/125 μ m OM3 LC adapters

Procurement, supply and installation of Fibre optic Patch panel with the following characteristics:

- With telescopic shelf
- Depth max 200mm
- IP20 index according to EN30529.
- Fitted with 24x MM 50/125 μ m OM3 LC adapters with ceramic sleeve
- Adapter according to standards IEC 61754-20, TIA 604-10-A
- Moulded trademark on the body of adapter
- Fitted with 24 LC pigtails, OM3 MM 50/125 μ m
- Fully equipped with splice cassettes, thermo retracting protectors, and other necessary equipment

Payment made per piece.

3.3.2.7.27 Fibre optic patch panel with 8xMM 50/125 μ m OM3 LC adapters

Procurement, supply and installation of Fibre optic Patch panel with the following characteristics:

- With telescopic shelf
- Depth max 200mm
- IP20 index according to EN30529.
- Fitted with 8x MM 50/125 μ m OM3 LC adapters with ceramic sleeve
- Adapter according to standards IEC 61754-20, TIA 604-10-A
- Moulded trademark on the body of adapter
- Fitted with 8 LC pigtails, OM3 MM 50/125 μ m
- Fully equipped with splice cassettes, thermo retracting protectors, and other necessary equipment

Payment made per piece.

3.3.2.7.28 Fibre optic patch cable 2x50/125 μ m OM3 2m length

Procurement, supply and installation of Fibre optic Patch cable with the following characteristics:

- LC-LC duplex
- 2x50/125 μ m OM3
- LSOH protection cover
- 2m length

Payment made per piece.

3.3.2.7.29 SFP optical module

Supply, installation, connection of SFP Optical module 1000BASE-SX with following characteristics:

- Plug & Play, hot swappable
- 1000BASE-SX, 850nm, for multimode fibre
- LC connector
- Full-duplex connectivity

Payment made per piece.

3.3.2.7.30 Installation of software appliance on an industry standard server or a virtual machine for Cloud-based application

Installation of software appliance on an industry standard server or a virtual machine for Cloud-based application with the following characteristics:

- Flexible data forwarding
- Wireless IPS
- Enterprise class security
- Guest access (Captive portal)
- Seamless mobility
- Resilience
- Wireless controller grouping
- Graphic network visualization
- AP Plug and Play: Device detection, Layer 3/IP discovery, Layer 2/VLAN discovery, Authentication, Configuration
- Data rate setting (automatic/manual)
- RF management and control: Planning (automatic/manual), Continuous, adaptive monitoring, Interference mitigation (automatic/manual), Dynamic channel assignment, Transmission power control
- Layer 2/Layer 3 seamless mobility
- Fast roaming; Dynamic key caching/forwarding
- Data forwarding (WLAN/SSID basis): Centralized and Distributed
- RF scanning, Rogue AP detection, Rogue client detection, DoS protection/mitigation
- AP profiles up to 64
- WLAN/SSID profiles up to 255
- Captive portal up to 10
- Graphical interface (HTTP, HTTPS)
- Peer grouping (controller cluster)
- Graphical visualization
- Licenses included for at least 20 APs
- One-year service support contract included which allows a higher level of support than the standard warranty, including technical support 12x5 (via e-mail, phone or web) and unlimited firmware update and upgrade

Payment made per piece.

3.3.2.7.31 Wireless Access point

Supply, installation and connection of Wireless Access point with the following characteristics:

- Power supply 802.3at PoE +
- Minimum 2x100 / 1000BASE-T autosensing (RJ-45)
- Management Console Port (RJ-45)
- USB 2.0 port
- System memory: 1024 MB DRAM and 256 MB flash
- Possibility of mounting on the lower ceiling
- Necessary support for 802.11ac Wave 1: 4x4 MIMO with three separate strips, Maximal Ratio Combining (MRC), 802.11ac beamforming, Channels widths 20, 40 and 80 MHz, Data rate up to 1.3Gbps, 802.11 Dynamic frequency selection, Two types Frame aggregation: A-MPDU (Tx / Rx), A-MSDU (Tx / Rx)
- Necessary support for 802.11ac Wave 2: 4x4 MU-MIMO with three separate strips, Maximal Ratio Combining (MRC), 802.11ac beamforming, Channel widths 20, 40, 80 and 160 MHz, Data rate up to 5.2 Gbps, 802.11 dynamic selection frequency, Two types of frame aggregation: A-MPDU (Tx / Rx), A-MSDU (Tx / Rx)

- Possibility of detecting interference in an access point environment. If the interference is sufficiently strong, the system automatically changes the channel on which the wireless network operates at a particular access point
- Using multiple transmit antennas to increase the focus of the transmission in the direction of the client, in order to increase the SNR parameter value or the transmission speed
- Optimized roaming clients
- Support for Dual 5-GHz radio
- Auto Link Aggregation Support (LAG)
- Integrated omnidirectional antennas with minimum 4dBi and 2.4 and 5GHz bandwidth
- Security:
 - 802.11i, Wi-Fi Protected Access 2 (WPA2), WPA
 - 802.1X
- Advanced Encryption Standards (AES)
- Support for Wi-Fi Multimedia (WMM)

Payment made per piece.

3.3.2.7.32 Firewall device

Supply, installation, connection and commissioning of Router/Firewall device with the following characteristics:

- Routing performance is minimum 100Mb / s, with the possibility of expanding up to 300 Mbps (through additional licenses)
- Minimum one slot for installation of the service module
- Minimum of three integrated 10/100 / 1000T ports
- Minimum 1 SFP slot for adding 1Gb / s modules
- Minimum 1 shared RJ-45 / SFP port
- Minimum one slot on the board for the DSP module with the included 32-channel module (filled in)
- Minimum 4GB DRAM memory
- Minimum 4GB flash memory

Supported Characteristics and Protocols:

- Built-in cryptographic acceleration of IPSec traffic with a minimum bandwidth of 85 Mbps for ip Sec traffic
- Support for Dynamic Multipoint VPN (DMVPN)
- Support for OSPF protocol
- IP Service Level Agreements (IP SLAs)
- Advanced QoS functionality
- Support for AAA (Authentication, Authorization, Accounting)
- Support for ACL and Zone Based Firewall
- Possibility of administration through Telnet, SSHv2, web or SNMP
- Support for SNMPv3
- Possibility of integration with the call processing system using SIP, H.323 or MGCP protocol
- Integration with another independent VoIP system based on SIP protocol. It is necessary to calculate licenses for a minimum of 20 simultaneous calls via SIP trunk with the possibility of expanding up to 400 SIP channels
- Support for Voice SML
- Support for voice codecs: G.711, G.722, G.729, G.726, G.728 and G.729
- Support for introducing Voice service on the device: conferencing, transcoding, MTP (Media Termination Point)
- A manufacturer's warranty of minimum 3 years

- Service support that supports next business day replacement and direct access to technical support (TAC) of equipment manufacturers for a year

Payment made per piece.

3.3.2.7.33 16 port console server

Supply, installation, connection of feature-rich 16 Port Console Server that simplifies out-of-band management for your network, server and power infrastructure in data centres with 16 serial Cisco Straight pinout, dual power Delivery, 2Gbe Ethernet, 4GB flash

Payment made per piece.

3.3.2.7.34 Resilience gateway

Supply, installation, connection of Resilience Gateway which ensures uptime with Cellular access provides an always-on gateway to your off-site network devices, even when the primary network is down. Equipped with 8 serial Cisco Straight pinouts, external power, 2 GbE Ethernet, 4G LTE cellular, dual SIM, 2 DIO and 2 output ports

Payment made per piece/complete set.

3.3.2.7.35 System for Rack monitoring

Supply, installation, connection of System for Rack monitor with support up to 4 external camera pods, 12 sensor pods and up to 78 Universal Sensors. Delivered with 2x Temperature and Humidity Sensors and 2x Leak Rope Sensor

Payment made per piece/complete set.

3.3.2.7.36 Network penta-scanning, categorization and issuance of the relevant minutes

Payment made per piece/complete set.

3.3.2.8 Multimedia system

3.3.2.8.1 S/FTP installation cable Cat6a

Procurement, supply and installation of S/FTP installation cable Cat6a with the following characteristics:

- Cable is S/FTP, with LSOH sleeve
- Cable is Cat6a, performance up to 600MHz
- Fire resistance according to IEC 60332-1 standard
- Cable must fulfil all requirements according to ISO/IEC 11801 standard
- Characteristic impedance of the cable 100Ω
- Usage temperature: – 20 to + 60°C
- In compliance with the standards: EN 50173, EN 52288 i IEC 61156-5

Payment made per m'.

3.3.2.8.2 Halogen free speaker cable

Procurement, supply and installation of halogen free speaker cable

Payment made per m'.

3.3.2.8.3 Microphone cable

Procurement, supply and installation of halogen free microphone cable

Payment made per m'.

3.3.2.8.4 Set of interconnect cables and connectors for the equipment

Procurement, supply and installation of Set of interconnect cables and connectors for the equipment

Payment made per piece/complete set.

3.3.2.9 System for distribution of radio and TV signal

3.3.2.9.1 Marking of cable routes

Marking of cable routes

Payment made per m'.

3.3.2.9.2 Excavation and backfilling of a trench in Class 3 soil

Excavation and backfilling of a trench size 0.4x0.8m in Class 3 soil, for placing of plastic protective tubes and coaxial cable.

Payment made per m'.

3.3.2.9.3 PVC protective pipes 110mm

Procurement, supply and installation of PVC protective pipes 110mm for leading-in a coaxial cable into the building. The pipes shall be placed from the lead-in shaft to the nearest PCT tray and there from to RO-KDS

Payment made per m'.

3.3.2.9.4 Plastic warning tapes

Supply and mounting of placing of plastic tapes warning of the presence of buried cables in the ground

Payment made per m'.

3.3.2.9.5 Prefabricated concrete shaft 80x80x100cm

Procurement, supply and installation of prefabricated concrete shaft with the dimensions of 80x80x100cm (Length x Width x Height), including a metal cover, protective pipes for leading-in of cables and any sundry auxiliary material. The full set including excavation of a hole with the dimensions of 90x90x110cm for placing of the shaft, placing of sand bedding with thickness of 10cm and backfilling with sand after the placing

Payment made per piece.

3.3.2.9.6 Geodetic surveying document

Development of a geodetic surveying document on the surveyed route of cablings placed. The item shall be calculated per linear meter

Payment made per m' of cable.

3.3.2.9.7 Polyester distribution cabinet

Procurement, supply and installation of Polyester distribution cabinet of RO-KDS cable distribution system with the dimensions of 50x50x20mm, including the following equipment:

- Distributor, 1 input, 8 outputs – 1 piece
- F Connectors – 8 pieces
- Final 75 ohm resistor– 1 piece
- Single-phase socket outlet for wall-mounting, including protective contact and protective cover - 1 piece

Payment made per piece.

3.3.2.9.8 Polyester installation distribution cabinet

Procurement, supply and installation of polyester installation distribution cabinet of IRO-KDS cable distribution system, dimensions 20x20x20mm, including the following items:

- Distributor, 1 input 6 outputs, 1 piece
- F Connectors - 6 pieces
- Final 75 ohm resistor- 1 piece

Payment made per piece.

3.3.2.9.9 IRO-KDS cable distribution system

Procurement, supply and installation of polyester installation distribution cabinet of IRO-KDS cable distribution system, dimensions 20x20x20mm, including the following items:

- Distributor, 1 input 4 outputs- 1 piece
- F Connectors - 4 pieces
- Final 75 ohm resistor- 1 piece

Payment made per piece.

3.3.2.9.10 Fabrication of antenna connection points

Procurement, supply and installation of the material for fabrication of antenna connection points, including placing of coaxial cables, partly above the suspended ceiling in PCT light current ducts and on the walls with clips in halogen-free protective pipes, and partly under mortar of the suspended ceiling, in sandwich partition walls, in halogen-free protective pipes and partly along walls in halogen-free plastic conduits

3.3.2.9.10.1 Final antenna socket outlet for wall-mounting

Payment made per piece.

3.3.2.9.10.2 Final antenna socket outlet for mounting in 4M modular set

Payment made per piece.

3.3.2.9.10.3 Halogen-free coaxial cable RG 6

Payment made per m'.

3.3.2.9.10.4 Halogen-free ribbed hose f 20mm

Payment made per m'.

3.3.2.9.11 Testing of RTV installations

Testing of RTV installations and delivery of the test certificate issued by a certified company.

Payment made per piece/complete set.

3.3.2.10 Access control system

3.3.2.10.1 Modular controller for access control

Procurement, supply, installation and connection of intelligent modular controller for access control with following characteristics:

- Connection up to 4 card readers over Wiegand interface for communication
- Card Reader power direct from controller
- 8 analogy inputs can be used as digital or analogy contacts
- 8 relay outputs which can operate with potential free contacts for external power supply (dry mode) or using internal voltage of power supply (wet mode) (maximum 30 VDC and 1,25 A)
- Ethernet 10/100BaseT RJ45 and RS485 port for connection with server
- Local buffer memory compact flash card min 2 GB

- Able to carry out independent authorization checks on access points, take access decisions, control closing/opening elements and register movement events in offline mode-) Tamper switch
- LCD Display for information
- Support additional module for extend up to total 8 card readers
- Support for additional modules for extend up to 16 alarm input and 16 relay outputs
- Working temperature from 0°C to +50°C
- Set includes housing with 2 DIN rails
- Set includes power supply of 60W with surge protection and integrated device for battery charging with LED status indicators, temperature sensor
- With two 12V/7Ah battery

Payment made per piece.

3.3.2.10.2 Controller expansion module for controlling 4 additional card readers

Procurement, supply, installation and connection of controller expansion module for controlling 4 additional card readers with following characteristics:

- Connection up additional to 4 card readers over Wiegand interface for communication
- Card Reader powers direct from controller expansion module
- Additional 8 analogy inputs can be used as digital or analogy contacts
- Additional 8 relay outputs which can operate with potential free contacts for external power supply (dry mode) or using internal voltage of power supply (wet mode) (maximum 30 VDC and 1,25 A)
- RS485 commination with controller
- Able to carry out independent authorization checks on access points, take access decisions, control closing/opening elements and register movement events in offline mode
- Tamper switch
- Working temperature from 0°C to +45°C
- DIN rail mounting in adequate housing
- Set includes power supply of 60W with surge protection and integrated device for battery charging with LED status indicators, temperature sensor.

Payment made per piece.

3.3.2.10.3 Contactless access control reader

Procurement, supply, installation and connection of contactless access control reader with following characteristics:

- For I Class, Mifare and Mifare Desfire EV1 cards
- Working frequency of 13,56 MHz
- Reading range from 5 to 7,6cm
- Supports 32-bit format in compliance with ISO standard 14443A
- Multicolour LED status indicator
- Buzzer
- Connection with controller via wiegand interface
- IP 55 protection level
- Working temperature from -35°C to 65°C
- Black colour, for wall mounting

Payment made per piece.

3.3.2.10.4 Fail safe electric bolt lock for single-leaf doors

Procurement, supply, installation and connection of the fail-safe electric bolt lock. Holding force: 3750N, including all necessary sundry auxiliary material for mounting on single-leaf doors.

Payment made per piece

3.3.2.10.5 Fail safe electric bolt lock for double door

Procurement, supply, installation and connection of the fail-safe electric bolt lock. Holding force: 3750N, including all necessary sundry auxiliary material for mounting on double door.

Payment made per piece.

3.3.2.10.6 Push button for door opening

Procurement, supply, installation and connection of Push button for door opening with the key symbol made of plastic material.

Payment made per piece.

3.3.2.10.7 Digital contactless card

Procurement and supply of digital contactless card with following characteristics:

- I Class chip
- Frequency 13,56 MHz,
- Size of the standard credit card
- 2KB of data storage,
- Integrated antenna
- 50 pieces package.

Payment made per piece/complete set.

3.3.2.10.8 Cable J-H(St)H 2x2x0.8mm

Procurement, supply and installation of cable J-H(St)H 2x2x0.8mm

Payment made per m'.

3.3.2.10.9 Cable J-H(St)H 5x2x0.8mm

Procurement, supply and installation of J-H(St)H 5x2x0.8mm cable

Payment made per m'.

3.3.2.10.10 Cable S/FTP cat.6a

Procurement, supply and installation of cable S/FTP cat.6a

Payment made per m'.

3.3.2.10.11 Cable N2XH 3x1.5mm²

Procurement, supply and installation of cable N2XH 3x1.5mm²

Payment made per m'.

3.3.2.10.12 Halogen-free ribbed hose

Procurement, supply and installation of halogen-free ribbed hose dimensions:

3.3.2.10.12.1 Ø32mm

Payment made per m'.

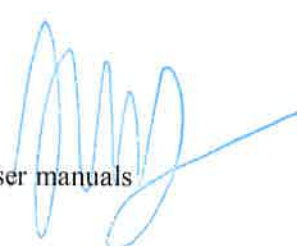
3.3.2.10.12.2 Ø24mm

Payment made per m'.

3.3.2.10.13 Programming and commissioning of the entire system

Programming and commissioning of the entire system, training of users and supply of user manuals

Payment made as a lump sum.



3.3.3 AUTOMATIC FIRE DETECTION & ALARM SYSTEM

Fire detection and alarm system should provide early fire detection within the building and to adequately warn (audibly/visually) everybody who is present at that moment in the building.

The building shall be equipped with following fixed fire detection system elements

- point detectors (optical and thermal)
- manually actuated initiating devices (call-points)
- fire sirens

System is intended to have characteristics of analogue addressable fire alarm system, which enables precise identification of actuated alarm and rapid detection and determination of the alarm character with the aim of adequate application of procedures regarding localization and neutralization of the accident.

All the equipment necessary for constant supervision and permanent record of conditions and parameters of the fire panel and system elements shall be installed.

Type and kind of fire detectors shall be compliant with expected fire sizes, installation places and external influences of the surrounding they are installed into.

Number and especially arrangement of the fire detectors shall be compliant with technical norms and standards, paying attention to the process arrangement and room heights, as well as easier maintenance during the exploitation period.

Depending on the impact and importance of other systems, and with the aim of rapid localization and neutralization of fire, it is possible to create some sort of connection of the fire detection system with the adequate power supply, ventilation, alarm and evacuation systems.

System installation shall be carried out with cables which are in its type and size fit in the designate installation place, and special attention shall be paid to the routes along the evacuation direction in the sense of preventing the smoke appearance in the space and enabling the proper insulation within the set time frame of the device operation during the fire.

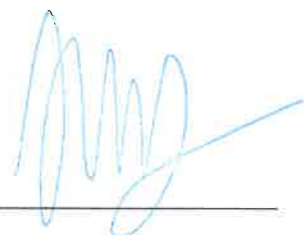
Fixed fire detections system shall be installed in the entire building, except in the rooms where technical supervision measures are not binding (toilets), according to the technical norms and standards.

Automatic detection and signalization system includes a central device – fire panel with control panel, automatically and manually actuated fire alarm initiating devices (call-points), alarm sirens and cable installations. System may as well include the computer for displaying graphic layouts in real time and a printer for recording the panel condition and printing of reports.

The system is able to detect the fire outburst at its earliest phase, to notify the people present in the building due to the evacuation, to initiate activates regarding the prevention of spreading, and fire extinguishing and to provide alarming outside the building (fire brigade or responsible entitles) with the aim of extinguishing the large scale fire.

Planned system of automatic fire detection and signalization shall be carried out as analogue addressable system. Addressable detector system provides continuous control of detecting and supervision modules and transmission of statuses between central and communication units.

Each of the components in the loop has its own address thus achieving precise display and determination of the alarm place at the central device. Short circuit and detection lien disconnection are shown as a mistake but in that case the system still remains functional owing to the closed loop, except the element which suffered the failure.



3.3.3.1 Fire detection & alarm system

3.3.3.1.1 Fire detection

3.3.3.1.1.1 Fire detection panel

Procurement, supply, installation and connecting of microprocessor controlled central unit with 4 loops.

- A maximum of 32 loops
- Maximum up to 4096 detection points
- A maximum of 254 devices per loop lengths of up to 3000m
- Up to 46 hot-plug internal modules
- Programming CBE (Control By Event) equation to activate output
- Adjust the sensitivity manually and automatically (mode day / night)
- Control systems, automatic test detectors, automatically detect the type of detector
- Programming using the keypad and LCD screen 320x240pix colour touch screen, or via upload / download programs
- The ability to connect in a ring network to 32 stations via RS485, Ethernet and optics
- RS232 and USB connector for Up / Download; RS485 output for up to 15 separate signalling and control panels, Ethernet output card OPC protocol
- Approved the total number of control panels: 32 in the network with up to 40,000 points detection
- Module for LED status indication zone
- Up to eight power supply modules
- Modules with alarm inputs, relay outputs
- Modules for control of conventional zone detectors and sirens
- Certified by EN54 and CPD and VdS norms
- The possibility of installing up to 2 rechargeable batteries to 27Ah. for more specific battery casing
- Log up to 1000 events, 10 levels of users, the choice of 18 languages
- Verification of alarms in the two levels of delay, the schedule for day and night mode
- Possible redundancy: panels, loops and power
- Available to the housings 6, 10 and 12 of the module.

Payment made per piece.

3.3.3.1.1.2 LCD 320x240pix colour touch screen panel

Procurement, delivery and assembly of a LCD indicator panel for remote presentation of the fire alarm system status, the LCD display with 2x20 characters, a built-in buzzer, memory for up to 200 events, scroll keys for presentation of a number of messages, connection via RS485 bus

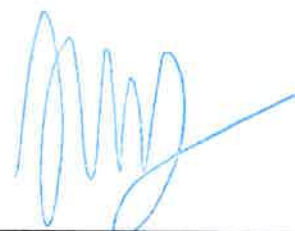
Payment made per piece.

3.3.3.1.1.3 Addressable Optical Smoke detector

Procurement, supply, installation and connection of Addressable Optical Smoke detector with the following characteristics:

- Intelligent electronics;
- The detection of smoke in the early stage using the double smoke detector;
- Properties of the detector adaptable to the conditions in the room;
- Retaining the function of the detection loop in the event of an interruption or short-circuit of the cable with the help of two integrated insulators;
- Remote diagnosis;
- Allows the air velocity: min. 20 m / s;
- Operating temperature: -20° C to +65° C.

Payment made per piece.



3.3.3.1.1.4 Addressable Optical/Heat Detector

Procurement, supply, installation and connection of Addressable Optical/Thermal Detector with the following characteristics:

- Intelligent electronics;
- Characteristics of the detector adaptable to the conditions in the room;
- Retention of the detection function of the loop in the event of an interruption or short-circuit of the cable with the help of two integrated insulators;
- A remote diagnosis;
- A programmable maximum release temperature A2S / A2R / BS / BR in accordance with the EN 54-5
- Allows the air velocity: min. 20 m / s;
- Operating temperature: -20° C to +50° C.

Payment made per piece.

3.3.3.1.1.5 Universal base for the addressable fire detectors

Procurement, supply, installation and connection of universal base for the addressable fire detectors (optical, thermal, multi sensor), suitable for the cables mounted on and in the wall; made of white ABS plastic; protection against dismantling; adapted for wire cross-sectional area to 2.5 mm².

Payment made per piece.

3.3.3.1.1.6 Plastic plates for marking the detectors

Procurement, supply, installation and connection of plastic plates for marking the detectors.

Payment made per piece.

3.3.3.1.1.7 Parallel indicator

Procurement, supply, installation and connection of the parallel indicator with the following characteristics:

- Parallel indicator lamp for detectors in false ceiling, double floor or channels
- 360° visibility
- The degree of protection IP40 according to EN60529 = IP40
- Operating temperature: -20° C to +65° C.

Payment made per piece.

3.3.3.1.1.8 Manual addressable fire call point

Procurement, supply, installation and connection of Addressable Manual Call Point with the following characteristics:

- Resettable Single Stroke Manual Call
- Wall mounting
- Red colour
- An indication of the alarm status change of the colour of the window and across the LED
- To reset the detector via test key
- The degree of protection IP54 according to EN60529 = IP54
- Operating temperature: -25° C to +70° C.

Payment made per piece.

3.3.3.1.1.9 Fire module for ventilation ducts

Procurement, supply, installation and connection a module for ventilation ducts, adapted to the ducts 0.6 to 2.8m wide, integrated presentation of air flow in the ventilation ducts, simple maintenance and testing on the module front side, IP54 protection class, with the base for an addressable fire detector; the detector using the latest multi-sensor principle shall be installed in the module (in the optical chamber, instead of the red lamp, there shall be BLUE LED lamp) whereby detection of smouldering, open flame fires and rapidly developing fires (rapid temperature increase) shall be achieved with increased sensitivity; it shall contain an isolator which shall, in case of open connection or a short circuit in the loop, ensure unobstructed operation of the system.

Payment made per piece.

3.3.3.1.1.10 Addressable Input/Output module

Procurement, delivery and assembly of an addressable U/I module with one supervised input and one programmable relay output. It shall contain a loop isolator.

Payment made per piece.

3.3.3.1.1.11 Door holder

Procurement, delivery and assembly of a floor mounted door holder, with the option of installation of a release button, of a capacity of holding weights of up to 180kg.

Payment made per piece.

3.3.3.1.1.12 Power supply module 220V/24V, 3A

Procurement, delivery and assembly of A power supply module of 220V/24V, 3A, in a metal housing, with two batteries of 12V 26Ah.

Payment made per piece.

3.3.3.1.1.13 Alarm sirens 112 dB

Procurement, supply, installation and connection of a conventional alarm horn strobe with the following characteristics:

- The alarm siren, the sound intensity of 112 dB / 1m
- Certified tones according to EN 54-3
- With 32 predefined tone
- With the equipment to be mounted on the wall / ceiling
- Possible external or internal mounting
- IP protection IP65 minimum
- Integrated LED
- Operating temperature -25° C to + 70° C.

Payment made per piece.

3.3.3.1.2 Cables and installation

3.3.3.1.2.1 Cable J-H(St)H 2x2x0.8mm

Procurement, delivery and mounting of cable J-H(St)H 2x2x0.8mm.

Payment made per m'.

3.3.3.1.2.2 Cable J-H(St)H 1x2x0.8mm

Procurement, delivery and mounting of cable J-H(St)H 1x2x0.8mm.

Payment made per m'.

3.3.3.1.2.3 Cable J-H(St)H FE180/E30 2x2x0.8mm

Procurement, delivery and mounting of cable J-H(St)H 2x2x0.8mm.

Payment made per m'.

3.3.3.1.2.4 Cable NHXHX 3x1.5mm²

Procurement, delivery and mounting of cable NHXHX 3x1.5mm² for connection of the fire alarm central control unit and the fire protection cabinet to the power supply source of 230VAC/50Hz, having adequate fire resistance characteristics, including procurement, delivery, and laying of the cable through a flexible hose of Ø16 mm, and its termination in the fire alarm central control unit/cabinet and on the fuse of the nearest distribution cabinet.

Payment made per m'.

3.3.3.1.2.5 Halogen-free ribbed hose

Delivery and laying of halogen-free ribbed hose dimensions Ø32/24mm, envisaged for wall-mounting or in suspended ceilings with clips

Payment made per m'.

3.3.3.1.2.6 Fire-resistant perforated cable tray

Delivery and laying of a fire resistant perforated cable tray (dim. W x H x L 100x50mmx2000mm) complete with ancillary equipment: manufactured steel supports of racks with steel rawl plugs, anchors and screws - threaded rods M10 etc., at every 1m, straps for fixing of conductors, covers, couplings, elbows (bends), etc.

Payment made per piece.

3.3.3.1.2.7 Fire-resistant clips

Delivery and laying of fire-resistant clips detached from the wall for conductors of the diameter of 5.20mm. Steel rawl plugs of Ø6-8mm and bolts for fixing in concrete

Payment made per piece.

3.3.3.1.2.8 Fire-resistant materials for protection of cables and racks

Fire-resistant materials (fire resistance of 180min) for protection of cables and racks at the transition from one to another fire zone, 1m each on both sides. Also, fire resistant materials shall be applied on the cable routes in long premises, specifically on 2 m each at every 15m of the cable route. Cable routes shall be layered by spraying or coating using a brush.

Payment made per kg.

3.3.3.1.2.9 Fire protection coating

Applying of protective coatings and issuance of the relevant certificate.

Payment made as a lump sum.

3.3.3.1.2.10 Software licence and installation

Delivery and installation licence for fire alarm system software.

Payment made per piece/complete set.

3.3.3.1.3 Commissioning

3.3.3.1.3.1 Programming of operational parameters

Programming of operational parameters for operation of the central control unit, entry of data on users.

Payment made as a lump sum.

3.3.3.1.3.2 Start-up of the system

Functional testing followed by issuing of the required certificate of functionality of the fire alarm system, preparing manuals and training for users.

Payment made as a lump sum.

3.3.4 APPLICABLE LAWS & TECHNICAL STANDARDS FOR ELECTRICAL PART

3.3.4.1 Legal Framework

If not specifically stipulated in the sessions above, the following framework laws shall be applicable to the works contract on the reconstruction and extension of Kraljevo District Courthouse shall be the Laws and Regulations applicable to the construction contracts in the Republic of Serbia, namely:

- Applicable Law on planning and construction,
- Applicable Law on fire protection,
- Rulebook on technical norms for electrical installations
- Other Laws and rulebooks applicable to this type of buildings.

3.3.4.2 Documentation To Be Maintained By the Works' Contractor

The Contractor shall keep/maintain the following documentation:

- Inspection book (forms laid down by the Law of the Republic of Serbia)
- Construction log (forms laid down by the Law of the Republic of Serbia)
- Measurement book (forms laid down by the Law of the Republic of Serbia)
- All necessary certificates (for material, equipment and other) during the works execution.

The works site manager shall keep the log and submits the measurement book sheets of the executed works along with each invoice. The construction manager has to enter into the construction log the following data:

- Number and qualification of workers executing the works
- Number and type of construction machinery used for works execution Weather conditions under which the works are executed Who shall and how to conduct marking of a route, buildings and give necessary data for construction of the same (elevations, type of material, installation manner, etc.)
- How the works are executed and if there is any deviation from the investment, technical documentation and Technical conditions in doing so.

3.3.4.3 Applicable Technical Standards/Norms

EU-Standards or harmonised National Standards in their latest Edition shall be used throughout this Contract, generally. Authoritative shall be all standards that are valid at the location of the Plant during the time of implementation.

If not otherwise specified in separate sessions above, the technical standards of this sub-session shall apply in the following priority order of prevalence:

- If there is no given standard for separate parts or elements of the mechanical works, or the standard given provides for lower/lighter technical requirements, the standard in this session shall prevail;
- If there is no national standard existing for an element/work/equipment/material, or the conditions it set forth are lower/lighter than those of the standards in this session, the latter shall prevail.

Where Serbian standards are more stringent than other applicable European standards then the Serbian standards shall prevail.

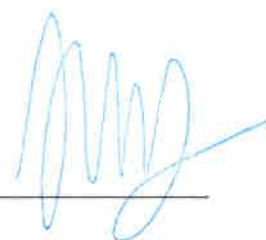
The regulations concerning the permitted level of noise emissions shall be applied.

Furthermore, the regulations of the Local Electricity Supply Company and the public guidelines, decrees and regulations for the protection of the environment shall be observed.

3.3.4.3.1 National technical standards

National Technical Standards applicable for all electrical works mentioned in this document shall consist of the following:

- LV installation:
 - SRPS EN 61140
 - SRPS HD 60346-1
 - SRPS-HD 60364-6
 - SRPS HD 193 S2
 - SRPS HD 308 S2
 - SRPS HD 60364-1
 - SRPS HD 60364-4-41
 - SRPS HD 60364-4-42
 - SRPS HD 60364-4-43
 - SRPS HD 60364-4-442
 - SRPS HD 60364-4-443
 - SRPS HD 60364-4-444
 - SRPS HD 384.4.482 S1
 - SRPS EN 60529:2011
 - SRPS HD 60364-5-51
 - SRPS HD 60364-5-51:2013/A11
 - SRPS HD 60364-5-52
 - SRPS HD 60364-5-557
 - SRPS HD 60364-5-559
 - SRPS HD 60364-7-701
 - SRPS HD 60364-7-718
 - SRPS HD 60364-7-729
 - SRPS EN 61439-1
 - SRPS EN 61439-3
 - SRPS EN 62305-1
 - SRPS EN 62305-4
 - SRPS EN 62305-3
 - SRPS EN 50164-1
 - SRPS EN 50164-2
 - SRPS EN 50164-4
 - SRPS.N.B4.803
 - SRPS.N.B4.810
 - SRPS EN 60439-3
 - SRPS EN 61534-1
 - SRPS EN 61534-21
 - SRPS EN 62080
- ICT installation:
 - SRPS EN 60950-1
 - SRPS EN 60950-1:2010/A11
 - SRPS EN 60950-1:2010/A12
 - SRPS EN 60950-23
 - SRPS EN 60288-2-2
 - SRPS EN 60288-3-1
 - SRPS EN 50290-2-1
 - SRPS EN 50290-2-2
 - SRPS EN 50441-1
 - SRPS EN 50441-2
 - SRPS EN 50441-3



- SRPS EN 60728-11
- SRPS EN 62080
- SRPS N.CO.101

3.3.4.3.2 International technical standards

International Technical Standard applicable for all electrical works mentioned in this document shall consist of the following:

- LV installation:
 - IEC 60896-21
 - IEC 60896-22i
- ICT installation:
 - ISO/IEC 11801
 - ISO/IEC 8877

3.3.5 ELECTRICAL TESTS UPON COMPLETION

If not clearly and specifically elaborated in the separate sessions above, this session shall set out the tests and test procedures that the Contractor shall run upon work completion. Those shall consist of the followings:

3.3.5.1 General Requirement

The Contractor shall carry out the tests stated in the current appropriate DIN/EN standards, and such performance tests as are considered necessary, either under test conditions in the manufacturer's works, on site, or elsewhere, in order to determine that the works fully comply with the requirements.

The Contractor shall provide a Testing Programme to check out the function of each part of his work.

Plant shall not be incorporated into the works or delivered until this acceptance has been received.

Within two weeks of completion of any witnessed tests, the Contractor shall obtain and submit to the test certificates and performance curves of all items, giving detailed records on all electrical and mechanical tests carried out on the equipment and material, both at the manufacturer's works, or on site, including lifting equipment, tanks, pressure containers, cables and cabling, etc.

Copies of certificates of all tests and all manufacturer tests of all items shall be submitted.

Copies of the test certificates of all major items shall be included in the operating and maintenance instructions as detailed elsewhere.

Measuring and testing must include following:

Electrical resistance of electrical installation insulation is measured between live conductors, taking two by two and between each live conductor and earth.

Electrical resistance of insulation is measured for each circuit without connected equipment and it should be at least 500k ohm for nominal voltages of circuits up to 500 V.

The measuring results should be shown in protocol on performed measurement, and appropriate attest should be issued based on it and entered in measurement log.

Measuring of parameters of earthing protection, transient resistance of earth wire, contact voltage and steps on the facilities in the building and metal masses outside the building which are galvanic connected to earth wire (discharge network, cable sheaths, etc.); preparation and delivery to the Client of three copies of the study and Test Certificate.

3.3.5.2 Test Equipment

Any equipment used in the testing of the plant shall comply with the appropriate safety regulations and requirements in all respects.

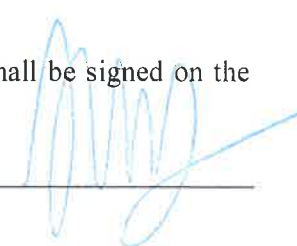
The manufacturer shall satisfy regarding the accuracy of all instruments used for tests and, if required, shall produce recent calibration test certificates, or otherwise have the instruments calibrated at his own expense by an independent authority.

KWh meters shall be checked for correct rotation and creep tests shall be carried out to ensure that the meter is inoperative with voltage alone if the secondary of the current transformer is left connected with the primary current interrupted.

3.3.5.3 Works Test

The Contractor shall give an advance written notice of his intention to carry out testing.

Test certificates shall be prepared by the Contractor in a form to be agreed upon, and shall be signed on the satisfactory completion of each test.



3.3.5.4 Works Inspection Tests and Guarantees

Full witnessed testing within the manufacturer's works to the relevant standards and to prove guarantees given will be required upon request, the Contractor shall supply the required type test certificates

In addition, all other items of equipment not subject to witnessed tests shall be temporarily erected at the manufacturer's works and tested for satisfactory operation and shall be offered for inspection. Copies of the manufacturer's test results shall be submitted.

Where items of equipment are of identical size and duty it may be required that a reduced number of the items may be subjected to witnessed tests. However, this shall not relieve the manufacturers of the requirement of carrying out the performance tests on all items prior to submitting them for witnessed testing.

Where type tests are required as specified, such tests shall be carried out according to manufacturer's specification and current technical regulations. The Contractor shall provide certificates showing that such tests have been carried out satisfactorily on apparatus similar to that to be supplied.

3.3.6 SAFETY AND SECURITY ON-SITE

If not specified in the above sessions, the following safety and security measures shall be regarded:

3.3.6.1 General Requirements

Contractor should submit the list of workers and the tools that they will use during their work.

3.3.6.2 Fire Fighting and Site Security

The Contractor shall provide and maintain adequate fire extinguishers on site and areas of high fire risk shall be fenced and signs posted and supplied with specialized fire extinguishers, if necessary.

The contractor shall be solely responsible for the employment of skilled and qualified machinery and equipment operators as well as the sufficient and proper maintenance of all machinery and equipment employed on the site. Generators, their batteries, water pumps and all other equipment and tools on site shall be adequately protected against theft and other damages including atmospheric agents.

The contractor shall be solely responsible for the adequate lighting where work is being executed at night and shall provide and install any additional lighting in order to watch and supervise the works and carry out any testing and examination of materials.

3.3.6.3 Health, Safety and Accidents on Site

The Contractor is also obliged to observe all the stipulated measures pertaining to fire protection, protection at work as well as hygienic and technical conditions such as Fire Protection Regulations, Rule Book on General Measures and Normative of Protection at work concerning building facilities intended for the work and other subsidiary premises. The Contractor shall ensure, so far as his reasonably is practicable and to the satisfaction of the Contracting Authority, the health, safety and welfare at work of his employees including those of his sub-Contractors and of all other persons on the site.

His responsibilities shall include: the provision and maintenance of equipment and systems of work must be safe and without risks to health; the execution of suitable arrangements for ensuring safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances; the provision of protective clothing and equipment, first aid stations with such personnel and equipment as are necessary and such information, instruction, training and supervision as are necessary to ensure the health and safety at work of all persons employed on the Works all in accordance with Laws and all local By- Laws.

The Contractor shall designate as the Safety Officer one of his senior staff who shall have specific knowledge of safety regulations, and experience of safety precautions on similar works and who shall advise on all matters affecting the safety of workman and on measures to be taken to promote such safety.

3.3.6.4 Safety Equipment At Work

The Contractor shall ensure full compliance with national standards and regulations regarding to use of Safety Equipment at Work. In addition, the Contractor shall try his best to comply also with European Commission Directive 89/686/EEC on Personal Protective Equipment (PPE), whenever applicable, and the relevant EN standards (in particular EN 348:1992).

3.3.6.5 Dangers and Harms Which May Occur During Power Supply Process Through Electrical Installations During Installation and Use

Electric and technical installation materials, as well as all the other electrical devices, plants, machines and work protection tools, conform to the valid regulations, standards and generally known rules of protection during work.

The selection and installation of the electric equipment and installations have been completed in accordance with the previously performed classification of areas and rooms in relation to the external influences (in all in accordance with SRPS standards HD 60364-5-51, N.B2.730, HD 60364-5-52).

Protection against electric shock (excessive voltage contact) is achieved through the implementation of measures for protection against direct contact and measures for protection against indirect contact. Direct contact of live parts is prevented by placing of insulation over such parts, by protective partitions and housings or by placing of live elements out of reach. The insulation laid over live elements may be removed only by destruction. Protective housings and partitions may be removed with tools, whereas the space which is out of reach is limited to 2.5m. Protection against indirect contact is achieved through automatic turning off of power in case of malfunction with the aim to prevent the maintenance of the contact voltage during a period which is long enough to be dangerous. Protection against electric shock is achieved through the implementation of TN-C/S system whose efficiency is proven by means of a calculation given in the basic documents for the low voltage el. Installations.

Voltage and current loads which may occur in the form of permanent and temporary occurrences are ensured through an adequate selection of electric equipment and devices whose characteristics permit the magnitude of such strains, as well as through the installation of protective elements of the electric circuit (fuses, etc.) which cause automatic shutdown of electric energy.

Protection against short circuit currents is also achieved by adequate selection of electric equipment and installations and therefore there is no possibility for dynamic and thermal destruction because such effects are prevented by shutting down of el. power.

Short circuits in the detection zones are signalled by lights on the fire alarm control unit as a disturbance.

Impermissible voltage drops is prevented by selecting the supply cables according to the adequate calculation given in the basic documents for low voltage electrical installations.

Power cuts results in the turning on of the backup power source (accumulator battery installed in the fire alarm control unit which supplies the system for at least 72 hours during idle period and additional 30 minutes under alarm).

The effects of moisture, water and dust is resolved through the classification of spaces and rooms in accordance with these effects and through the selection of electric equipment which corresponds to such operating conditions.

The influence of mechanical, chemical and thermal effects is solved through the use of adequate el. equipment and installations resistant to such effects. Such effects within the facility are minimal.

Insufficient illumination is avoided through adequate choice and distribution of luminaries within the existing space.

Protection against lightning is achieved through lightning protection installations.

Equipotential bonding of the metal masses is achieved within the facility through the main busbar for equipotential bonding.

Static electricity is eliminated through grounding of all metal parts to the earthing line of the facility.

Installed elements are not radioactive (foreseen optic thermal smoke detectors).

Fire danger is reduced to minimum through defining of the sources, capacities, locations, positions and effects of the installations in the functional sense, as well as through the use of mobile protective systems at the level of the entire facility. Surveillance and attendance is ensured 24/7.

During normal use of the installations, explosive atmosphere should not exist.

There are no conditions of pollution of space with harmful agents which may cause undesired events when combined with el. Installations.

The influence of pollution of the work environment to the undesired effect of el. installations is prevented by installing of such equipment which reduces such effects to the minimum, by separating the equipment into

separate rooms, as well as by ensuring permanent maintenance and cleaning of the endangered parts of the equipment.

The equipment planned for installation does not produce a level of noise which has to be limited or eliminated.

3.3.6.6 Measures of Protection Implemented Through Design of Electrical Installations

Protection against accidental contact between live parts

The above specified risk exists in the rooms where electric installations are designed. Such dangers are neutralized in terms of item 3 of the electric shock in the safety requirements for the low voltage electric installations in accordance with the Rulebook no 93/27 from the year 1989 and Official Gazette of SFRY no. 12/89.

Protection against excessive contact voltage

The described risk exists in all the rooms and is neutralized with the implementation of the protection system TN-C/S and with the adequate selection of protective components (fuses).

Protection against thermal stress

The above mentioned risk is neutralized by selecting the cross-sections so that the permanently allowed currents are determined in accordance with SRPS HD 60364-4-43 and that the conductor and cable heating temperature does not exceed the maximally permitted value of 70 °C as defined by SRPS HD 60364-4-42.

Protection against electrical stress of the conductor

The protection against electric stress of the conductor is achieved through adequate selection of the type of conductor and cable in terms of service voltage.

Protection against mechanical stress of the conductor

Protection against mechanical stress of the conductor is eliminated through the adequate selection of the cross-section of the conductor. The smallest cross-section of the conductor is 1.5mm.

Protection against short circuit

The Protection against excessive current (overcurrent) is neutralized by the adequate selection of the cross-section of the conductor and protection devices (fuses, etc.). In the input at the low voltage side, the terminals are protected with high-efficiency fuses, in accordance with the safety requirements for protection against excessive currents SRPS HD 60364-4-43 item 5. Each short circuit has to be terminated on each element of the circuit in time which brings the conductors to the permitted limit temperature.

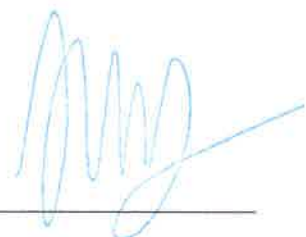
Risk of overload

Protection against overload in the installations is achieved through the use of protective automatic switches with adequate bimetal snap switch for drives and D and N safety fuses for the lines. The degree of bimetal snap switches and safety fuses corresponds to the degree of the nominal load of the conductor, as well as to the single load on the installations. The selection of protection is made in accordance with SRPS HD 60364-4-43. The efficiency of the overload protection is achieved if the following condition is met:

- $I_b < I_{n0} < I_z$
- $I_2 < 1,45 \times I_z$

where:

- I_b - designed current
- I_z - permanent allowed current of the conductor or cable
- I_{n0} - rated current of the protective device
- I_2 - current that ensures reliable operations of the safety device



Protection against fire

Protection against fire is ensured through the adequate selection of distribution cabinets and installation materials.

Through the adequate foreseen means of protection listed in the previous items which all individually form a part of the protection against fire, in this manner, the conditions foreseen by item 3 SRPS HD 60364-4-42 have been met.

Protection against stroboscopic effects

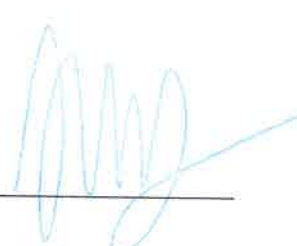
In order to neutralize the danger, the lamps for illumination with fluorescent tubes should be connected with dual-connections.

Protection against inadequate artificial illumination

Protection against inadequate artificial illumination is foreseen by the selection of the height of the illumination in accordance with SRPS U.C9.100 standard and technical recommendations JKO(DOS).

Protection against impermissible voltage drop

The design has checked the voltage drop and it is within the limits foreseen by the Technical regulations for electric installations.



VOLUME 3 – SECTION 4 – MECHANICAL ENGINEERING TECHNICAL SPECIFICATIONS

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