



ATELIER 4
ARCHITECTURE • ENGINEERING • CONSULTING



UNOPS



22644-001_ALB_EU4C_RFP_01 - "Provision of Consultancy for Design services for EU4CULTURE Project - Support for revitalization of cultural heritage sites and monuments affected by Earthquake in Albania."

22644-001_ALB_EU4C_RFP_01 - "Sigurimi i Konsulencës për Shërbimet e Projektimit për Projektin EU4CULTURE - Mbështetje për ringjalljen e vendeve të trashëgimisë kulturore dhe monumenteve të prekura nga Tërmeti në Shqipëri."

TECHNICAL ELECTRICAL SPECIFICATIONS

Project title:

HAMMAM OF DURRËS



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1. GENERAL TOPICS

1.1. SUBJECT OF THE CONTRACT

The subject of these Specifications is the execution of the electric and special equipments for the Hammam of Durres

These interventions are split into the two following functional groups of works:

1.2. REFERENCE TO DIRECTIVES AND LAWS

The systems must be carried out according to the latest directives and laws related. In particular:

- Directives 89/39 1/CEE, 89/654/CEE, 89/655/CEE, 89/656/CEE, 90/269/CEE, 90/394/CEE, 90/679/CEE, 92/58/CEE, 93/68/CEE
- CEI Standard in force at the date of the beginning of the installation works, that is:
- CEI 11- 1 Standard – Electric Systems with alternating current voltage higher than 1kV.
- CEI 13-10 Standard - File 483 – Electric measurement instruments and recorders with corresponding accessories.
- CEI 17-1 Standard - Number 1375 – Alternating current switches with voltage larger than 1000V.
- CEI 17-4 Standard - Number 1343 – Alternating current ground selectors with voltage larger than 1000V.
- CEI 17-6 Standard - Number 1126 – Prefabricated appliances with metallic covering for voltages ranging from 1 to 72.5 kV.
- CEI 17-9 Standard - Number 1974 – Operation switches, and operation selector switches for 1000V alternating currents and subsequent variants.
- CEI 17-12 e 17-14 Standard - Numbers 492 e 548 – Auxiliary control appliances for voltages not larger than 1000V.
- CEI 17. 13/1 Standard - Number 2463E – Grouped appliances of protection and operation for low voltage (LV boards) – Part 1 – Appliances subjected to AS tests and not-production appliances partially subjected to ANS tests.
- CEI 32-3/32-4 Standard - Numbers 1523-1082 – limitation fuses for currents with voltage larger than 1kV.
- CEI 38-1 e 38-2 Standard - Numbers 1008 e 1009 – Current transformers – Voltage transformers
- CEI 4 1- 1 Standard - Number 547 – Electric relays (with all, nothing of measurement) – General prescriptions.
- CEI 14-4 Standard Number 609 and subsequent variations on power transformers.
- CEI 11-35 - CT 11 Standards – Guidelines on the execution of the user's electric cabinets.
- CEI 20-22 Standard – Tests on not fire-spreading cables.
- CEI 20-36 Standard - 1984 I Ed. – Fire-resistance tests on electrical cables.
- CEI 20-38/1 Standard - 1994 II Ed. – Cables insulated with rubber, not fire-spreading with low smoke and toxic/corrosive gas emission. Part I: Nominal Voltage U_0/U not larger than 0.6/1 kV.



- CEI 64-8 Standard IV Ed. – User Electrical Systems with nominal voltage not larger than 1 000V in alternating current, and with 1 500V in direct current.
- CEI 70-1 Standard – Coverings protection degree (IP code)
- CEI 81-1 Standard – Structures protection against lightning.

2. GENERAL PRELIMINARY REMARKS

All connections must be made by the contractor and are requested in this functional description. All tools and utilities necessary for the assembly shall be remunerated with the unit prices.

The following technologies shall be installed:

- Low-voltage main distribution
- Building main distributor
- Level distributors
- Cables and lines
- Installation material and devices
- Illumination
- Fire alarm system
- EDP and telephone
- Antenna system
- Lightning protection system
- Outdoor facilities

The scope of services includes the complete supply and operationally-ready assembly of the electro-technical systems (high-voltage and telecommunication technology) for the construction project.

The proposed systems should allow an economic operation at optimal application qualities under consideration of the different application areas and their frequency of use.

All visible equipment intended for installation require sampling and approval by the building owner. The start of the test operation must be announced in adequate time so that the building owner is able to assign corresponding personnel for instruction in the system functioning.

Before the initial commissioning, all connections must be checked for correctness by a qualified electrician determined by the contractor at his expense, concerning whether the implementation corresponds to the designations of the plans and whether all electrical specifications have been complied with.

All required documents with circuit and control diagrams etc. must be presented.

A preliminary technical test must be carried out after commissioning and before the final acceptance. The defects occurring during this must be remedied before submission of the acceptance application. The electrical systems must be accepted by a recognised expert after completion.

All lines may only be laid horizontally or vertically. When laying lines on spacing clips, a maximum spacing of the fastening clips of 0.3 m may not be exceeded. Up to 2 cable lines must be laid on insulated spacing clips or with insulated nail clips.

The routing of several plastic-sheathed cables is realised in suspended or false floors, unless expressly required otherwise, using group holders, in the case of individual lines using nail or binder clips.



Installation materials in concealed version such as switches, sockets etc. must be provided in combinable, square design complete with switch or switch connection boxes for flush, cavity wall or parapet duct installation. The covers and covering frames must be factored into the unit price calculations. Multiple combination covers must be provided in the case of more than one switching device next to or above one another. There shall be no separate remuneration, as the costs only differ slightly in respect to the covers of the individual devices. Junction boxes must be provided with covers and terminals. Buttons, switches, sockets and covering plates must be provided as a standard large-scale program. Accessories, small material and fasteners must be factored into the calculation. The installation devices must be fastened with screws.

In rooms with wall tiles, the installation devices must always be mounted on cross joints or joint cutting, insofar as no statements to the contrary have been made in the specification of services or by the installation company.

All connection terminals in the switch and junction boxes must be wired in a plug-in version. Installation heights for switches and receptacles:

The mounting heights are always above the finished floor.

The mounting heights apply, unless it is otherwise indicated on drawings.

All cables and lines must be identified with permanently legible circuit numbers at both ends.

The cited CEI, DIN etc. regulations must be adopted in the corresponding DIN EN-, IEC-, CEN- and CENELEC regulations in accordance with the conversion table.

Additional technical regulations

The application obligation for compliance with CEI, VDE provisions for safety-relevant concerns of electrical power systems applies.

Measures are also permissible, with which a comparable safety level is attained, these measures not having to be a component of the VDE OR CEI regulations.

The power systems must be set up and operated in such way that the technical safety is ensured.

At the same time, the generally recognized rules of technology must be observed subject to other legal regulations.

Compliance with the generally recognised rules of technology is assumed if the technical regulations of the "Verband der Elektrotechnik Elektronik Informationstechnik e.V." (VDE, Association for Electrical, Electronic & Information Technologies) are complied with, in the case of systems for the generation, transmission and output of electricity.

In the case of systems or components which have been manufactured or put into circulation in accordance with the regulations or requirements applicable in another member states of the European Union or in another contractual state of the Agreement concerning the European Economic Community and which ensure the same safety, it must be assumed that the requirements for the condition of the systems are fulfilled. In justified individual cases, it must be demonstrated that the requirements are fulfilled after request by the authority responsible under national law.

The authority responsible under national law can realise the measures necessary for ensuring the requirements for the technical safety of power systems in individual cases.

The operating equipment used must verifiably correspond to the above provisions and regulations. The fire protection concept must be taken into consideration to the full extent and is a component of the functional description.

All assembly work must be checked by an authorised expert. This expert must be informed about all cir-



cumstances of the construction site and must be present during the handover.

The contractor is obliged to keep construction logbooks on a daily basis, containing data on the number of workers employed, the duration and type of work carried out, the number and type of major devices used, as well as the consumption of materials and components provided. The construction logbooks must be submitted to the local technical construction supervision on a fortnightly basis.

The waste resulting during the course of the contractor's work (construction debris, packaging material, disassembled materials and other refuse) must be collected in refuse containers of the contractor and disposed of.

The special waste resulting during the course of the contractor's work (assembly/disassembly) (e.g. fluorescent lamps, capacitor, batteries, cables/lines etc.) must be collected in suitable waste containers to be provided by the contractor for this and disposed of properly. Evidence of proper disposal must be provided.

The opening and closing of existing ducts, distributions and other equipment must be factored into the unit price calculation and will not be remunerated separately.

All tools and utilities for implementation of the services, also scaffolding up to 8.00 m in height, must be factored into the calculation.

Slots up to approx. 1 cm width, bushings in masonry up to approx. 1 x 1 cm, drill holes in concrete up to approx. 20 mm for wall and floor thicknesses up to approx. 30 cm must be factored into the calculation and will not be remunerated separately.

Requisite deviations from the placed order, such as extra and reduced costs as well as dimensional excesses, require prior follow-up commissioning by the client. The change services must be indicated to the client in sufficient time after coordination with the local construction supervision in the form of a follow-up offer.

The contractor must include all necessary materials and work services, which are part of a technically flawless implementation and are not specially mentioned, in the calculation of the prices. The complete supply with all accessories, operationally-ready assembly as well as commissioning and handover test for the systems parts/overall system shall be remunerated with the prices. The coordination with other contract sections must be independent and free of charge.

The following documents shall be provided by the client:

- Specification of services
- Draft plans and potential details after placement of the order

After completion of the system, the contractor must apply for the formal acceptance, and if necessary, also the partial acceptance, in writing.

Revision documents (in triplicate unless otherwise specified) must be compiled by the contractor. The architects shall provide layout plans for this.

The revision documents comprise:

- Table of contents
- Distribution scheme with all existing distributions as well as information on the supply lines.
- Circuit diagrams, 1 set additionally for the distributions max. DIN A3 with page numbering, designation of the terminal labelling and current path designations
- Revision plans, as three-colour blueprints, folded, DIN A4 with paper reinforcement ring1



set as dxf or dwg file.

- Distribution structure diagrams.
- Certification concerning proper implementation of the system
- Approval certificates concerning fire walls
- Certification concerning the proper integration of the sound barriers in the wall and parapet ducts, as well as compliance with the specified sound insulation
- If capacitors containing PCB have been disposed of, a corresponding certificate must be enclosed with the revision documents
- Light list with room numbers and lamp type
- Material or parts lists
- Measuring and test reports
- Operating and maintenance documents
- Selectivity verification
- Other documents in triplicate

The revision documents must be handed over to the client before acceptance of the services, bound in a folder.

Changes to the main routes (ascending routes, cable platforms, parapet ducts etc.) as well as the locations of the subdistributions and installations etc. which result as part of the implementation, must be changed or adopted correspondingly by the contractor in the plans. In addition, inspection openings etc. must be entered in the revision plans.

The final assembly plans, setup drawings, circuit diagrams, dimensions and calculations, selectivity verification, terminal diagrams etc. must be created by the contractor based on the documents of the technical engineer and submitted to the technical engineer in sufficient time before the start of manufacture and assembly in duplicate for inspection and approval.

The final work flow as well as individual schedules shall be regulated with all persons involved in the construction as part of a construction discussion.

The contractor must become familiar with the local situation by means of an inspection before submitting the offer.

Lack of knowledge of the situation is no entitlement to further claims.

Regulations concerning the construction site

Common rooms and storage rooms can be provided by the user insofar as available. However, there is no claim to common rooms and storage rooms.

All tools including special tools (e.g. core drill) must be provided by the contractor; the costs for this shall be remunerated with the prices.

All motors must be equipped with full motor protection.

Instruction of the operating personnel of the building owner, single or multiple including written confirmation.

Work may only be carried out with type approved plugs.



Fire protection elements must be provided in floors/ceilings and walls for all wall bushings. Pipe penetrations to individual fire compartments must be provided, documented and identified in fire-proof design, according to the regulations of the fire authority. The approvals of the individual fire protection elements must be presented and incorporated in the revision documents.

The safety devices must be dimensioned and realised according to the directives, standards etc. applicable on the day of implementation. It is the responsibility of the contractor to contact the corresponding authority in good time and obtain a preliminary approval.

All safety devices must be explained in detail to the operator of the system with respect to function, maintenance and operation. The contractor must have this instruction confirmed in writing by the operator.

16 01 00. POWER NETWORK SYSTEM

16 01 01. POWER SUPPLY

This building will be supplied from the cabinet with a 400 V network, the cabinet will be inside the building. Inside the structure, the technical spaces will be situated in the ground floor, where the low voltage network is coordinated for the various user categories.

The supply line from the electrical cabinet to the power center will be conducted through tubes.

The secondary distribution room for the low voltage main board for the building will be located at the ground floor.

In the technical space will be installed other equipment like cos ϕ regulator, UPS, etc...

All user categories, normal consumers, air conditioning and ventilation system will be supplied from here. Needed supply requirements are calculated from the values of the connections. The energy needs are calculated using a factor of 0.6. This load is divided between normal power needs(NP) and critical power needs(CP).

Anyways, the calculation according to DIN 0100-710 has been used, which according to it the total load has been calculated in the case of the functioning of the normal network.

COS Φ equipment, main low voltage boards are installed in the technical space in the ground floor, as shown in the drawings. The corresponding power requirement has also been determined for this as described above. Here too, the power requirement is divided into general electricity supply and safety current supply and operated via the general electricity supply network in normal operation.

The operating voltage of the system is 400/230 V, 50 Hz, L1, L2, L3 with N-conductor and PE- conductor.

All distribution panels are divided into the following sections:

Nominal-Power, Emergency-Power from UPS. (NP, CP, ESS).

Each section is separated from the other sections.

16 01 02. Normal power supply (mains)

Power supply will be at the power center in the technical space.

16 01 02 01. Main distribution panels

As shown on the on-line diagram :

- Transformers, feeds the main low voltage panel.
- The UPS is supplied from the emergency low voltage panel and supplies the sockets in the offices

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for IT services and other consumers according to the one-line diagram.

The low voltage panels are equipped with circuit breakers to reduce the dimension of the cables. The panel supplies all distribution boards on the floor levels, the distribution boards for HVAC, elevators, weak current systems and other.

If the tenderer suppose to quote for an alternative technical solution without circuit breakers (NH fuse breakers instead), then this technical solution must include a redesign of the main distribution panels, the sub distribution panels (to prove the selectivity), all cables outgoing from the main distribution panel including cable trays and wall break outs. Otherwise it will not be taken into consideration.

a) Sub distribution.

The sub distributions are installed on each floor according to the one line diagram and consist of three units.

The normal power supply sockets for non IT appliances, cleaning purposes and tea kitchen as well as lighting fixtures and fan-coil in the offices.

The UPS unit supply the IT service in the offices, the responsible active components and the disable units according the one-line diagrams.

The distribution boards are with vertical bus-bar system on which the appliances can be plugged in. The connection of the outgoing cables are without terminal clamps directly connected to the appliances. All sub-distribution boards are with doors.

Used in local sub distribution board (SDB)

b) Power consumption metering

The total power consumption is measured at the medium voltage plant. The power consumption can be measured in each floor sub-distribution, where meters are installed or can be installed at a later stage (spare space).

With this design of the distribution boards the different zones can read their power consumption from one or several meters easily. The data are transferred automatically to a central building service station be a EIB/Konnex bus system. The difference between the main meter and the total sum of the sub meter must be calculated and will be added to the common area cost centre.

Data shall easily be processed with MS Office applications.

16 01 03. Uninterruptible power supply (UPS)

a) UPS needs

UPS is supplying the IT services only. These are the desktop and screens in the offices and the server and active components in the main IT room. No copy machines, printer or even kitchen devices shall be supplied.

b) UPS distribution

The UPS distributions start at the separate UPS panels. The cable laying shall be done in the same cable tray and ducts. The cables are of standard type (no certain colours).

16 01 05. Switchgear cabinet construction

All front sides are equal. The housing and doors shall be made of min. 2 mm thick steel sheets. Isolation shall be 1000 V (rated voltage).



On front door the lettering shall be in English and Albanian.

Steel sheet distributions shall be realised as standing wall cabinets, suitable for flanging onto each other with stable doors. Colour according to the choice of the client.

Standing housing made from stable, edged-on sheets, with removable mounting plate, cable holding rail, with doors on the front, designed with an internal hinge; opening angle minimum 13°C.

Tumbler through lever handle with safety cylinder lock according to a design still to be determined.

Height with base: approx. 2100 mm

Depth: approx. 300 mm to 00 mm

Width: approx. 1000 mm.

Appropriate detachable lifting rings must be attached to each switching panel for the transport.

If the switchgear cabinet consists of more than two individual panels, the setup must be realised on a dimensionally adapted U-profile frame, in the same colour tone, in order to ensure secure standing.

Switchgear cabinet setup and cable entry

All switchgear cabinets shall be provided with labelled terminal strips, while all motors, pumps and ventilators shall have operating hour meters in the switchgear cabinet.

The switchgear cabinet sizes must be dimensioned in such way that a space reserve of 20% remains and so that no internal temperatures greater than max. 4°C result without the use of mechanical cabinet fans.

Ventilation slits for natural ventilation are possible, insofar as they do not contradict the protection type.

The switchgear cabinets must be correspondingly pretreated with rust-protection paint and supplied with impact-resistant and scratchproof top coat. The colours shall be coordinated during the course of the order processing with the construction supervision. Colour according to the choice of the client. All switchgear cabinets must be equipped with the same safety keys or integrated in the closing system.

All live system parts must be protected against unintentional contact through suitable measures.

A corresponding insertion pocket, non-flammable, must be firmly attached in the switching panel on an inner door for holding the associated circuit diagrams.

All components belonging to an operating current circuit must be located on the mounting plate in such way that the device context is clearly recognisable.

If several systems are grouped together in a common switchgear cabinet, an individual control current fuse must be assigned to each system.

All automatic circuit breakers must be designed as high-power devices, current-limiting, with selective response to the upstream protection element.

All contactors must be suitable for hum-free permanent operation.

All rack-mount devices must be grouped together on a system basis, but installed within one switchgear cabinet panel, separated according to switching and control devices. In doing so, the greatest importance must be placed on simple and reliable operation and simple and fast replacement and service.

All installation parts important for the operation and monitoring, such as pushbuttons, control switches, signal lamps and measuring instruments, must be installed in the front doors and arranged sensibly on a system basis.

Each panel of a switchgear cabinet shall be provided with a fluorescent lamp, switched via a door contact, also operationally ready with the main switch switched off. Each incoming panel shall be provided with an earthed socket 220 V, 16 A, operationally ready even with the main switch, switched off.

Cable entry from above: Cable entries must be made in a covering plate with metal cable threaded joints in the case of steel sheet-encapsulated switchgear cabinets. The cable threaded joints must be sealed with suitable putty after installation. The arrangement of the introduced cables/lines to the terminals must be realised in a loop-in space or cable duct with removable cover, which is to be dimensioned corresponding to the cable scope. The loop-in space must be provided over the entire width of the switch-



gear cabinet with semi-threaded joints or similar, corresponding to the number of electric circuits, including their reserve. Cable entry from below: The cables must be fastened free of tension with a holding rail using clips. Arrangement of the inserted cables, as described above.

Protection type: The protection type to be provided for the switching panel is dependent. The size of the switching panel, type of cable entry and ventilation (incoming and outgoing air) depend directly on this. Specified protection type: See list of services.

The switchgear cabinets shall be supplied via power switches with triggering or via fuse switch disconnectors.

Normal network-authorised and safety network-authorised consumers shall receive a separate in-feed and separate panels.

The phase control shall be realised by 2 white signal lights with their own pre-fuse.

The infeeds shall be provided with a separate supply panel. The switchgear cabinet infeed then always includes 1 current measuring instrument, if necessary with a converter (connected to the supply line), 1 voltage measuring instrument with measuring point selector switch for the voltage measurement phase-phase and phase-N.

The power interrupters must correspond to the definition of the main switch as per VDE 0113 or CEI, lockable, with red handle.

Upstream fuses greater than 63 A must always be implemented as fuse disconnectors.

If bus bar systems are necessary for the power distribution in the switchgear cabinet, they must consequently be dimensioned in accordance with VDE 0102, Part 2 or CEI.

Bare conductor systems must be protected against contact by protective covers. The conductor fastenings must be realised in such way that the forces occurring in the case of a short-circuit are absorbed and no damage caused by this can occur.

16 01 06. Bus bars and circuit breakers

The distribution panels are to be equipped with copper bus bars for the external conductors L1, L2, L3, N (neutral conductor), PE (protective conductor) and PA (equal potential conductor). The N-, PE- and PA bus bars have to be isolated. The short circuit capacity and the allowable load are to be adjusted to the total output requirement of the particular distribution panel. Twin wiring of terminal screws is not allowed. In those cases, cable conductors are used instead of bus bars for supplying the equipment, these are to be provided separately for each item of equipment. Looping the feeders from equipment to equipment cannot be allowed. The load of the three outer conductors must be distributed symmetrically at the outgoing points so as to ensure that unbalanced load does not exceed 10%.

Protection against short circuit and overload

The supply cables are switched by load disconnecting switches.

Motor protection switches and over current trips are only allowed with reclosing lockout. This switches are to be equipped with potential free changeover contacts.

All miniature circuit breakers are type B, C temperature class T1 for equipment connections and motors.

Insulation voltage 400 V WS group B, to alternating voltage, with snap fastening, the dimensions for all sizes being the same to ensure interchangeability at any time. The MCBs must have an interrupting capacity of 4.5, 6 and 10 kA and meet selectivity class 3.

All ground fault interrupters have to be in accordance with the regulations of Albania.

Motor protection circuit breakers meet the following to the nominal current, non-delay electromagnetic over-current trips, trip free release of the operating elements.



Over-current trips for air break contactors are to be offered for the range of adjustment for the nominal current. The over-current trips must be equipped with reclosing lockouts.

Undervoltage monitors are to be provided with an adjustable release which is adjustable to at least 80 % of the nominal voltage.

A load break switch with 1 NO + 1 NC auxiliary contacts has to be supplied with rated voltage 1000 V, rated insulating voltage 1000 V service life 30,000 switching operations short circuit strength (maximum) 10 kA rated cut-off (effective) 1000 A.

Circuit breakers are 3-pole, current limited 10 kA effective minimum interruptive capacity according to P 2 testing cycle, thermal trip adjustable to rated current, magnetic trip adjustable to 80% of rated current setting.

The maximum permissible load for each miniature circuit breaker is 6-8 receptacle outlets 230 V, 10 A for lighting fixtures, but not more than 32 fluorescent lamps of 36 W each with normal on-off switch, change over switch or two circuit single switch.

All switchgear must comply with the technical regulations of Albania. The breaking capacity of the contactors must suit the class of use and is to be designed for at least 20,000 switching operations. The contractor has to coordinate with all disciplines the voltage level for the contactor coil. In addition to the auxiliary contacts necessary for locking, all contactors are equipped with a potential free changeover contact for the operating and fault signals.

16 01 07. Switchgear

Main distribution panels for mains, genset

16 01 07 01. Standards

IEC 60439 : Low-voltage switchgear and control-gear assemblies – Part 1 Type-tested and partially type-tested assemblies.

IEC 60947 : Low-voltage switchgear and control-gear

16 01 07 02. Technical characteristics

1. Form and earthing(grounding) system : as mentioned on the one line diagram
 2. With-drawable equipment as shown on the one line diagrams
 3. In accordance with the local electricity company regulations
 4. Protection degree IEC 529 : IP 31 / IP 20 with open doors
 5. Rated voltage : 690 V
- Operating voltage : see the one line diagram
6. No use of fluids
 7. No fuses, all protections by means of circuit breakers with electronic trip units
 8. Digital measuring device in TRMS (true values) on each general supply for :
 - 3A, 3V, kW, kVAr, kVA, Hz, cos.phi
 - Pmax. and I1, I2, I3 max. on 8, 10, 15, 20 or 30 min.



- Recording of the max. values
- Alarms transmission of presets (dry contacts)
- 9. Over-voltage protection device on each phase
- 10. Automatic power factor correction :
 - harmonics filter
 - automatic change over for condenser battery in order to guarantee the same working hours on all condensers.
 - dry type
 - IEC 60831-1/2
- 11. Selectivity calculations to be delivered (discrimination)
- 12. All the settings are tested and sealed
- 13. Test reports to be delivered

16 01 08. LV switchboards

16 01 08 01. Characteristics

Switchboards are used as service disconnecting means. Switchboards shall be circuit breaker-equipped unless indicated otherwise. The construction of switchboards shall be in accordance with the one line diagram schemes. The construction of the Switchboards shall be done in factory and come ready made in site with certification seal. Design shall be such that individual breakers can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as means of obtaining clearances as required by UL. "Specific breaker placement" is required in switchboards to match the breaker placement indicated in the switchboard schedule on the drawings. Use of "Sub feed Breakers" is not acceptable unless specifically indicated otherwise. Main breaker shall be "separately" mounted above or below branch breakers. Where "space only" is indicated, make provisions for future installation of breakers. Switchboard locks shall be keyed. Directories shall indicate load served by each circuit in switchboard. Directories shall also indicate source of service to switch board. Type directories and mount in holder behind transparent protective covering. Switchboards shall be listed and labelled for their intended use.

Circuit Breakers: thermal magnetic-type having a minimum short-circuit current rating equal to the short-circuit current rating of the panel board in which the circuit breaker shall be mounted. Breaker terminals shall be listed as suitable for type of conductor provided.

Multi pole Breakers: Provide common trip-type with single operating handle. Breaker design shall be such that overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases 1, 2 and 3, respectively.

Circuit Breaker with GFCI: Provide with "push-to-test" button, visible indication of tripped condition, and ability to detect and trip on current imbalance of 30 mA device for personnel protection and different types for equipment protection.

Fusible Switches for Switchboards hinged door-type.

ENCLOSED CIRCUIT BREAKERS: Individual moulded case circuit breakers with voltage and continuous current ratings, number of poles, overload trip setting, and short circuit current interrupting rating as indicated. Enclosure type as indicated.

FUSES: Provide complete set of fuses for each fusible switch, panel and control centre. Time-current characteristics curves of fuses serving motors or connected in series with circuit breakers or other circuit

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protective devices shall be coordinated for proper operation. Submit coordination data for approval. Fuses shall have voltage rating not less than circuit voltage.

Instruments for Metering in the main switchboard shall be with 2 percent accuracy. In the entrance of external line shall be installed in LV Switchboard a multi meter for measuring of ac current (A), ac Voltage (V), Energy (kWh, kVAh, kVA) and $\cos \phi$. The apparatus shall be a minimum of 50 mm square, with 4.36 rad 250 degree scale.

(1) A.C. Ammeters: self-contained, Transformer rated, 5 ampere input, for use with a xA/5 ampere current transformer ratio, 0 to 1000 ampere scale range, 50 hertz.

(2) A.C. Voltmeters: Self-contained (3) Instrument Control Switches: Provide rotary cam-operated type with positive means of indicating contact positions. Switches shall have silver-to-silver contacts enclosed in a protective cover which can be removed to inspect the contacts.

16 01 08 02. Construction

All switchboards shall be metallic hot-dip, zinc-coated with security lock and shall be installed in safety places. Local switchboards are wall recessed type. The dimension of local switchboards shall be in accordance with the manufacturer recommendation and the up mentioned UL regulations. The main Switchboards are with dimensions according to the drawings.

16 01 09. TERMINALS AND WIRING

Switchgear terminal blocks on support rails corresponding to DIN 46 277 in non-tracking version as per T 4, DIN 480 or respective CEI, must be used as output terminals. The terminals must be able to hold minimum 2. mm² wires.

Each side of a terminal may only be assigned one wire.

Terminals which are also live when the main switch is switched off must be labelled specially.

N disconnect terminals must be used for the N connection. Protective conductor terminals must be used for the PE connection (protective conductors). N and PE terminals shall be directly assigned to the relevant electric circuit. All terminals must be uniquely labelled.

At least 10% space reserve shall be kept free for secondary installations in each terminal strip.

Power failure

The high-power consumers in the system groups must be switched on again in a staggered return (time delayed) upon resumption of the mains supply after a general or partial power failure. In the same way, all switchgear cabinets must be released with time staggering (time delayed) among one another. The time relays or tap changers necessary for this shall be considered in the "infeed" assemblies.

16 02 00 ILLUMINATION NETWORK SYSTEM

16 02 01. GENERAL DESCRIPTION

The type of lighting fixtures depends on the purpose of a room and on the type of ceiling. The intensity of illumination must meet the requirements of the particular room.



Provision is to be made for the installation of surface mounted fixtures in the building, and, in the places where there are suspending ceilings, flush mounted fixtures are to be used.

In technical rooms, single and double lamp closed lighting fixtures are used which are suspended from chains or by other similar constructions according to local conditions. Special rooms will have special light fixtures as required.

Material and components

Only hum-free light fixtures are permitted. All light fixtures are wired ready for connection including sockets, starters, ballasts, and with twin circuit capacitor installed at factory for light fixtures with 2 and/or 4 tubes, half each inductive/capacitive for light fixtures with one tube. Observe the following features for equipment:

Ballasts: Low loss 6 W during operation,

Starters: 1 through 6 W (fused quick starters),

Capacitors: For power factor 0.9,

Internal wiring: Heat resistant,

Radio frequency: Interference suppression but not less than radio frequency,

Protection classes:

Protection Class 1, min., otherwise indicated,

Equipment: 8 W fluorescent lights only, 10 cm and/or 48" long, standard with 200 Lumen, light colour 2

and Lumilux with 320 Lumen, light colour 11

Fluorescent-decorative light fixtures: The kind of the light fixtures is in accordance to the site requirement.

There will be compact fluorescent bulbs with integrated ballasts for incandescent bulb thread E 27 (for example: Osram DULUX EL and Compacta) and/or fluorescent tubes with one-side socket, G23 with colour rendering group 1 (for example Osram Dulux D and/or Dulux S)

Execution

The unit price includes the following work:

1. The complete initial equipping of all lighting fixtures with lamps.
2. All fixtures with 3 or 4 lamps shall be installed in such a manner to make a two-step lighting in relation to daylight.
3. Installing the fixtures including supply of necessary small fittings and fastening materials such as screws, dowel pins, threaded pins, slotted steel strips, lashing lines, pendulums, etc., including connection ready for operation.
4. All fixtures shall be equipped with fixed branch terminals up to $\times 2. \text{ mm}^2$ to facilitate wiring up to the next luminaries. The lighting fixtures must comply with the regulations of Albania and the codes of practice.
5. Fastening materials for flush mounted fixtures optionally for fitting both in concrete ceiling structures and in suspended ceilings. All lighting fixtures shall be installed flush to ceiling.



6. The contractor must ensure that the fixtures cannot suffer damage.
7. When installing surface mounted ceiling fixtures below suspended ceilings (e.g. metal ceilings) suitable materials are to be laid the ceiling panels so that the whole of the lighting fixtures is pressed against the underside of the suspended ceiling.
8. Inside each lighting fixture a sign in accordance with RAL 2004 will be fixed with heat adhesive or rust proof screws, with the respective inscriptions.

When replacing the lamps use only lamps with the same light colour and the same luminous output as originally designed.

Emergency lighting

The emergency lights is included in the drawings. They have to be installed as described in this section.

Emergency light fixture with built-in batteries is provided as emergency lighting in evacuation corridors. In each corridor are needed minimum 2 lights; at each end one. If the corridor is longer as 20 m it is needed one light more in the middle of the corridor. Each entrance to the stairs needs emergency light as well.

The emergency light fixtures are used in all technical rooms.

Materials and components

Materials and components have to be conform to the requirements of Albania and the codes of practice.

Execution

The lights at the exits are to carry the inscription "EXIT" in addition to the "EXIT" inscription, direction arrows are to be fixed. The lights have separate circuits and can only be switched at the distribution panels. They are regarded as emergency lights and have built-in standby batteries which can supply the lamps for at least 3 hours in the event of power failure. The fixtures are equipped with NC batteries.

16 02 02. Normal-nocturnal-security light system

It must realise lighting systems to serve the building different areas and rooms as indicated in the attached design drawings, and according the following special prescriptions.



16 03 00. Cables and lines.

16 03 01. Low voltage wires not fire-propagating type (f)rg7(o)r 0.6/1kv

Conductor in flexible re-cooked red copper wire; insulation in HEPR rubber with high modulus giving high electrical, mechanical and thermal properties to the wire (norms CEI 20-11 - CEI 20-34); sheath in PVC of special quality Rz, grey coloured.

3011><number of conductors per section><PRODUCER> (G) <YEAR> Metrical progressive marking. CE Mark.

Reference norms:

CEI 20-3 Not propagation of the flame CEI 20-22

II Not propagation of fire

CEI 20-37 I Reduced emission of corrosive gasses.

Laying in predisposed raceways, gangway, pipes or ducts according to the indications given in the design drawings and the specifications given in norm CEI 11-17 e 64-8.

All the wires must be sealed at both extremities by means of apposite collars to insert in each conductor; moreover, in the triple-phase systems it must identify the single phases.

It must foresee appropriate fire-proof barriers in correspondence of the walls and slabs crossed.

They must consist of barriers in incombustible material laid on the wires path, with shape and size suitable to prevent the flame to step over. The specific solution to adopt (partitions with intumescent materials, prefabricated elements or other) must be approved by the Supervision of Works.

16 03 02. Low voltage wires not fire-propagating type n07 v/k

Conductor in flexible re-cooked red copper wire. Insulator in PVC of quality R2

Nominal voltage: 40/70V

Test voltage: 200v in c.a.

Service maximum temperature: +70°C

Short circuit maximum temperature +160°C

Marking Mark reporting CEI

<Producing> <year>

Reference norms: CEI 20-22II

Laying in predisposed raceways, gangway, pipes or ducts according to the indications given in the design drawings and the specifications given in norm CEI 11-17 e 64-8.

All the wires must be sealed at both extremities by means of apposite collars to insert in each conductor; moreover, in the triple-phase systems it must identify the single phases.

It must foresee appropriate fire-proof barriers in correspondence of the walls and slabs crossed.

They must consist of barriers in incombustible material laid on the wires path, with shape and size suitable to prevent the flame to step over. The specific solution to adopt (partitions with in-



tume scent materials, prefabricated elements or other) must be approved by the Supervision of Works.

16 03 03. Low voltage wires not fire-propagating type (f)rg7(o)r 0.6/1kv

16 03 03 01. Wiring

Wiring of the internal wiring and cables must be installed in plastic wiring ducts. The wiring bunches are to be supported with special cable camps between the equipment.

Single core conductors must be used for the wiring.

Dimensioning of the cross-sections must conform to technical rules of Albania. The allowable voltage drop to the point of consumption must not exceed 4% full load. The internal wiring is to be designed to give the nominal voltage at the cross-sections, based on a ambient temperature of 2°C.

Cables of equipment with different protective measures may not be laid together in one cable bundle or wiring duct.

In particular, the wiring in the distribution panels with the isolation transformers must be installed in such a manner which guaranties the wiring bundles of the various supply systems are separate from each other by means of wiring ducts in order to prevent the effects of short circuit being transmitted to other systems.

The specified colours are to be chosen for the wiring.

16 03 03 02. Terminals

For connecting up to the internal and brought-in cables, only inline terminals on support rails for switching stations in non-tracking design are to be used. The terminals must be proportioned to suit cables having a cross section of at least 2. mm². To permit a better detection of creep tracks, only terminals in bright colours are allowed.

Neutral conductor isolating terminals with associated collecting bus bars in copper must be used for the connection of the N wires. The protective bus bar is formed by the terminal support rail. All incoming and outgoing connections of all equipment must be made in-line terminals. This also applies to outer conductors.

Protective conductors and equipotential conductors must be secured to the bus bars to prevent getting loose. In order to maintain the allowable cross sectional area of these collective bus bars, the N and PE bars must, where necessary be proportional and connected a new to the N and PE supply conductors.

The N and PE terminals are to be arranged directly adjacent to outgoing terminals of the outer conductions making continuous wiring of the external cables.

The necessary number of terminals is not separately listed in the spoon. The several systems must in each case be partitioned from the others. Equipotential bus bars are to be arranged vertically in the space adjacent to the cable ducts for connecting the equipotential wires.

For this purpose, copper bus bars 6 x 6 mm in section and with terminal suitable for leads up to 16 mm² are to be used.



16 03 03 03. Cable route

Requirements for the technical implementation of cable holder systems as steel. The bars must be provided with an upper rebate as reinforcement and edge protection. Rungs made from C-profile, spacing maximum 300 mm, with burr-free cable support surface.

The cable holding systems include the necessary mounting brackets, terminal brackets, steel expanding bolts, screws with accessories, spacers, support claws, anchor bolts, connecting pieces, clamping pieces, clamping clips, wall hangers, support straps, protection caps, corner plates, connecting parts, support brackets, covering protection sleeves and bevels, joint pieces, supports, connecting straps, spacer straps, holder couplings, conductor holders and other small parts.

All laid empty pipes must be provided with taut wire.

Cable lines must be installed in the main line routes as well as in the centres for line earths. Cables and lines shall be arranged corresponding to the cross-sections and bundled according to line types as well as laid onto the routes without twisting.

Separating strips must always be inserted when laying heavy-current lines, communication lines and data lines. The specified distances must be complied with correspondingly in the case of crossovers.

16 03 03 04. Ascending route

Ascending cable routes must be installed in the case of lines routed vertically. The lines must be fastened with BBS clips either individually or bundled every 30 cm on the ascending routes depending on the line cross-section and number. All floor/ceiling bushings must be sealed in a fireproof manner in the case of routes leading over several stories.

The distances specified by the system manufacturer must be complied with in parallel laying in the case of joint routing of heavy-current lines and communication or data lines.

Line installations in the false ceiling area must be routed on cable lines or in line group holders - size corresponding to the number of lines. At least one group holder must be used every 30 cm.

All outgoing cables of the various distribution panels are to be laid in multiple fashion on cable trays, i.e. separate cable trays must be installed both for communication systems and power system. The size of the cable trays is so as to leave at least 20% reserve space for future extensions.

The cable trays are normally fixed on supports which are fastened on the ceiling. In case the cable trays are installed in parallel air ducts, water- and heating pipes and the distance to the ducts and pipes, the supports can be used for all systems.

The wiring of the emergency system is mechanically protected by installation in entirely closed cable trays.

Minimum requirements for the technical execution of cable trays made of steel.

The sheet steel must have good bending properties. The distance for the rows made of C-profile is max. 300 mm and has to be burr-free where the cables are laying.

The thickness of the not-galvanizing has to be 70 - 90 micrometers. Electro-galvanizing has to have a



thickness of 12 micrometers. The nominal width is equal to the useful width.

Load factor: 80.

Thickness of sheet steel: 1. mm

The cables and wires for all mechanical systems are specified in this section. This includes all cables and wired outside of distribution panels, motor centres, distribution boxes and connection boxes. Prior to the work, the contractor must coordinate the shop drawings with the contractor for the mechanical systems and install in accordance to the approved shop drawings.

Included in the unit price are all necessary distribution boxes, sleeves, elbows, small materials and fasteners suitable for each conduit system.

Electrical circuits which are installed under floor and can be damaged shall be installed in galvanized rigid steel conduits and protected from water penetration.

If prefabricated concrete parts are used, empty conduits shall be inserted for a later installation of cables. Before manufacturing the prefabricated parts, all outlets for the empty conduits have to be approved by the contracting agency.

16 03 03 05. Cables

Inside the building cables of type FG7-OR, NYM, NYCWY and NYY will be used. Feeder cables for emergency system and equipment system will be flame retarded, halogen-free cables type FG7O-R, NHXCHX 0.6/1 kV and type NHXHX 0.6/1 kV.

The electrical feeders is installed by a conductor system. Lighting and receptacle circuits are separate circuits. Cross section of 1.5 mm² is the smallest allowed for lighting circuits; for receptacles and equipment according their connected load. In general, concealed installation is provided.

In wet rooms, the installation is concealed wet room installation; in supply rooms, surface mounted wet-room installation is executed.

In areas of suspended ceilings cabling is installed in cable trays or rails.

Single phase - lighting and receptacle circuits, as well as the various single phase circuits shall not connected to multiple phase circuits, they must have single phase back feeders up to the distribution panel. All cabling must only be installed horizontally or vertically.

All accessories, connections, connecting material, and small material for installation in accordance with regulations of Albania are supplied by the contractor.

The cross-sections of cables are dimensioned to allow only 80% constant load, also under regard of necessary reduction factors for assembling and surrounding temperature. Assembling of feeder cables and cables under constant load (lighting fixtures, heating apparatus etc.) only one layer is permitted.

It must be guaranteed 2 free sides per cable for heat removal.

For all feeder cables only cables with copper conductors are allowed. The lighting and power installation, the supply lines to the consuming equipment are routed via the main traffic routes(corridor).

Cable branches on the main routes are made by branch boxes which are installed on the cable tray system. The appropriate ceiling panel is marked up. Branch boxes for cable and terminals are part of the unit prices.

In order to save costs as far as possible in the installation, the cables to several lighting fixtures within a room are to be installed with a branch terminal within the lighting fixtures.



The electrical cable and wiring-system is separated into:

Non-Essential system and Essential system (Nominal Power and Critical Power)! The wiring requirements for those systems are as follows:

The Essential system branch from the low voltage switch gear to the subdistribution panels are kept entirely independent of all other wiring and are not in the same raceway with other wiring.

For the different types of installations are identification letters used at the items. The meaning of the identification letters is listed below and will be part of the item:

Type of installation:

A - The cables have to be furnished and installed ready for operation, under plaster etc. including the chiselling work in masonry and the typical fastening material.

B - The cables have to be furnished and installed ready for operation, on plaster with space clamps and/or clamps on profile rails, max. distance between two clamps 2 times the cable diameter.

C - The cables have to be furnished and installed ready for operation, in existing conduits, cable ducts, underfloor ducts, cable trays, installation ducts or in exiting excavated cable trenches.

D - The cables have to be furnished and installed ready for operation, above suspended ceilings, in open spaces within gypsum board walls, including the collecting cable holder.

E - Halogen free cables have to be furnished and installed ready for operation, with cable clamps (heavy duty type) made of metal (material 30 x mm) with screws, with halogen-free cable holder, distance of the clamps 3 cm fastened with 2 ea. steel dowels M 8, in lime sand bricks with cement and anchor screws M 8.

Cables and wires installed with-in the gypsum board walls have to be fastened securely and have to be mounted with pull-relief. Penetrations through the metal studs have to have protected edges before the cables will be installed.

The cables shall be treated with talcum or similar materials prior to pull them in conduits.

A maximum of four cables shall be installed on one junction box.

16 03 04. Pipes

The conductors except the case of air installations must be always mechanically protected and covered. Such protection may be; pipes, cables carrying channels, passages, pipes or holes in building structures etc. In plants and in the buildings must be apply these rules:

Internal diameter of the pipe must be at least 1.3 times at the external diameter of the cables inserted on it and shall not include cables for the fire detection networks, LAN and telephone network. The zoom ratio will be increased to 1.5 when the cables are sealed type or metal coatings; diameter of the tubes should be large enough to enter and re-enter easily in the cables so that cables or even tubes are not damaged. However, internal diameter should not be less than 14mm;

The curves of the pipes should be performed with faucet or the gradient of the installations of the pipes should not permit to impair or block the passage of the cables; In every strong turn is necessary that the wall structure to premises that the cable could pass easily through the pipe and for any deviation from the main in secondary lines in every room the conduit box must be terminated with jointing; mergers conductors need to be made in branching boxes using the necessary clamps;



16 03 05. Boxes

The distribution boxes must be such that during the installation the intervention of the foreign troops should be impossible, and the heating generated in them should be exhaust out.

The cover of the boxes must be guaranteed by fastening and could be open only with special tools.

So it is agreed to install cables in the same pipe and the same box, while there are not isolated for different voltages and the special boxes to be equipped with the membrane, which can be removed only with relevant tools, between clamp intended for tight conductors belonging to different systems.

16 03 06. Cable trays

Cable trays shall form a wire-way system, and shall be of nominal 60 mm height. Cable trays shall be constructed copper-free zinc-coated after fabrication. Trays shall include splice and end plates, drop-outs, and miscellaneous hardware. Edges, fittings and hardware shall be finished free from burrs and sharp edges. Fittings shall have not less than load-carrying ability of straight tray sections and shall have manufacturer's minimum standard radius. Radius of bends shall be 140mm or more.

- Trough-Type Cable Trays:

Sized as indicated of nominal 100, 200 ... 600mm width.

- Ladder-Type Cable Trays:

Sized as indicated of nominal 100, 200 ... 600mm, width with maximum rung spacing of 300 mm.

- Channel-Type Cable Trays:

Trays shall be one-piece construction having slots spaced not more than 115 mm on centers.

16 03 07. Switches and receptacles

Installation boxes for switches and installation are part of the reference items. Only equipment branch boxes with screw connections are used for the flush-mounted switch and receptacle outlets.

The flush-mounted boxes in solid brickwork and concrete are fixed as a general rule with cement mortar and must be sealed flush with the plaster. Special cavity wall boxes are used for gypsum board walls or other materials.

In gypsum board walls, care must be taken to ensure that the cables or conduits are not only fixed to the gypsum boards but also to the metal studs with suitable means. The flush-mounted installation boxes shall also be installed in a similar fashion.

The switches are basically installed as individual units which can be combined under a common over plate. Back to back installation of switches and receptacles is not allowed.

All on/off, 2-way, 3-way, series and push button switches are type 10 A, 230 V. All 230 V receptacle 16 A, 230 V. For connected loads of more than 10 A, CEE-type receptacles of adequate size are used.

All 400 V receptacles and 230 V receptacles with loads of more than 10 A are CEE type according to the required load. The respective plugs shall also be supplied.

In general concealed installation is made. Installation in tiled walls and in wet-rooms shall be in concealed and in mechanical rooms, shall be surface mounted.

Switch boxes for flush mounting are flush with plaster. Wherever possible switch boxes with space for connection shall be provided as branch boxes.

The cover is fixed by screws, white colour for switches and receptacles. Surface mounted moisture proof



equipment can be made with grey colour.

Emergency power receptacles are white colour with an orange device plate. Each emergency device plate are marked "EMERGENCY" at the top with black engraved letters not less than 6.3 mm (one-fourth inch) in height.

Pressure sensitive tapes are not allowed.

Corridors are provided with single type 230 V receptacle spaced at 10 m maximum. Additionally, one single type 230 V receptacle is installed at each drinking fountain.

The installation of hollow wall boxes shall be installed with not more than 4 cables or wires.

Defective materials or materials damaged by testing shall be exchanged or repaired to satisfaction of the contracting agency. Materials for surface installation is moisture proof; moisture proof receptacles are equipment with cover.

Switches, receptacles and branch boxes for surface installation are fastened by dowels.

Branches are installed with equal distance from ceiling. In case the branches can be reached by hand, the boxes have a screwed cover. Where ever possible, they shall be installed vertically above switches. In areas with suspended ceilings the branches are above the ceiling. The respective ceiling sheet shall be marked by signs.

All required receptacles are generally duplex-type. Receptacle at drinking fountains and in corridors are single-type. The receptacles are fixed by screws not with clamps. The 230 V duplex-receptacles are a combination of two single receptacles under one cover-plate, i.e. with two installation boxes.

The connecting wiring from the terminal block in the installation box to the receptacle should be made with 1.5 mm².

Cover plates for switches and receptacles are rectangular. Combinations next the doors are vertically, duplex-receptacles are horizontally installed. For combinations multi-covers are used.

In order to facilitate the location of concealed junction boxes after plastering, all concealed junction boxes are closed with a special cover to enable the concealed junction boxes to be found without damaging the finished plaster.

All concealed materials must be calculated including supply of switch boxes and the ancillary work as chiselling, fixing etc.

All surface mounted materials include the supply of dowels, screws, distant-pieces etc.

The signs are white with black engraved letters not less than 6.3 mm above the receptacle and fastened by screws.

Child-safe receptacles are provided in all waiting areas and playgrounds.

Connections

All permanently connected equipment is connected by connection boxes. The feeder cable to an equipment ends in a wall mounted connection box. A flexible connection cord between the connection box and the equipment supplies the equipment.

The connections of the connection cord shall not contradict the given protection code for the connection box and equipment.



Prior to the work, the contractor must coordinate with the contractor for the mechanical systems the shop drawings and install in accordance to the approved shop drawings.

The surface mounted wiring of the emergency system which is not in cables trays is mechanically protected by installation in steel conduits.

16 04 00. Telephone network system

It must realize a telephonic system having the following characteristics. This system must be realised according to the norm EN0173 (European Standard of Structured Wiring) and of the norm EIA/TIA 68B (American Standard of the Structured Wiring, whom is referred by almost all the products in the market). Moreover, it must obtain the relevant approval certifications by the Contractor.

The telephonic system must have the following general characteristics:

16 04 01. Telephone switchboard

The system must be served by a telephone switchboard installed in the Special Systems Room in the the Building.

The telephone switchboard must have the following characteristics:

- electronic programmable PABX Unit
- n.°4 external urban lines
- n.° 60 internal lines
- predisposition for people seeker system
- supply group with back-up accumulators with 30 minutes of autonomy.

The telephone switchboard must be connected with n.10 telephone wires multi-couple shielded TR 10x2x0,6/HR.

the wires for the connection of the external lines to the telephone switchboard are excluded by this contract.

16 04 02. Building dispenser (BD)

In the Special Systems Room of the Building it must install a building dispenser made of a floor column 700x700 mm with a rack frame 19" and equipped with:

- Attesting modules of the telephonic backbones by the building dispenser
- Attesting modules of lines toward telephonic users
- Attesting modules of the backbones and users for transmission data, as described below.
- Active equipments for transmission data as described as below
- Wiring accessories and patch cord.

16 04 03. Telephonic socket points

In the points indicated on the design drawings it must realize the telephonic socket points equipped with socket RJ45, connected to the building dispenser BD through lines in cable Cat5 e UTP and sheath LS0H.



For the telephonic socket points the following execution procedures are provided for:

- Wall socket points in recess box connected to the ducts of secondary electric distribution for LV currents through recess pvc RK1 pipes, diameter 20 mm.
- Wall socket points in exposed box connected to ducts of secondary electric distribution for LV currents through exposed pvc RK1 pipe, diameter 20 mm, IP44 min.

16 04 04. General notes on the telephonic socket points

The installation position of the socket points indicated on the design drawings is to be considered just an indication. The final position will be stated during the works execution on the basis of the furniture lay-out and the information provided by the Works Direction.

Besides the points indicated on the design drawings attached, the Contractor must provide for the realization of the following further socket points:

- n.°1 exposed socket points
- n.°1 wall recess socket points.

16 04 05. Topology

Horizontal cabling will be installed in a star topology, with each work area outlet being connected via the horizontal cable to the horizontal cross connect cabinet.

Vertical cabling will be installed in a star topology too, with each floor cabinets will be connected

- multi twisted copper wire cables
- to the main cross connection cabinet nearby the central phone system.

The cables will be laid vertical in shafts in closed tubes on wall mounted, horizontal in cable trays in false ceilings, on ceiling, in closed flexible flush mounted tubes inside the office rooms.

On technical room at minimum 1 cabinet (regular 2 cabinets) will be installed.

Each 19" cabinet is from steel made, all sides closed, powder coated and equipped with a door (prepared for a cylinder, cylinder delivered by the landlord) with integrated schuko socket module, In panels with integrated assembled panel connectors (RJ45, Cat5 UTP, 68B) for copper cables to the central phone distribution cabinet.

Each workplace will equipped with nje socket outlets (RJ45, Cat 6e FTP, 68B) one used for computer the second one used for phone connection.

Each room will additional equipped with one socket outlets (RJ45, Cat 6e FTP, 68B) for additional phone or other devices in the room.

16 05 00. Transmission data system

It must realise a transmission data system, category 6E, with the following characteristics.

The cabling of IT services must rely to the regulation EN 50174 classes E. Each cable shall be type FTP cat5 for inside installations. All cabling system must be measured after installation. Written reports are to hand over to the client afterwards showing all results.

In general all working positions is equipped with one RJ45 cat.5 data outlet socket. The supply shall be done with one FTP cat.6 lines based on structured cabling systems. The lines shall be connected on each end ready for operation. Labeling has to be done on both ends.

For each outlet in the field, there must be on outlet on the patch panel. The rack is basic models of the manufacturers with following components: front door with 3 mm security single pane and comfort handle with security lock insert, 2 mm steel sheet door on the backside with 130° hinges.



Rack is wall mounted 19" with space for 9 units each. Approximate dim. 2200x600x600mm and is equipped also with the power patch 220V, 3 universal schuko sockets 10A and a 2p breaker 16A.

16 05 01. Equipment for transmission data of the building dispenser (bd)

The transmission data system must begin from the building dispenser BD, described in the previous point telephone system. Besides the attesting modules for the telephonic lines, it must be equipped with the following components for the transmission data:

- Attesting module of lines toward the transmission data users
- SWITCH Ethernet with 24 doors RJ4 Cat. 6E
- Outlet module for active equipments supply
- Cooling ventilators
- Wiring accessories and patch cord.

16 05 02. Transmission data socket points

In the points indicated in the design drawings it must realize transmission data socket points equipped with socket RJ45, connected to the building dispenser BD by means of lines made of a cable S-FTP 4x2x0, Cat. 6E with sheath LS0H.

For the transmission data socket points it is provided for the following execution procedures.

- wall socket points in recess box connected to the secondary electric distribution ducts for LV currents made of pvc RK1 recess pipes, diameter 20 mm.
- wall socket points in exposed box connected to the secondary electric distribution ducts for LV currents made of pvc RK1 exposed pipes, diameter 20mm, IP44.

16 05 03. General notes on the transmission data socket points

The installation position of the socket points indicated on the design drawings is to be considered just an indication. The final position will be stated during the works execution on the basis of the furniture lay-out and the information provided by the Works Direction.

Besides the points indicated on the design drawings attached, the Contractor must provide for the realization of the following further socket points:

- n.°X exposed socket points
- n.°X wall recess socket points.

At the end of the works execution, the Contractor must provide for testing every transmission data socket point, issuing a certificate of the system in Category 6E.

16 06 00. Fire alarm system

The described work includes the installation of the fire alarm system with manual pull stations, smoke detectors and the optical and acoustical alarm.

Materials and components have to be conform to the regulations of Albania and the codes of practice.



16 06 01. Execution

The transmission of a fire alarm is effected by means of the alarm horns.

Annunciator panel

An annunciator panel is installed before the main entrance. This panel is to be used for the extended system.

16 06 02. Alarm devices

Manual alarm push buttons are installed 1.4 m above finished floor. They are red coloured and labelled in English.

The installation shall be surface mounted.

Optical smoke detectors and heat detectors are used as automatic detectors.

16 06 02 01. Control and management fire alarm central

- Intelligent Addressable,
- Max. twomicromodules,
- Max. two esserbus analogue loop modules,
- Short circuit and open circuit resistant loop operation,
- Loop installation with I-Y(ST)Y 0.8 mm cable for a maximum length of 3.5 km, Up to 127 esserbus devices (fire detectors, respectively manual call points)/detector zones, per loop,
- Up to 32 esserbus transponders per loop/, operation of wireless components,
- Connection to graphical supervisor WINMAG via, serial essernet interface (SEI),
- Operating panel with alphanumeric display, 4 x 40 backlit LCD display,
- Event memory for up to 10,000 events,
- Printer interface for internal printer,
- Two batteries with monitoring circuit,
- Monitored input for external power supply unit,
- BUS powered, synchronously controlled, acoustic, alarm signalling devices as per DIN EN 54-3 with, alarm tone as per DIN 33404. Approval: VDS

16 06 02 02. Multisensor detector

Multi-sensor with integrated optical detector and heat detector. The optical measurement chamber is provided with a newly developed sensor technology, enabling the detection of open fires, smouldering fires and fires with high heat generation. Especially for open fires, the classical ionisation technology implemented in ionisation detectors is replaced by the new detection technology. The detector is capable of identifying the TF1 and TF6 test fires described in the EN 54-9:1982 specification. The multi-sensor is an intelligent detector with

- time-related signal analysis,
- signal correlation of the sensor data,
- decentralised intelligence,
- automatic function self-test,
- CPU failure mode,
- automatic adaptation to environmental conditions,
- alarm and operating data memory,
- alarm indicator and soft-addressing.
- loop isolator integrated



In white colour, similar to RAL 9010 The detector is provided with an integrated isolator and a parallel detector indicator can be connected. Approval: VDS

16 06 02 03. Remote indicator for detector

Red prism is - down to the activation - continuously or pulsed illuminated by 3 LEDs. In red colour. Approval: VDS

16 06 02 04. Shallow base sounder white.

Description :The alarm transmitter offers a sound selection of 32 tones including to the DIN tone as well as further country-specific tones.

The configuration is done via a 5 pin DIL switch. Up to two different tones can be activated.

Features: Flat design; Applicable for 12 and 24 V CC operating voltage; Low alarm current; Adjustable audio volume from the device

Technical Data:

Operating voltage 18- 28 V DC

Alarm current @ 12 V DC approx. 3 mA

Alarm current @ 24 V DC approx. 5 mA

Sound level @ 24 V DC 103 dB(A)

Ambient temperature -25 °C ... 70 °C

Type of protection IP 54 and IP 65

Housing ABS V0

Color white, similar to RAL 9010

Dimensions Ø: 93 mm H: 63 mm Ø: 93 mm H: 91 mm (incl. base)

Accessories: IP 65 plate, red color

Approval: VDS

16 06 02 05. Alarm combined alarm signaling device

IP65 base Addressable, completely bus supplied and short circuit / open circuit resilient alarm signaling device in compliance with EN 54-3 with up to 20 different programmable signaling tones including DIN tone in accordance with DIN 33404 Part 3 for acoustic and optical alarm signaling. The volume can be set to 8 different levels. Its flat design enables optimum adaptation to the environments. It is made of shock and scratch resistant plastic. Optionally, the siren bases has the side cable entry and weatherproof protection (IP65) can be installed, in red color. Approval: VDS

16 06 02 06. Alarm electronic module

Addressable electronic module suitable for use in the esserbus and powered loop with alarm latch and alarm indicator. Optional connection for fire alarm central. Without BUS connection, the detector operates as conventional MCP. Built-in loop isolator in the manual call point. In red color. Approval: VdS, CNBOP

16 06 02 07. GSM dialer remote

Controlled bidirectional 5-line configurable as inputs and outputs. It has listening environment, the outputs can be managed by voice call, text messages and phone calls with CALLER ID recognition. The phone numbers are freely assignable to voice calls, SMS, digital protocols CONTACT ID. 5 terminals that



can be programmed as inputs and / or outputs, 8 phone numbers can be associated with events and all the rest. In red color. Approval: VdS, CNBOP.

16 06 02 09. Installation

All cables are installed in a closed steel conduit system (also with-in cable trays). Covers of pull boxes and junction boxes must be red coloured.

The installation is separated from the power installation. The cables must be labelled on the ends for a clearly identification as fire alarm cable.

It must be realised a fire detection system according to the ICE UNI 979 standard with following general characteristics:

The building must be provided of analogical electronic programmable fire detection unit, according to the norm EN 4-2, completely compatible (both for the communication typology and the use and programming interface) with the existing unit in the surveillance room.

The new unit must be equipped for the control of n. 16 analogical loops so distributed:

The new unit must be equipped with serial interface RS-232 and RS-48 for the connection with the Supervision Fire Alarm Centre. Its location is indicated in the design drawings attached.

The fire detection unit must be able to carry out the following functions:

- acquisition of the field detector state
- validation of the read values
- elaboration of the state changes
- local detection and management of alarms and anomalies
- internal self-diagnosis by watch dog
- addressing and individuation of each detector
- alarms and/or anomalies communication to the devices at the upper level
- actuations toward field on upper level command or after local elaborations
- automatic and manual tests of the detectors functionality

The messages that, after query, will be sent by the unit to the supervision fire alarm centre are:

- no state change
- state changes of: single detectors, zones (input and output), supply devices with information about the alarm criteria, failures, reset.
- loss of connection between the supervision centre and the local units
- diagnosis messages as: periphery restart, loss of configuration, clock failure, alarm queue saturated.

The unit must be able to contain: the electronics supply group, the emergency battery and the charge board with battery state check and charge voltage adjustment depending on the temperature.

16 06 02 10. Fire alarm supervision centre

The fire detection system control must be organised in the Fire Alarm Supervision Centre located at the Surveillance Office, and made of:

- Personal Computer INTEL Pentium IV – HD 120MB – RAM 12MB –ETHERNET card 100/1000 (minimum configuration) equipped with interface cards for connection to the LONWORKS network



- printer
- Monitor 17"

The PC of the Fire Alarm Supervision Centre must be equipped with software of maintenance and recording of all the alarms recorded by the fire detection units in the building.

This software must display the state of the fire detection on video-graphic maps on more levels and record the history of the events through tables.

Through the fire detection system maintenance software it must be possible to realise, with a simple graphical interface, all the provided checks on the fire detection plants.

16 06 02 11. Detectors, buttons and actuators

In every room, except for the bathrooms, it must be installed, in the ceiling, analogical optical smoke detectors addressed, with Tyndall effect on appropriate base.

The position and number of detectors must be able to cover the entire surface of the areas to protect.

The indication of alarms in the central unit must allow to exactly identify the room or specific point where the alarms occurs.

This functioning must be realised through analogical detectors, able to provide a punctual alarm indication in each case.

In the compartments equipped with more manual alarm fire buttons, these must be attested to a zone attesting module.

In the compartments with a unique manual fire alarm button, this must be attested to a addressing module for button.

It must install smoke detectors in the following places:

- on the re-start duct of each C.T.A.
- in the roof of any lift case
- in the higher point of the upright columns for electrical and special systems

For each floor it must be provided for a control module for each of the following actions:

- release of retaining magnets for REI doors if if they commanded from the fire central.
- release of retaining electro-magnets for fire-proof shutters
- opening of fixtures for ventilated filters
- sirens action

These control modules must activate the contactors installed on the lines leaving from the REI Doors Magnets Supply 24V Board.

Between each Air Treatment Cabinet and the respective shutter it must be provided a control module for the opening roll in the general switch of every CTA on the CDZ Board.

For each fire-proof shutter it must be provided for a addressing module that must be connected to the micro-switches to signal the open/closed state of the shutters on the display of the Fire Detection Unit.

All the smoke detectors, the thermal detectors, the addressing modules and the control modules must be connected to the fire detection unit by means of analogical loops with cable 2x1 mm², twisted and shielded, laid in ducts and pipes predisposed for the CD systems. The cables for alarm devices and smoke extracting windows must be fire proofed for 90 minutes the cable traying components (clamps) must also be fire proofed for the same time or the cable must installed at minimum 2cm under wall finery (for example vertical installation in the staircase or in a shaft). It is not allowed to install fire proofed cables below systems, components, devices cables and so on which have a lower fire resistance than the



fire proofed cables. If fire proofed cables will be installed vertical on wall, the cable must be laid all 30 cm in a meander form. (safety measure against gliding of the cable). The colour of the detector cables must be Red and separate from all other installations laid in conduits. The connection must be a serial one.

The fire detection system must provide for the software needed for the system functioning and a correct intervention of the actuations.

Fire protection

All breakthroughs (walls and floors/ceilings) provided with cables and lines must be closed to ensure fire protection and noise prevention in accordance with the regulations.

All breakthroughs through fire protection walls must be closed off with F90 bulkheads in accordance with the regulations. The specified space reserves must be complied with.

Installation of cables within installation shaft of other disciplines is not allowed.

Materials and components have to conform to the requirements of Albania and the codes of practice.

The bidder is obliged to submit the official verifications for the fire protection measures offered by him. Official verifications can be:

- Test certificate
- Test decision and
- General construction supervision approval

It must be ensured by the contractor that the fire compartments are realised corresponding to the approval decisions of the individual manufacturers.

If it is not possible for the contractor to realise the fire compartments properly, a corresponding specialist company must be commissioned for the implementation or creation of the fire compartments.

The contractor must ensure that a fire load excess of 7 kWh/m² is avoided for the cable routing and development of the cable lines in the escape routes. If cable lines are laid through corridors or if cable lines extend over 2 fire compartments, corresponding precautions must be made in coordination with the technical construction supervision. The contractor must bear the costs for potential rerouting in the case of failure to comply with the proper routing.

16 07 00. Grounding, potential equalisation

16 07 01. Grounding and equipotential grounding

For the prevention of static charges and the establishment of a uniform electrical potential, all large metal surfaces are interconnected.

Materials and components

Materials components and the equipotential system in the heating, water and ventilation technical rooms have to be conform to the latest regulations of Albania and the codes of practice.

Execution



All metal pipe runs for fresh water, waste water, heating, gases, vacuum and all large metal surface which are liable to be roughed, fitted metal cabinets, equipotential receptacles, etc. are included in the equipotential system. All equipment and all leads are connected individually with a ground wire (4 mm² copper green/yellow) dateable of being detached from the equipotential busbar.

The receptacles for the equipotential connections for portable equipment are designed so that the connecting wires terminate in a standard concealed socket box and are connected at this point to the flush mounted receptacle.

Equipotential busbars are installed in technical central stations. The foundation ground is connected (in strip steel 30 x 3) to these busbars, also the equipotential wires for the pipe system and ventilation ducts. The individual pipes of the heating, vacuum, compressed air and water systems are connected together via the equipotential busbar.

The ventilation ducts are also connected together and joined to this busbar with ground wire.

Telephone and antenna systems are grounded by 16 mm² cable.

The connections are made as necessary to the equipotential system either with grounding clamps or by soldering so as to be fixed, conductive, permanent and corrosion protected.

The equipotential cables are laid uncut from the equipotential busbar to the particular connection point, and are green/yellow coloured only.

All outgoing leads from the equipotential busbars must be individually detachable and clearly, permanently and indelibly marked to indicate wire they belong.

Hot-dip galvanized strip steel 30 x 3 mm is provided parallel with the supply cables, in addition to the foundation grounding strip.

16 07 02. GENERAL EARTH WIRING SYSTEM OF THE BUILDING

The conductors for the protection of the users electrical systems at the examined building service must be made of Y/G coloured core of multi-pole cables of distribution and must have origin in the equipotential bars inside the Zone Electric Boards.

In the bathrooms with bathtub and/or shower it must be realized an additional equipotential connection of the following masses:

Heating system water pipes

Sanitary water pipes

The connections must be realized by means of conductors N07V/K, colour Y/G and cross section area 6 mm², starting from the equipotential collector in a recess box to be installed inside the bathrooms.

The bathrooms equipotential collectors must be connected to the nearest zone equipotential collector through a conductor N07V/K, colour yellow/green and cross section area 2.5 mm².



REF.	PARTS TO BE CONNECTED	NOTES
1	Metallic shield of possible insulation transformers	
2	Possible shields against the electro-magnetic interference	
3	Extraneous masses	metallic parts inside the room at high less than 2. m, presenting a ground resistance $<200\Omega$ ($0.M\Omega$ for the rooms in the 2nd group with micro-shock hazard)
4	Masses	i.e. fan-coils cabinets and bedhead lamps.
	Earth poles of the plug sockets	

Each equipotential node must be separately connected to the room equipotential collector as indicated above.

Beginning from the room equipotential node, the equipotential connections must be brought directly to any single part to connect. Only one intermediate node (sub-node) can be interposed between a mass, an extraneous mass, or an earth pole and the room equipotential node, in order to join various protection or equipotential conductors among one another.

THE REALISATION OF MORE THAN ONE EQUIPOTENTIAL NODE SERVING THE SAME ROOM IS NOT ALLOWED

For this reason, it is necessary that the box containing the equipotential node be dimensioned to place easily the connections needed at the execution stage plus an enlargement of the 30%, in order to match possible future integration.

The equipotential node must be placed inside the room, at well visible and accessible position (during the works execution it must well estimate the location of the room furniture). Each node must be marked by unambiguous serigraph numeration on the box cover containing the node.

The connections to the equipotential node must be realised through ring terminals and must be able to be disconnected individually.

All the conductors coming to an equipotential node must be provided of identification labels unambiguously numerated according to the following convention:

"n1.n2"

where:

n1 = number of the node belonging to

n2 = progressive number of the connection belonging to the same node

16 08 00. Voice announcement system

The corridors and staircases of the Buildings must be served by the Sound Diffusion System the emergency evacuation depending by the Sound Diffusion Unit (SDU), to be installed in the "A-1" Building (see the following point 2. 15).

In particular, the building must be equipped with sound projectors 6W, installed in the positions indicated in the design drawings attached, and connected to an appropriate zone outlet of the SDU through backbone in fire-proof cable according to the CEI 20-45 standard, type FG10OM1 0.6/1kV 2x4 mm², laid in ducts for LV currents system distribution.



16 08 01. General characteristics

The main requirements to be satisfied by this system are:

- functionality and easy safe use
- constant working in time without interruptions
- reliability
- possibility of interface to other systems

The system must be designed and structured for minimising possible failures or bad-workings. It will be realised with the needed self-diagnosis levels to respond to the norm EN 60849 (CEI 100-55). Again, according to this norm, it must be possible to monitor the functions and state of the system, in order to check its functionality and detect immediately possible failures or bad-workings.

The sound diffusion system will allow to send live voice messages to the frequented zones, and to any system's service room, other than diffuse music or automatic alarm messages.

According to the CEI 100-55 standard, the main aim of this system will be to allow a guided and controlled escape from the building in case of fire or other emergency. The system will be able to be interfaced to fire-fighting unit, and will be able to be programmed to transfer the following signals:

- 19 different alarms to be selected during the programming stage
- pre-recorded alert signal
- pre-recorded escape message
- absolute priority live voice messages

Every function must be carried out by operator workstation (n1 supervision station with digital display control)

In each zone (ward) it must be possible (if required) to connect an amplified autonomous system with tuner, CD and microphone for the local diffusion of ambient music, and live voice messages

However, the autonomous system will depend by the main system for what regards the priorities management in case of emergency.

All the components involved in the management of emergency signals will be controlled and constantly monitored by the system's CPU. It must indicate possible failures or bad-workings of these appliances within 100 seconds from their manifestation (as required by the norm CEI 100-55). Besides the appliances it must control and supervision the integrity of the "Critical Path ". This is intended as acoustic signal path from the emergency microphone capsule and/or

the message generator to the speakers line through the amplification chain: any failure relative to the microphone capsule, to its connection cable to the central unit, to the amplifiers and to the speakers line must be properly signaled.

Eventually, the system will allow to carry out, through speakers network, the diffusion of the following signals typologies (listed according a growing priority order):

- diffusion of ambient music in the required wards (low priority level)
- live voice call in the specific zone (ward) by the dedicated microphone workstation (where required)
- live voice call (to zone or zones groups), in the frequented zones and in the whole service area of the structure; use of the supervision console without emergency key insertion
- automatic alarm and/or security messages diffusion (to zone or zones group)

live voice emergency calls (to zone or zones groups); use of the supervision console with emergency

key insertion (maximum priority).

16 08 02. Architecture and functionality

As a whole, the sound diffusion system will be made of:

- a central unit for amplification provided of digital controller that provide for all the control and check functions of the system (up to 36 zones and will be predisposed for 18)
- n. 1 main operator workstation for the supervision with digital control connected to the central unit
- autonomous amplified system with tuner, CD and microphone for music and local messages
- speakers network for the sound diffusion into the various served areas.

The central amplification unit architecture must be based on a modular, flexible, easily to enlarge system with the possibility to diffuse service and emergency messages, and able to be interfaced to the fire detection central unit, according to the norm EN 60849 (CEI 100-55).

The system will provide for the use of a signals chest where it will be possible to put up to a maximum of 20 modules. In this chest it will be put the input/output modules, the zone selectors, the output line, the suppliers, etc. On the bus lines of the main card runs the supply lines, the acoustic signals, the serial communication line, and the service signals (priority, etc). The chest is fixed on sliding rails that allow its extraction from the rack and to access inside it without completely removing it. Thus, the installation and maintenance of the modules results extremely easy and functional. In the fore part of the modules it is reported the commands, the indications and main adjustments, while in the back there are all the connection sockets and terminals. The modules are easily inserted in the chest from the upper part without any further wiring operation inside the chest itself.

The system will allow the diffusion through speakers of messages, service communications (possibly alarms as well) inside the required areas, for a total of n. 14 diffusion zones. However, the central unit will be predisposed for the control of 18 zones.

All the functions of the system will be carried out by the supervision and control console. The calls will serve n. 12 separate sound lines (one for each zone) with the possibility to activate them at the same time, or together in groups either for service, notices or people search communications and for possible alarm messages in emergency situations. Each sound line is connected to the respective zone amplifiers (their number and power will depend on the number and power of the speakers to install in each zone).

Depending on the circumstances, the operator will be able to make, from the microphone station, both calls to the corresponding line (or group of lines), where he wants send his message, and a general call to all the zones of the system.

The supervision digital console will be equipped with a controlled microphone, a wide supervision LCD display, and a hexadecimal keyboard to allow to carry out any management function of the system. Two extension modules will add 24 keys to the keyboard in order to quickly call and display through a LED the state of the various zones.

Through the console it will be possible:

- Display the failures and alarms logs through date/hour/minutes
- Make service calls to each zone or group of zones
 - Check the whole state of the system.

A security key will let the security staff:

- Reset possible alarm signals: this event is recorded in the memory as date/hour/minutes.

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- Send pre-recorded escape and alarm messages into particular zones: this event is recorded in the memory as date/hour/minutes
- Send live voice escape and alert messages.

When a failure occurs, a buzzer in the console will provide the acoustic signal that will be able to be re-stored by the keyboard or the security key.

The pre-recorded escape and alert messages will be managed by an opposite module. This will dispose of pre-recorded messages completely controlled and diagnosed, suitable for escape system, according to the norm EN 60849 (CEI 100-55). In case of danger, it will be possible to reproduce the two messages into two different zones at the same time. The messages sending can occur automatically (controlled by a contact of the fire-fighting unit) or manually through supervision console. All the emergency acoustic signals (supervision console and pre-recorded messages) must be addressed through apposite routing cards. These modules manage, controlled by the modular system CPU, the addressing of the emergency signals toward the amplifiers. The module will have 6 program inputs and 6 outputs for as many amplifiers. In conditions of normal working (not in emergency), the signals applied to these inputs will be reported faithfully to the outputs. In emergency conditions, the VES signals (acoustic emergency signals whose path must be completely diagnosed) in the system bus will be taken and sent to the outputs the programming recorded in the control CPU. Through this module, it will be possible to send at the same time pre-recorded alert and escape messages into different zones.

The acoustic control unit will be able to be interfaced with the fire detection central plant through I/O contacts (cards 8inputs/8 outputs); using the digital input and/or output contacts will be possible to receive commands and if necessary activate external emergency signals. It will be possible to program each contact during the stat-up stage, in order to send an escape message into the danger zones and, at the same time, send the alert message to the neighbouring zones as well. Using a PC connected to the system through a dedicated software it will be possible to communicate with the system, sharing data relative to the configuration and recording the possible failures occurred during the normal working. In total, the system is able to guide the different zones (1) The amplifier dedicated in each zone has been dimensioned in order to cope to future enlargements.

Each zone is served through a modular power unit 120, 240 or 500 W RMS (depending on the required power) with constant voltage output (100/70/50 Volt), provided of thermal protection on the final parts, forced ventilation system and serial card for remote diagnosis control. It will be provided for the reserve amplifier with automatic commutation in case of failure of the main appliance. A supervision modular card let the control of 4 amplifiers and a reserve. It must be possible to group this control on a higher number of amplifiers (4/8/12 etc.) and a reserve.

All the appliances will be mounted of apposite cabinets standard rack 19". The central rack mounted and tested must be provided complete of ventilation panel, closing panels for the not-used spaces, fore doors with transparent front and key lock and closing back doors.

The Sound Diffusion Plant must be supplied of electricity through a 230Vca single-phase UPS group with 6kVA of power, provided of gas recombination batteries with 10 minutes of autonomy.

16 08 03. Device and speakers network

1. Tuner / CD / MP3 Player MP02. The tuner / CD / MP3 Player combination MP02 also includes a Flash disk reading device. The player can also be operated using the supplied remote control. The 2 audio outputs facilitate the simultaneous playback of both sources.



2. The central control unit system, together with the four-channel amplifier, forms a complete voice alarm system for such projects. The emergency power supply is built in to the four-channel amplifier. For voice alarm systems compliant with DIN VDE 0833-4 and electro-acoustic emergency warning systems compliant with EN 60849. All power amplifiers are continuously monitored. In the event that a power amplifier fails, it can be replaced dynamically by a backup amplifier. The switchover is carried out automatically by the central control unit system. The loudspeaker cables are continually monitored for short circuits, earth faults, interruption and impedance variations. Incorrect loudspeaker zones are isolated without feedback.

The central control unit system has storage capacity for preset announcements that can be used for alarm texts and signals (escape alarm, caution signal) and warning signals (gongs). The volume of each source and each amplifier channel can be controlled. Additional filters, such as parametric equalizers, high and low pass filters, and delays, are also available. In compliance with standards, all disturbances are detected within a matter of seconds, displayed and logged. The central control unit system is equipped with four independent amplifier channels to operate a total of 8 loudspeaker zones or four loudspeaker rings in high loop technology. It is also possible to mix the both technologies in one. The central control unit system also has 12 contact inputs, 8 of which can be programmed to be monitored, as well as 8 potential-free relay outputs, one audio-line output, up to 3 audio-line inputs and/or up to 3 microphone inputs, 3 DAL connections and one connection. This variant offers Ethernet networking with other Ethernet-capable equipment in this system.

3. Four-channel power amplifier with built-in battery charger for emergency power supply of the central control unit system. The amplifier has four independent amplifier channels with 125 W each in class D technology. The amplifier can be used together either with the central control unit system.

4. Digital Call Station, Part of EN54-16 approval 0786-CPD-20997, Approval: VdS. The Digital Call Station is used to select loudspeaker circuits as well as for the issuing of voice announcements and of various tones and/or alarms. It is equipped with 12 freely configurable keys, 13 LEDs and a swan neck microphone. The communication unit can be connected to a free DOM (Digital Output Module) DAL bus (Digital Audio Link) via a standard CAT5 cable. All audio signals as well as all control signals are transferred digitally. Up to four Digital Call Stations can be connected to one DOM. Every Digital Call Station can simultaneously produce and receive different voice signal through connections and control signals within the system. One digital call station can be relocated by up to 300 m via a CAT5 cable (expansion up to 2,000 m possible using fiber optic cabling) and can be expanded with up to six digital key modules; this increases the total number of available keys and LEDs to 120 per communication unit. The function of the microphone in the digital call station is permanently monitored acoustically. The digital key modules furthermore provides an external audio input and output which can be used to connect audio devices such as CD players or tape decks.

6. Recessed Ceiling Loudspeaker, 6-10 W, Plastic ceiling loudspeaker with integrated 100 V transformer and metallic lattice. The Loudspeaker is perfect for recessed mounting. Mounts easily and almost invisibly. In white color, similar to RAL 9010.

Considering the technical-functional characteristics of the system, and considering that in particular conditions it can be emitted alarm messages, in order to best cover the service area it must use a diffused acoustic system of the whole area. This solution guarantees an optimal distribution of the acoustic pressure levels of the various signals ensuring, at the same time, a good level of the spoken signal.



The speakers lines must be tested according to the normative CEI 60849 (CEI 100-55) standards (integrity and ground connection). Besides the line impedance measurement, it must insert a card of end-line able to guarantee and control the effective integrity of the line itself. The connection of the speakers line must be made "in chain" (from the first speaker to the second, to the third, etc).

The speaker to use will be recessed ones. They will be made in ABS self-extinguishing, with frontal metallic net. The power will be 6 W (adjustable to 6-3-1.5 W). The maximum acoustic pressure (nominal power/1m) is 96 dB.

16 09 00. Speakers connecting lines

From the Sound Diffusion Plant previously described, it will be realised new distribution lines of the acoustic signal through multi-core cables with sheath FG10OM1 0.6/1kV CEI 20-22, 20-37, 20-38 e 20-45 laid in ducts for the secondary distribution of LV currents within the false ceiling of the corridors in the horizontal routes, and on the platforms for LV currents in correspondence of the upright columns.

16 09 01. Properties of the maintenance central unit

Maintenance central unit up to 16 users with 2 separate channels of communication including supplier with 36 Vcc, dimensions 234x396x96 mm; (1 20x1 55x42 mm supplier) having the following possibilities:

- to expand up to 32 users with accessory cable;
- of two-ways communication with live voice and receiver;
- to recognise a not existing number;
- to dial emergency calls;
- to signal through a flashing device in case the called user results absent;
- of call transfer and to make hold the line, during a conversation and during the call by a third person;
- of call transfer to a third person;
- to have, for a single user, the filtering of the calls coming from another user;
- to pre-define 3 groups of users to whom it is possible to communicate a single announcement;
- to carry out a general announcement or an emergency call by means of a special signal to all the users;
- to pre-define a user who can carry out priority calls;
- to open one or two doors with a call that can be transferred to a central point or to a nocturnal point to identify from which door the call arrives each 2 users it must defined one card.

16 10 00. Cctv network system

It must provide the installation of television-cameras in the following rooms:

- All the entrances building
- Corridors

In each surveillance room of each floor it must provide the installations of recess pipes (PVC pipe of 20 mm of diameter and the television-camera) and relative inlet recess boxes for the TVCC monitors workstations.



16 10 02. Technical characteristics

To provide a permanent record of activity from all cameras enabling 24 hour monitoring of all the designated areas.

To enable clear identification of miscreants within the range of the cameras.

To provide continuous recording of all cameras in the system.

To enable rapid movement of any Dome camera to pre-set positions of pan, tilt and zoom.

To enable live, real time recording of selected cameras.

Equipment

Cameras:

Indoor IPCameras

The indoor IP cameras containing a varifocal and several fixed focal models. The camera is equipped with a Super Low Lux CMOS image sensor which allows the camera to provide a colour live view in near darkness. The camera features a mini USB port which supports wireless connection through a Wi-Fi Adapter (optional) or external storage using a USB hard drive.

Minimum requirements:

- H3D1F2X, 2.5-6 mm VFAI, F1.2,
- Horizontal Angle of View Wide: 87.9°Tele: 37.9°,
- Vertical Angle of View Wide:48. 6°Tele: 21.3°Network,
- Day/Night, Rugged,
- Indoor Mini-dome,
- 1/4" Progressive Scan CMOS,
- 720p Resolution,
- 24 VAC or PoE IEEE 802.3af
- Class 1,
- Height of installation 264 cm
- Colour white similar to RAL 9010

Outdoor IP Cameras

The outdoor camera should be (IP66 and IK10) and designed for environments of extreme temperatures. Being a day-and-night camera, it must also equipped with a super low lux CMOS sensor with which the camera is capable of providing a colour live view in near darkness.

Minimum requirements:

- 1080p resolution in HD format
- Day/Night function with removable IR cut filter
- Vandal-resistant and IP66-rated robust design
- Built-in IR illuminator with 30m (45m*) viewing distance
- External adjustments provides easy access to on-site set up
- 3–9mm (10-23mm*) MZF (motorized Zoom / Focus) VFAI lens
- Angle of view:
 - Depth 93° (W) ~ 38° (T) ± 5°,
 - Height, 73° (W) ~ 30.4° (T) ± 5°,
 - Vertical 56.6° (W) ~ 23° (T) ± 5°,



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- IR LED Quantity,
- 16 IR LEDs,
- Interface,
- 10/100 Ethernet,
- Protocol, HTTP, TCP, UDP, SMTP, FTP, DHCP, NTP, UPnP, DynDNS, 3GPP/ISMA RTSP, PSIA,
- Operating -20 °C ~ 50 °C / -4 °F ~ 122 °F,
- Humidity 10% to 90% (no condensation),
- Colour white similar to RAL 9010

Network Video Recorder NVR

The NVR (Network Video Recorder) records video and audio data over TCP/IP networks.

NVR, 4TB RAID5 storage, 16 channels, Performance Package NVR should be an open, flexible and scalable IP videosurveillance system. Utilising high definition cameras, NVR must be a powerful, high definition IP recording system and viewing client for small to medium sized installations. NVR is an open platform and supports broad third party device integrations with support for standards—PSIA and ONVIF (including Profile-S devices), real time streaming protocol (RTSP) standard and native device integrations including new 360° camera support. NVR provides easy to use desktop clients and mobile apps. The NVR user interface offers a feature rich user experience.

Minimum requirements:

- Support for up to 24 Cameras
- HDD Capacity over 4TB RAID5,
- LAN Port - 2 x Gigabit RJ-45 Ethernet port.
- Viewing System - Windows XP/ Vista/ 7,
- Authentication - ID, password,
- Protocol - TCP/IP, DHCP, DNS, HTTP, FTP, NTP, SMTP, UPnP.
- Recording Mode - Continuous,
- motion-triggered recording,
- tampering triggered recording,
- scheduled recording (daily, weekly, specific day),
- audio-triggered recording,
- IO triggered recording,
- manual recording.

System Controller

Minimum requirements:

Main System:

- Defining detection zones by drawing rectangular areas instead of drawing a line in Object Counting and Intrusion Alarm
- Extend recording length beyond maximum video clip size during motion recording in order to begin each recorded clip with a key frame, which can avoid gap between video clips due to GOP setting of the IP device

LCD Monitor

Minimum requirements:

- 22" open frames LCD
- Active matrix TFT-LCD – 16:9



- Pixel Pitch: 0.294mm DP
- Contrast Ratio: 400:1
- Colors: 16.7m
- Video: Dsub/DVI
- Response time: 20ms
- Range of vision angle: 160 degrees
- Max resolution: 1360x768/1280x768 promotions
- Ability to show up to 16 pictures / screen to be divided in 16 parts with the same quality.
- Desk and Wall mounted type

Rack

Central processing unit of video surveillance and connections are placed in a lockable 19" rack with a space of 36 units. The rack is +basic model of the manufacturer with following components: front door with 3 mm security single pane and comfort handle with security lock insert, 2 mm steel sheet door on the backside with 130° hinges.

Approximate dimensions are 600x600x1715mm.

The rack construction shall be produced in accordance with EN ISO 9000, 9002 and DIN 41488.

16 11 00. Access-control system

Product description and technical details

The access-control central(ACC)is a high-performance central and security field panel. This ACC is installed like a physical main unit, integrated access-control and high security solutions. The ACC is capable of holding multiple access-controls and security applications from a single panel, while managing up to 96 doors(possible only with 2.30.xx firmware or higher). ACC processes all the special events, independent from the main unit. This offers an integrated system even in the cases of communication failure. This also allows for high speed information transfers, since the user doesn't have to wait for a decision from the main unit.

1.Standard Access-Control, 230V AC, its a high quality control panel which achieves all the requirements of an advanced control system. Its current performance can sustain a more advanced technology and system implementation in the future.More than two special doors or 1 door with internal and external card reader can be connected through conventional means.The communication module allows for an extension according to specific need of the RS-485 cable with BUS technology to a maximum of 8 doors(16). Seeing that standards and requirements are ever increasing, two controllable RS-485 interface drivers are integrated into the communication module. Also automatic clocks for regulation between seasons.

- Variable door lock release, monitoring and alarm periods
- Automatic function control via time zones (e.g.: door lock release, etc.)
- Special relay function for real-time release for rescue route interface
- Convenient and flexible event control via inputs and output modules
- Macro control (intrusion detection system control, lift control, etc.)
- Zone change control
- Blocking of repeated access



2. Short-distance card reader with proX2 keyboard. Information panel and clock with RS-485. Capable of reading proX1 cards, IK2 and IK3, configurable with industry standards(13.56 MHz Read/Write

- Simultaneous operation standard multi-RF
- Advanced security option, DES/3DES encryption
- Physical control system Master and automatic management key
- Easy of application installation
- Compatible with ISO 15693 and 14443 A standards
- Configurable with the LEGIC ruleset of the transponder
- Easy commission
- Simple RS-485 location address, manual or automatic
- Special evaluation methodology guarantees stable transmissions

3. Electrical switch for the gate which has access-control with openings on both sides monitors the contacts, current load and usage on the gate surfaces(independent positioning)

4. Alarm button- electrical addressable module fit for BUS and loop functions for IQ8MCP centrals and 804905 code. Optional connection for conventional MCP. Without a BUS connection it operates as a conventional MCP. Built in a loop isolated with a manual call button. White color, similar to RAL 9010. VDS, CNBOP certification.

5. Exit button

6. MultiAccess is a new development based on a client or smart server architecture having a high-speed data connection. This makes the A-C wholly scalable, even though virtually it isn't a subject of any stop, while respecting number of users, doors, rooms, etc... The server and the RAID system offer higher security to the control system. All the data is transferred encoded and all critical information is also encoded. The server can be operated with a Windows or Linux system.

The whole MultiAccess system ensures a specific division according to the usage of the last user(including the creation and administration of the personnel and the access authorization and the understandable evaluations) and the equipping of the NetEdit installer for physical definitions. MultiAccess supports different access-control systems. Usually, the registration time in terminals and interventions in the alarm control panel can be connected together. The data system used is a free SQL program, part of the standard package and automatically installed. The maintenance is automatically done. To connect the existing SQL data systems(Oracle,IBM-DB2, MS=SQL server,etc...)the professional package has been used.

7.Printable ID access cards. The ID card is equipped with a chip for the methodology and IK3 codes. The data are registered inside the card and protected from damage.

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16 12 00. Technology equipments

16 12 01. First Room – Waiting Room



Technical Description

4 columns, each made of 3 screens set vertically



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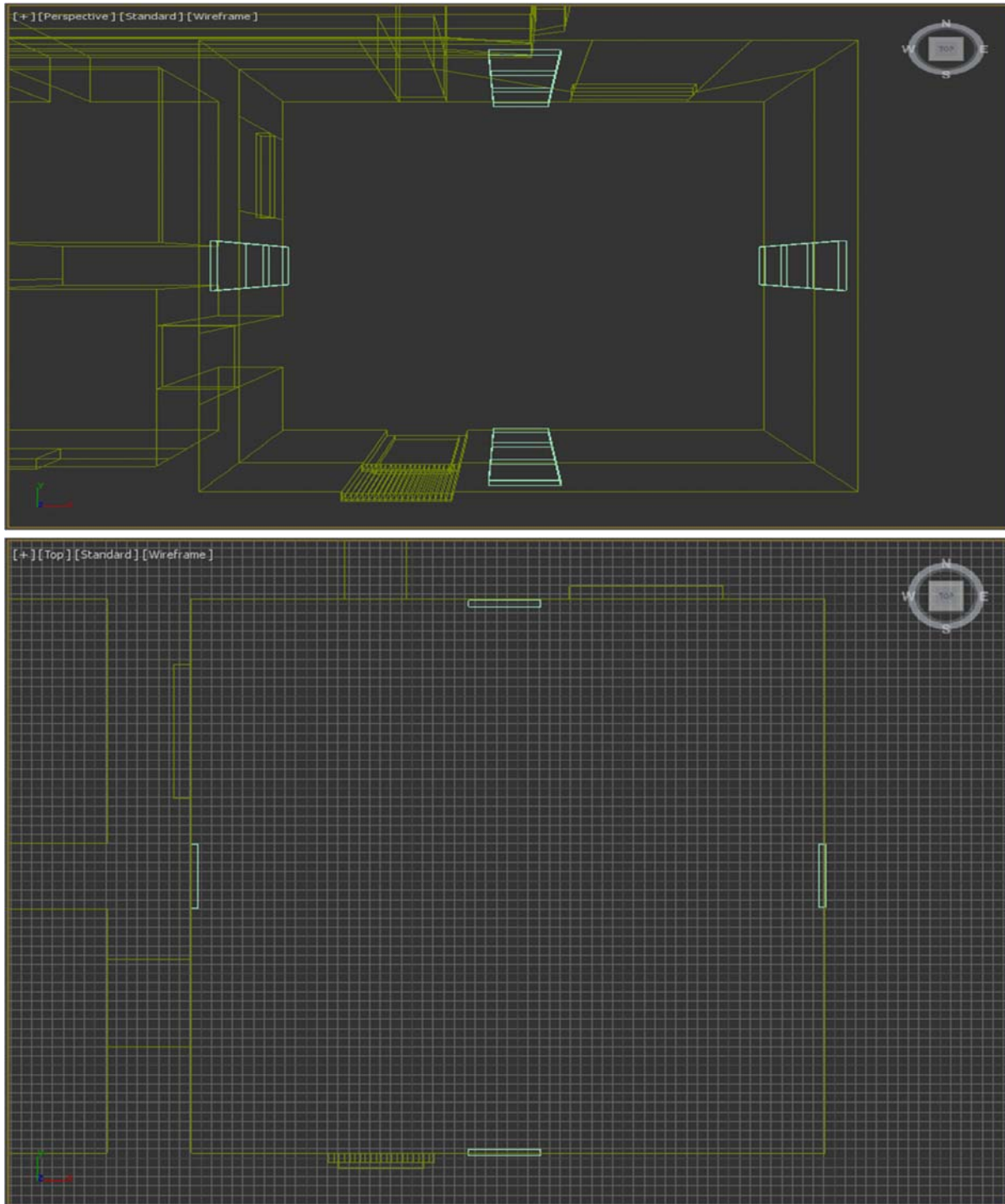


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Equipments

Screens x12

4 columns, 3 monitor vertically set in each column,

Minimum Requirements: Each Monitor: 55", 1920 x 1080, ultra narrow bezel (less than 2 mm.)

Rough Dimensions: 1211,6 x 682,4 x 96,3 mm

Media Player x4

Technical Electrical Specifications



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One for each column

PC 1

Only one pc connected to the 4 media players (if it wouldn't be possible to connect with cables all the columns to a single pc, each colum could work independently; we'll lose coordination between the videos in different columns, but it works anyway)

Software 1

Cables

Custom designed columns x4

Audiovideo Contents

16 12 02. Second Room – Lukewarm space

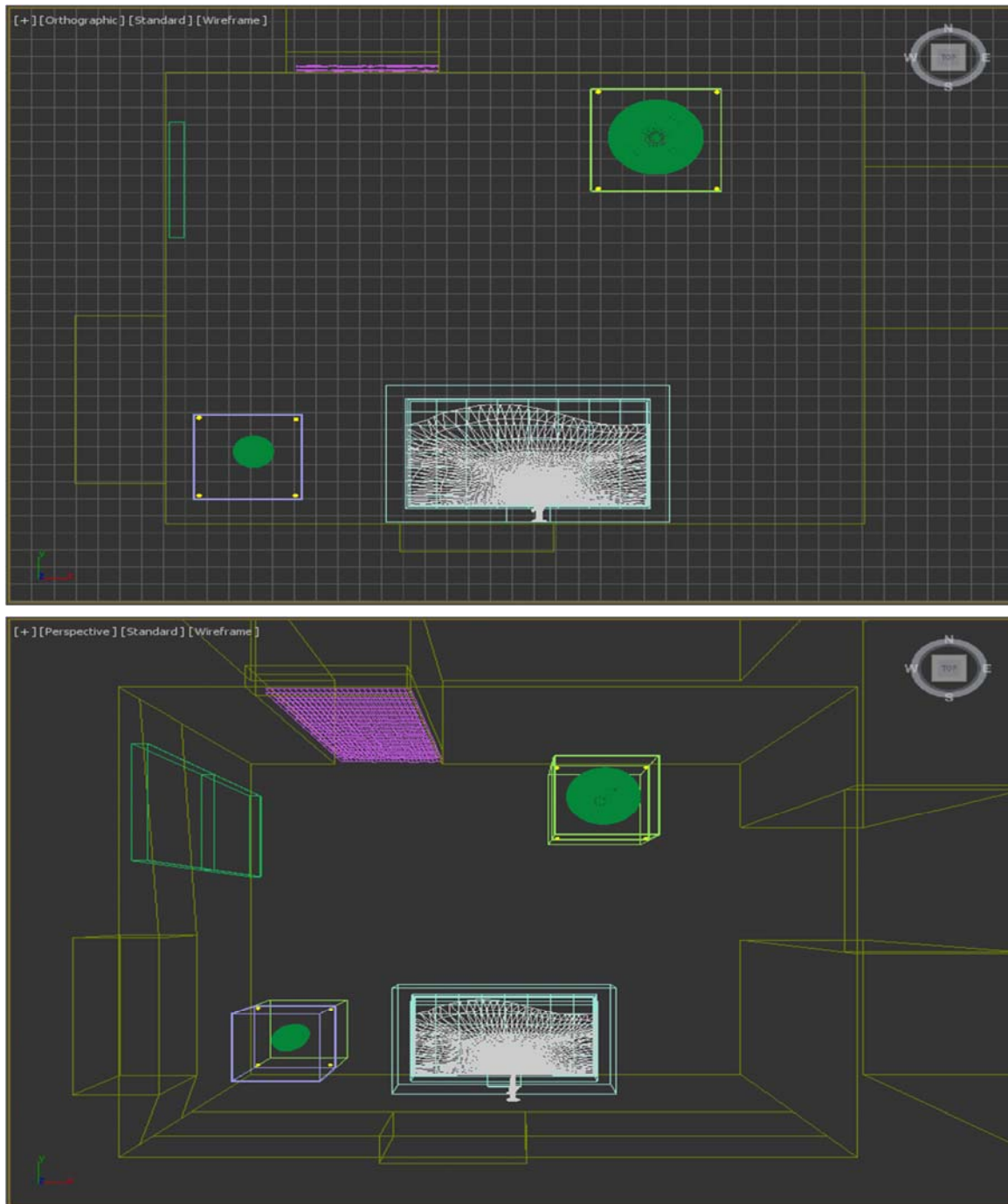
General Description



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Technical Description



Equipments

Screen x1

Monitor set at the basement of the sink, protected by a glass to avoid contact with water.

Minimum Requirements: 55", 1920 x 1080

Rough Dimensions: 1211,6 x 682,4 x 96,3 mm

PC x1

Technical Electrical Specifications

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Interactive sensor x1

Software x1

Cables

Custom designed sink and tap x1

Audiovideo Contents

16 12 03. Second Room – Lukewarm space (Purification)

General Description





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Technical Description

For the room technical drawings see the previous installation

Equipments

Screens x2

Column of 2 screens set vertically.

Minimum Requirements: Each Monitor: 55", 1920 x 1080, ultra narrow bezel (less than 2 mm.)

Rough Dimensions: 1211,6 x 682,4 x 96,3 mm

PC x1

Interactive sensor x1

Software

Cables

Custom designed column

Audiovideo Contents

16 12 04. Third Room - Hot Hammam

General Description

This room will virtually reproduce the old times Hammam, with steam filling the room.





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Technical Description

A fog machine that turns on when someone enter the previous room, so that steam and special fluidi are not wasted.

Every morning at the opening of the museum the special fluid tank has to be checked and eventually filled.

Equipments

Fog Machine x1

1000 Watt, DMX receiver

Usage note: the fog machine needs a special fluid in order to work. The liquid should be checked every morning at the opening of the museum. A 5 liters tank, should last a week (depending on the number of visitors and duration of usage), and it costs about 15 Euros.

Cables

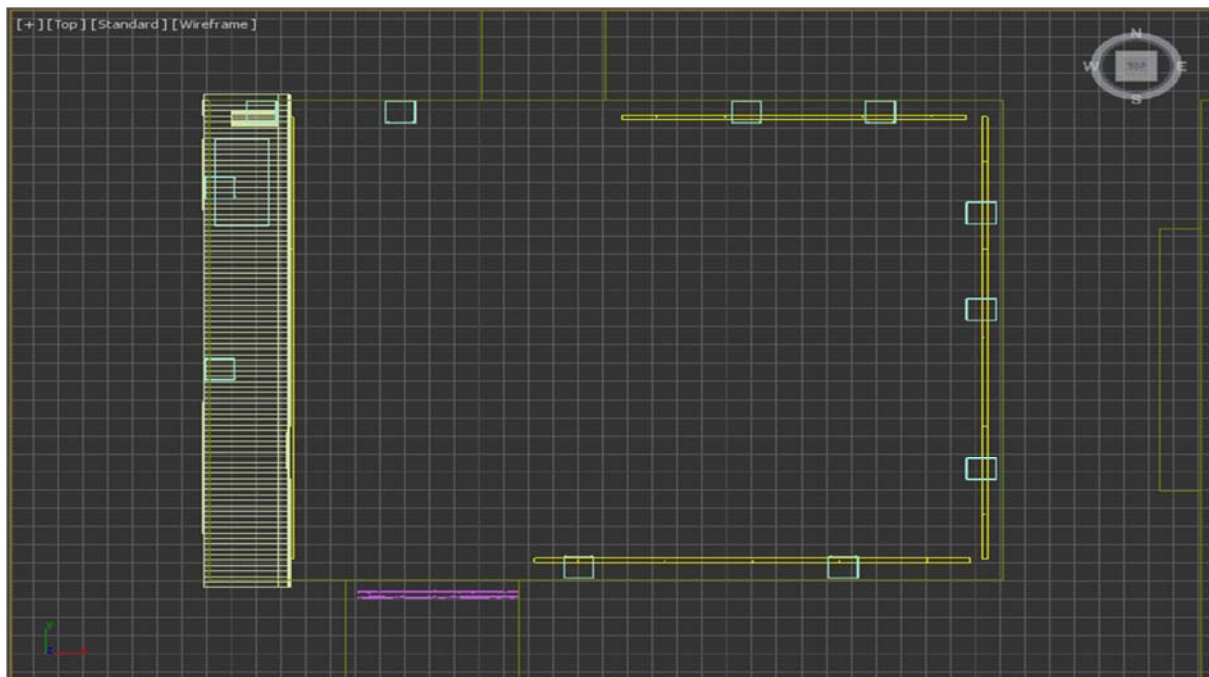
power supply of the Fog Machine x1, cable to connect the interactive sensor x1.

Interactive sensor x1

A presence sensor, to be installed in the previous room, in order to turn on the fog machine when someone is there, and don't waste fog and special liquid if there is nobody there. It could be connected to the fog machine via DMX or Arduino.

16 12 05. Third Room – Hot Hammam (Old Times Conversation)

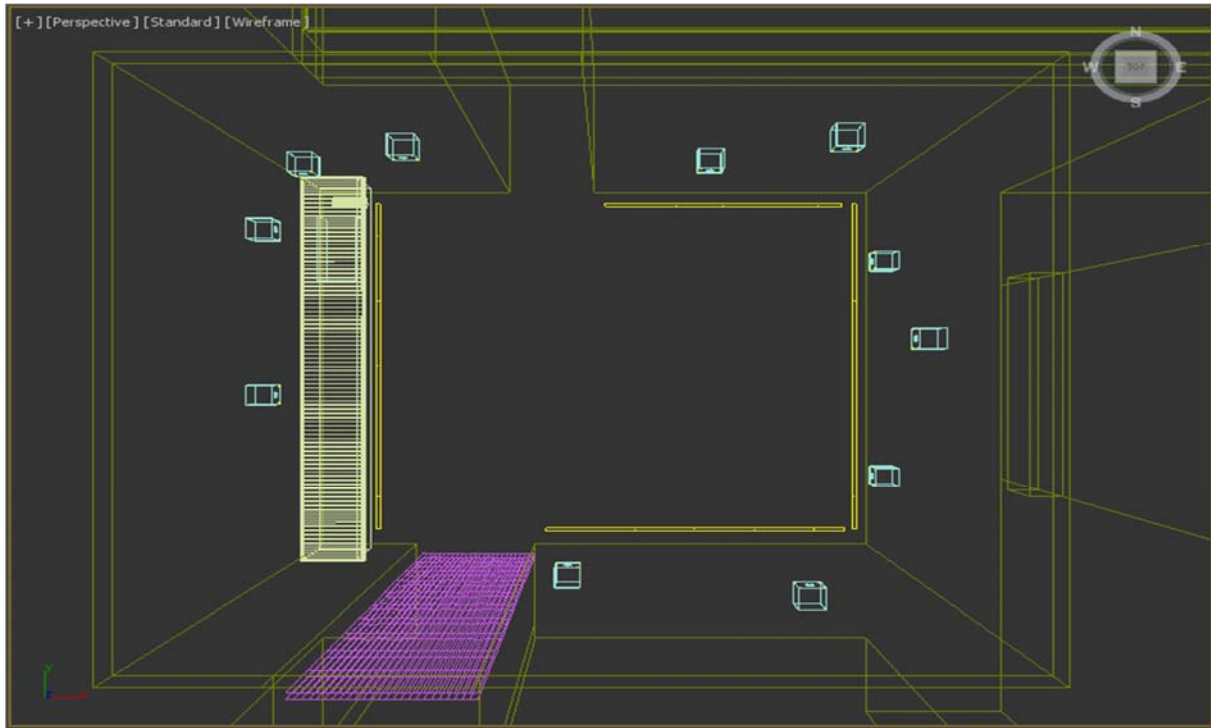
Technical Description





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Equipments

Led lights and/or strips

Speakers

Cables

Media server

Custom designed wall structure

Audio Contents

16 12 05. Fourth Room – Water Deposit

General Description



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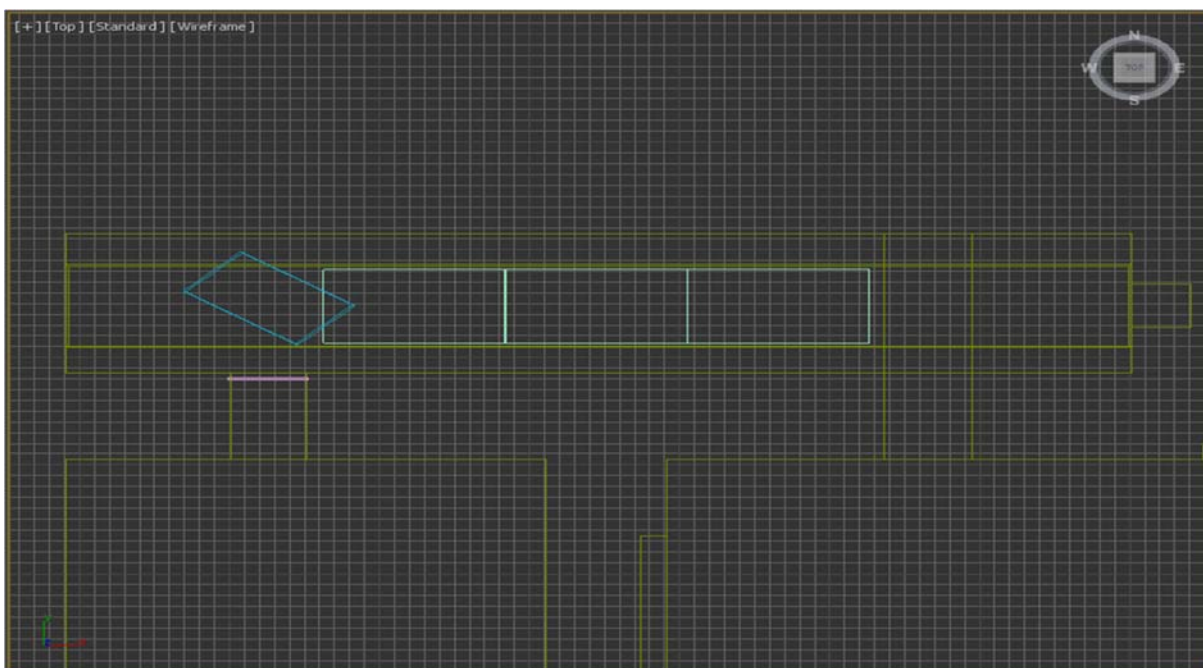


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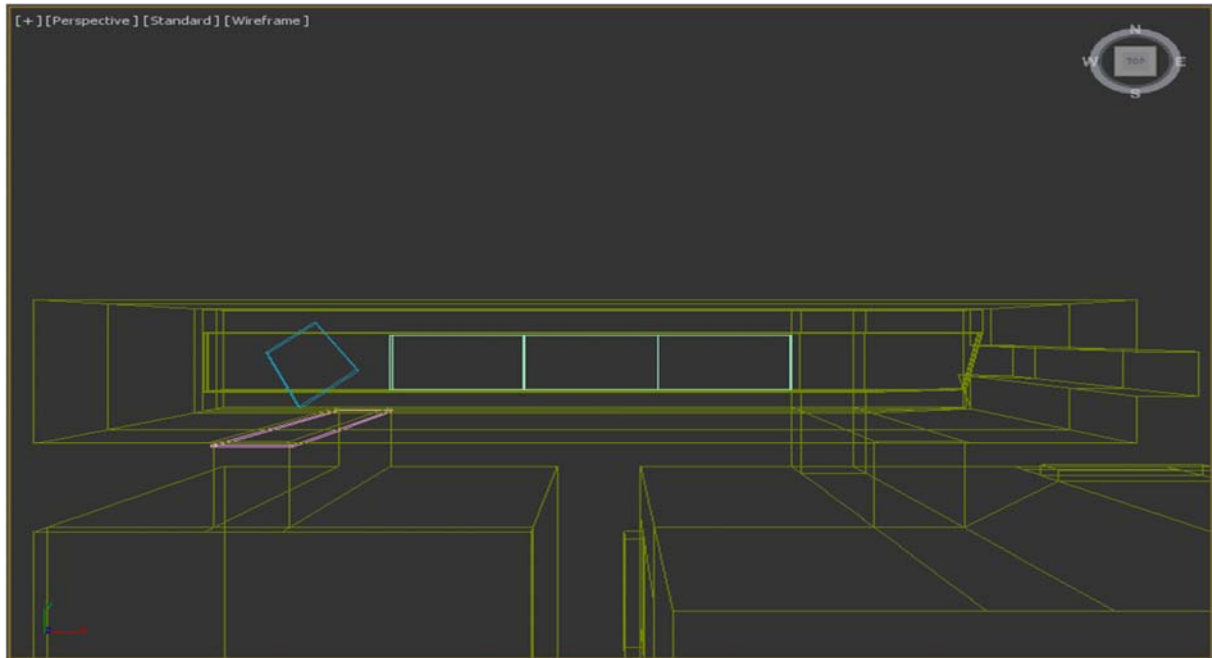
Technical Description





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Equipments

Screens x3

Minimum Requirements: Each Monitor: 55", 1920 x 1080, ultra narrow bezel (less than 2 mm.)

Rough Dimensions: 1211,6 x 682,4 x 96,3 mm

Mirrors x2

Media server

Cables

Custom designed doors

Audiovideo Contents

16 02 06. Velocity System

The Atlona VTP-800 is a Velocity System 8" touch panel for AV control and room scheduling. VTP-800 features Power over Ethernet (PoE), enabling a single network connection for data and power. Setting up the touch panel is effortless as the AV control GUI is automatically uploaded from the Velocity System hardware or software server gateway during system configuration

Specifications



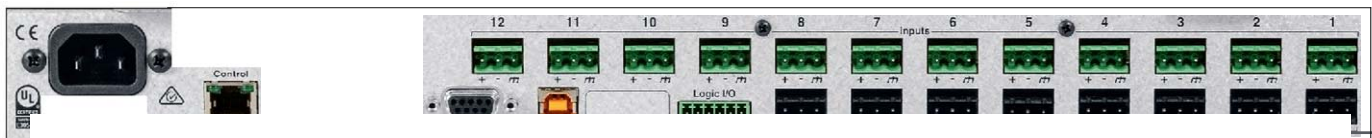
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Display		
Panel	Capacitive touch, 8” LCD, 1280 x 800	
Color Depth	8 bits per channel / 16.7 million colors	
Audio		
Microphone	Digital MEMS (MicroElectro-Mechanical Systems)	
Speaker	High-Fidelity, 2 W	
Sensors		
Electro-optical	Ambient light sensor	
Proximity	Advance “time-of-flight” sensor	
Power		
Type	PoE 802.3af compliant	
Dimensions		
H x W x D	Inches	Millimeters
	5.84 x 8.79 x 1.42	148 x 223.50 x 36
Wall, 2-gang, H x W x D	2.05 x 3.41 x 0.81	52.14 x 86.64 x 20.45
Weight		
Device	Pounds	Kilograms
	1.0	0.45
Certification		
Device	CE, FCC, RoHS/WEEE, CB (safety)	

16 02 06. Data sheet tesiraforte® ai fixed 1/0 DSP

TesiraFORTE® AI is a fixed 1/0 DSP with 12 analog inputs and 8 analog outputs and includes up to 8 channels of configurable USB audio. USB audio allows TesiraFORTE to interface directly with USB audio hosts, as well as to take full advantage of today's most sophisticated conferencing solutions.



VO! The above materials or their equivalents that will be used during installations, must comply the technical-electrical specifications regardless of the manufacturer or bands.

Prepared by:

Ing Deshira Mena