

REQUIREMENTS OF THE CONTRACTING AUTHORITY for



“Residential buildings in RLE (Regulated Landed Estate) IV-1371, 1389, 1390, 1419, quadrant 83, locality of Vitosha – “Simeonovo” HPP, “Lozenets” district

GENERAL PROVISIONS

The residential complex is located in a corner estate surrounded from three sides by streets and with main inclination towards South. It consists of two residential blocks – A and B. Block A is with free building-up, while block B is with free building-up from block A and with connected building-up from RLE II-1193.

The buildings are of IV category according to Art. 137, Item.4, Letter b of the TPA (Territorial Planning Act).

The buildings have five floors, two of them being terrace-type floors /included in the under roof space at cornice level/ and an underground parking. Due to a terrain out of level the parking in some sections consists of one floor, covering completely the area of the estate and in some sections consists of two floors. Two external ramps provide access to the parking.

The terrain outside the main buildings has lanes, plants and water surfaces and is designed to create and optimal habitat. A fence shall be provided /subject to a particular design/, as well as security premises in block A and block B at the main entrances. An area for domestic waste and utility refuse is provided.

Kiosk switchgear is designed for the purposes of the complex. This kiosk switchgear is not subject of the present tender

The bearing structure is of monolithic reinforced concrete beamless type, with brick walls and flat roof of reinforced concrete. Each building is separated with dilatation joints into sections with different level of entrance – three sections in block A and five sections /six entrances / in block B.

The vertical communication comprises double-flight staircases and lifts with lower machine unit in each entrance.

The heating is based on local heating with natural gas. Central system for cooling of apartments is designed. In addition, thermal insulation at façade surfaces, bay windows and terraces is provided.

Contents of the buildings:

BLOCK A AND GARAGES.

Block A consists of three sections with entrance from the street.

Below block A the underground parking has two levels.

In the basement (cellars) there are provided storage premises, and for some apartments such premises are provided inside. At level -3.70 two boiler rooms are provided for the tow blocks, a diesel generator and a sprinkler.

Each section includes 3 apartments per floor, including at I –terrace-type level; at II –level the total number of apartments is 5.

The option is used for projections above the roof at 45 degrees according to the provisions of Art. 93 Par. 2 of Decree №7.

BLOCK B

It consists of five sections /six entrances/ with access from the yard. Each section includes three apartments per floor, except for entrance A where there are two apartments at the level of entrance.

Due to a terrain out of level the basement corresponds to the level of the second underground floor.

The level of entrance from the street is below the street level, but is separated from it and by terrain processing is constructed as a surface level.

A passage for connection with the yard is constructed at the level of entrance near the blind wall at RLE II. Fro there access for the security is provided.

The option is used for projections above the roof at 45 degrees according to the provisions of Art. 93 Par. 2 of Decree №7.

The volumetric and planning conception is characterized by a stair-type silhouette of the buildings and with trapezoid frames called vertical pergolas. Block B is also characterized by a cylindrical solution and with glazing of the obtuse angles from the street.

The following materials are used for the facades:

- Mineral dragged plaster on thermal insulation.
- Suspended façade of structural type for cylindrical elements
- Fretwork metal railings
- PVC millwork
- Sun-protective elements on first and second terrace-type floors.
- Fretwork barriers on the terraces between the apartments.

Technical parameters:

- **Number of apartments - 128, of which 50 are in block A and 78 are in block B**
- **Number of garages - 157, of which in I basement there are 53, and in II basement there are 103**
- **Are of the plot – 5340m²**
- **Built-up area: 2 120 m²**
- **Real built-up area: 13 915 m²**

Scope and requirements towards individual types of building and erection works

1.1. Architectural part

Actually this is a design for two 5-floor buildings with residential designation. According to the visa 98% of the lot is used at the basement area in two levels for parking lots, cellars, sprinkler installation, boiler and machine rooms, lift and distribution station. The access to them is provided by 2 ramps with width of 4,20 m and with inclination smaller than the admissible, with reinforced concrete pavement. 3 metal doors with smoke-tight seal and self-closing hinges are designed between the garages, the staircase and the lifts.

The out-of-leveling of the terrain at the Eastern street is from 629,21 to 630,10 m, at the Western street - from 631,23 to 633,40 m, and at the Southern street - from 633,80 to 630,35 m as pictured by „GeoCAD” company and according to the enclosed project for vertical leveling. For block “A”- sector A1 the elevation is - 0,55=631,75 m ; for sector A2 the elevation is +0,00=632,30 m; for sector A3 the elevation is +0,55=632,85 m, and for block “B”- sector B1 the elevation is +0,00=632,30 m,; for sector B2 the elevation is - 0.55=631,75 m; for sector B3 the elevation is -1,10=631,20 m; for sector B4 the elevation is -1,65=630,65

m; for sector B6 the elevation is -2,20=630,10 m; cornice elevation has height of 11,50 m compared with the average adjacent elevation of the terrain, related to all the respective levels; coping elevation has height of 16,00 m compared with the average adjacent elevation of the terrain, related to all the respective levels. The fence at the street is 60 cm high. Compact part related to all the respective levels.

The location of the surface part of block "A" is 4 m away from the lateral regulation line, and more than 3 m away from the street regulation; at the Western street the distance is 6 m, at the South street it is 3 m. Block "B" is moved back from the regulation line of the Southern street with 3 m, from the respective line of the Eastern street -with 3,5 m, and at the North has a blind wall faced to a future building. 60 cm firewall is provided.

Three entrances for access to the internal yard, where the recreation area shall be, are provided in the complex.

Block "A" has three entrances. They can be accessed from the street from West with second internal sidewalk. Block "B" has six entrances which can be accessed from the internal yard. Door-keeper premises are designed in the entrance lobbies.

The basement floor consists of apartments. The entrance hallway to the residential part has width of 2,05 m in the narrowest section.

Residential apartments are designed at the standard floors of the building. In the areas under the roof there shall be also apartments that are pulled-back in a stair style, with terraces that broaden up inside at the expense of the rooms behind the pane of 45°. Their entrance hallways are wider than 1,30 m. There is no apartment that is designed with prospect only to adverse directions. The clearance height of all premises exceeds 2,60 m. The vertical connection between the floors is provided by an autonomous staircase with width of the flight of stairs 1,20 m and intra-floor platforms with width of 1,40m and direct lateral lighting. In addition, a lift with lower machine unit is provided.

The exit to the roof shall be located at the last floor platform with a ladder escape.

The selected construction system is a monolithic beamless structure of reinforced concrete. The walls the surround the apartments shall be of 25 cm brick walls. The external walls shall be lined with 5 cm „Stirodur" and mineral plaster. The millwork shall be of PVC type with 22 mm glazed millwork filled with argon. Heating shall be of local type with natural gas. The railings at the loggia and the terraces shall be of inox type at metal frame. A central system for cooling of residential premises is provided. The lift shafts comply with the new requirements. The individual yards at the basement apartments are separated by green fences.

All types of works must be carried out according to requirements of the project, the Regulations for Execution and Acceptance of Building and Erection Works, the instructions of the manufacturers and the suppliers of specific materials and the good practice. Only materials shall be used that comply with the requirements of the HЧНОССП and the criteria for luxury construction. To the specific works shall also be added all additional elements and works as joining, strips, cornices, composite profiles, etc. All materials that form the interior and the outlook of the building must be approved with the Contracting Authority before incorporating them.

1.1.1. Masonry.

It must be constructed of clay (ceramic) bricks with vertical cavities and thermal-conductivity coefficient $\lambda \leq 0,33$ W/mK. Lime mortar with 1:3 proportions shall be used for brick-laying.

1.1.2. Noise insulating membrane under coating.

In order to reduce the acoustic shock a membrane with thickness of 2,5÷3 mm shall be laid under the coating. A board of the same material with thickness equal to the thickness of the coating must be laid around the walls. The reduction of the acoustic shock must be at least with 25 dB.

1.1.3. Floor coating.

Coating on cement basis must be laid with volumetric weight of 600 kg/m³ and compressive strength of >20 kg/cm². The thickness of the coating must be 4-5 cm. The coating shall be laid on a noise insulating membrane (see above). All floors in the individual apartments must be at one level.

1.1.4. Internal lime and cement coating at walls and ceilings.

This coating must be made with a mortar of lime and cement with the following proportion lime:cement:sand from 1:5:18 to 5:1:18. It can be replaced with a plaster coating if the walls and the ceiling are of quality that permits such a coating.

1.1.5. Integrated thermal insulation system at facades with 5 cm EPS and mineral plaster finishing.

This system must be made with „Baumit“ system or a similar one. Up to the height of the cap it must be made with XPS and „Baumit“ mosaic coating. If elevation zero corresponds to the terrain, the system with XPS and mosaic coating must be made at 30 cm above the terrain. The color of the coating must correspond to the architectural plan. These works must be confirmed with Contracting Authority.

1.1.6. Thermal insulation on ceilings.

The bay windows and the plates on the ceiling must be lined with „Baumit“ integrated insulation system or similar. Thickness of thermal insulation: 7 cm EPS. Finishing– with silicate paint. The color must correspond to the architectural plan. These works must be confirmed with Contracting Authority.

1.1.7. Thermal insulation on floors.

It must be made with XPS. Thickness: 7 cm.

1.1.8. Light concrete for slopes.

Foam concrete or similar with volumetric weight of up to 600 kg/m³.

1.1.9. Hydro insulation.

Under the foundation and on the walls to elevation ± 000 a double-layer hydro insulation with bitumen-polymeric membrane. Thickness of the membrane: 4 mm. The horizontal hydro insulation shall be protected with 5 cm ferroconcrete with class of strength B10. The reinforcement shall be a mesh with $\varnothing 4$ mm and pitch of 20/20 cm. On the walls the hydro insulation shall be protected with 3 cm XPS and backfill shall be carried out. On the roof there must be laid the same hydro insulation, and the second layer shall have mineral coating.

1.1.10. Granite flooring.

In the common parts (staircases and lobbies) a flooring of artificial granite shall be laid. On the periphery caps of the same material shall be laid. These caps shall be specially shaped for this purpose. The steps shall have overall flooring of artificial granite. The material and the color of the granite must be confirmed with Contracting Authority and the architect. The same flooring shall be laid on terraces. These flooring shall be accompanied with the respective railings made of polished inox. As an alternative the flooring in the common parts can be made with clinker. As an alternative on the terraces the flooring can be made with granite mortar with dimensions of $\geq 30/30$ cm – rustic type. The material and the color of the granite must be confirmed with Contracting Authority and the architect.

1.1.11. Marble flooring.

In the corridors of the apartments a flooring of artificial marble shall be made. On the periphery caps of the same material shall be laid. These caps shall be specially shaped for this purpose. The color of the marble must be confirmed with Contracting Authority and the architect. As an alternative this flooring can be made with granite mortar with dimensions of $\geq 30/30$ cm – rustic type. The color of the granite must be confirmed with Contracting Authority and the architect.

1.1.12. Terracotta flooring and faience lining.

In service premises, including the kitchen box, flooring of imported terracotta and faience lining with joints. On the periphery caps and friezes from decorative elements shall be laid. The corners and the edges shall be shaped with additional profiled tiles (profiled strips). The borders between various types of flooring shall pass across doors and shall be shaped with a strip. The type, the color and the dimensions of the tiles, joints and strips must be confirmed with Contracting Authority and The Designer .

1.1.13. Parquet flooring.

In the bedrooms the flooring shall be of moquette type. In the halls, except for the kitchen box, a flooring of oak parquet shall be laid. The parquet shall be laid on a pad in order to reduce the acoustic stroke, without gluing. The moisture content of the coating before laying the parquet shall not exceed 3%. The moisture content of the parquet shall be within the range of $9 \pm 2\%$. The parquet shall be without whiteness and must have strong knots up to 5 mm and the following dimensions (thickness/width/length): 16/60-75/300-500 mm. The parquet shall be scraped and varnished with 3 coats of "Marshall" parquet varnish. On the periphery cornices of massive wood with extra quality shall be mounted. All materials must be confirmed with Contracting Authority.

1.1.14. Latex paint on walls and ceilings.

The ceilings must be painted with 3 coats of white latex paint, and the walls – with 1 coat of white and 2 coats of color latex paint, with hue set by the manufacturer. The colors and the type of the latex paint shall be confirmed with Contracting Authority.

1.1.15. Windows.

The windows shall be made with three-chamber white PVC . The glazed millworks shall be 22 mm thick and shall have one low-emission glass and one float glass. Each of the glasses shall be 4 mm thick. The glazed millworks shall be filled with argon. Opening –according to the specification. Rolette mesh against

insects. Internal blinds. Preferable profiles for frames: profiles manufactured by the companies Deceuninck, Kömmerling and Salamander.

1.1.16. Doors. There are several types of doors:

- Entrance doors – iron-clad doors with thermal insulation of rock wool and decorative plates with veneer of natural oak. Rubber sealing. Case lock with asymmetric key and trilateral locking. Two passive spikes shall be mounted near the hinges. The hinges shall be of adjustable type with axial bearings.
- Interior doors – made of MDF with oak veneer, adjustable hinges with titan and golden coating, handles with the same coating, shields and counter rods, common FAB locks. Rubber sealing.
- Fire safety doors – metal, fire resistance limit - 45 minutes, with self-closing hinges.
- Fire safety doors for boiler premises 75 min.
- Wooden doors for the cellars.
- Rolette automatic doors for the garages

1.1.17. Kitchens.

The lower cupboards shall be of MDF with polyurethane glazed paint. The upper cupboards shall be of the same material and shall have the same coating. The upper cupboards shall be 90 cm high. The color of the paint must be confirmed with Contracting Authority. All kitchens will include a dishwasher, refrigerator, stove top, range and oven.

1.2. Structural part

The two underground garage levels shall be with reinforced concrete structure – anti-seismic columns and reinforced concrete walls (washers), beam plates of reinforced concrete and circular supporting walls of reinforced concrete. The internal partition walls shall be made of non-supporting brick walls. The garages shall be divided into 11 individual structural blocks, separated with 5 or 10 cm joints.

The blocks are: A1, A2, A3 including the building area in the Western part of the estate, B1, B2, B3, B4, B5 – the building area in the Eastern part of the estate and G1, G2 and G3 – the blocks with underground garages without surface levels.

According to the engineering and geological report the grounding shall be carried out in a layer with $R_0 = 0.27\text{Mpa}$.

The level of the underground waters is above the level of grounding. Underground waters are expected to be reached during excavation works. Additional measures should be taken for drying of the construction site.

The excavations shall have vertical walls and depth exceeding the applicable depth for non-fortified excavations. That is why there shall be preliminary fortification of the excavations.

In order to protect buildings from underground waters there shall be hydro insulation of the whole surface that is in contact with the soil – foundations and circular walls of reinforced concrete. Unwatering shall be carried out until zero cycles are reached.

All types of works shall be carried out according to the requirements of the project, the Regulations for Execution and Acceptance of Building and Erection Works, the instructions of the manufacturers and the suppliers of specific materials and the good practice. Only materials shall be used that comply with the requirements of the НСИОССП shall be used.

1.3. Water Supply and Sewerage part

1.3.1. Water conduit

The water supply of the two blocks shall be performed from two separate branches from two individual street water conduits.

The water conduit branch for block „A“ shall be performed from street water conduit $\phi 160$ PEWC (polyethylene for water conduits). The construction of a street water conduit is not subject of the present project. Installation of additional turncock on the sidewalk with protective fillet is provided. This unit shall be located on the sidewalk at 0.50 m from the curb. The water meter unit of the building, which includes a turncock, a fillet, a pipe section of 1,30 m $\phi 160$ steel pipes, a water meter $\phi 160$, a pipe section of 0,80m $\phi 160$ steel pipes, a check valve and a turncock with discharger, shall be constructed after the entrance in the building at the 1st level of garages.

The water conduit branch for block „B“ shall be made of street water conduit $\phi 200$ PEWC. The construction of the street water conduit is not subject of the present project. The positioning of the sidewalk turncock and the construction of the water meter unit shall be carried out in the same ways as in block „A“.

The main horizontal network at the both blocks shall be constructed of polypropylene pipes and shall be constructed at the ceiling of the garages located on elevation (-6,55).

The vertical water conduit branches are located in installation shafts.

Installations for cold, hot and circulating water are designed. All these three installations shall be insulated from thermal losses and condensation. Turncocks with discharges shall be put on the taps for the vertical branches.

The hot water for the two blocks shall be supplied from two separate water heaters located in two separate boiler rooms, one for each of the blocks.

The water mirror shall be fed with water and drained respectively from the building water conduits and the sewerage networks of block „B“.

Pipes

- Pipes for cold water – polypropylene pipes PN16 – Czech Republic(e.g. Ecoplastik).
- Pipes for hot and circulating water shall be made of polypropylene pipe with aluminum insert PN20 (Stabi) – Czech Republic.
- Pipes passing through the floor of the premises shall be made of polyethylene pipes with aluminum insert that are laid in a protective pipe. Pipes shall be made by a renowned manufacturer (Henko, Unipipe....)
- Fire safety installation – from galvanized pipes.

Water taps

- Vertical, chromed with ceramic spherical head. Bathroom – shower tap with portable set. (e.g. Ideal - Standard or better)

Turncocks

- Spherical turncocks – made of polypropylene and brass, nickel-plated;

Circulation pumps

- Wilo, Grundfos;

Thermal insulation

- Foam polyethylene or micro porous rubber;

Fire coffers– according to BSS (Bulgarian State Standard)

All materials must be confirmed with Contracting Authority.

1.3.2. Sewerage

The drainage of the two blocks shall be performed with two separate branches to two separate street channels $\phi 300$. Street channels are not subject of the present tender.

The horizontal sewerage at the both blocks is designed to be suspended under the basement plate.

The vertical sewer branches shall be made of PVC pipes, paid above the roof at 0,30 m for ventilation. The drainage of the devices shall be made with PVC smooth pipes incorporated in the brick wall or the floor coating.

The drainage of the roof shall be made with drain pipes that shall exhaust the water on the terrain. The drainage of the yard, the adjacent areas and the underground garages shall be made with water-collecting grills and shafts in the green areas.

Pipes

- Vertical branches – PVC $\phi 110 \times 2,2$;
- Pipe system in bathrooms - PVC $\phi 50 \times 1,8$;
- Suspended sewerage – PVC $\phi 110 \times 5,3$ and $\phi 160 \times 4,7$ or cast iron pipes PONT – a- MOUSSON jointless;
- External drain pipes - PVC resistant to UV rays with a heater, pipes finish at 1.80 m above the terrain with cast iron pipes;
- Drainage pipes – PVC – perforated – e.g. REHAU;

Sanitary devices – IDEAL STANDARD or better

- Semi-porcelain sinks with half-boot+ flush boxes, brass, nickel-plated;
- Semi-porcelain WC seats with monoblock or consoles with incorporated flushing system;
- Belt traps, with arm with brass nickel-plated grill;
- Drainage pumps - Wilo, Grundfos;

All materials must be confirmed with Contracting Authority.

1.3.3. Sprinkler installation

In the common basements of the residential buildings there shall be parking lots at two levels for 158 cars and this area shall be protected with installation for automatic fire extinguishing. The water supply of the installation for automatic fire extinguishing shall be provided from the following water source – a street water conduit $\phi 200$ mm and $\phi 160$ mm. The pipes over $\phi 50$ mm shall be coated from inside with a bitumen varnish. From the outside the pipes shall have two coats of oil paint. No painting of sprinkler heads is allowed.

Pipes – steel, seamless with joint connections;

Pump unit and membrane container - Wilo;

Sprinkler heads and KCK – with guaranteed origin – ROLLAND SPRINKLERS, GLOBE SPRINKLERS;

All materials must be confirmed with Contracting Authority;

1.4. Electrical part

Common part

Subject of the project shall be the construction of two residential buildings with underground garages. In this part only the internal wiring shall be discussed, the power supply of the site is a separate project.

The project shall comply with the following guidelines:

Regulations for Execution and Acceptance of Electric Installation Works;

Decree №3 for planning of electrical facilities and power lines;

Construction and Technical Standards for Fire Safety - Decree №2;

All amendments and modifications in these documents are valid until to 1.11.2005 as well as the designs regarding the Architectural and Construction part, the Technological part, Heating and Ventilation part, Water Supply and Sewerage part;

Guidelines the National Electrical Company (NEC) for the implementation of a safe, properly insulated, grounded electric system capable of providing maximal loads:

Special part

The design provides a 380/220 V electrical installation - a TN-S system (separate neutral and protective wire) for lighting, domestic and technological purposes, carried out with installation wires ПБВМ under the masonry and CBT cables at clamps and pipes.

1.4.1. Scope of the task

Purchasing and delivering all the required materials according to the bills of quantity. In the common case at the site there shall be no storage areas for storing such deliveries, so in most cases all the required equipment and materials shall be delivered to the respective site at the date of their installation. The equipment and the materials must correspond to all technical requirements set and must be accompanied by the respective certificates.

Electric installation works. The Contractor shall provide at his own expense all devices, instruments, equipment and materials required for the execution of the works; the Contractor shall also be responsible for the execution of all interface activities required for providing access to the installations.

The Contractor shall be liable for the restoration of all damages caused during the execution of works regarding floors, walls, building installations, equipment, etc., both the required and anticipated, and accidental ones. The Contractor shall not be liable, unless the damages are caused by his serious negligence, for damages of personal items;

The Contractor shall be liable for maintaining the platforms clean during the execution of works and for collecting all waste materials in proper containers outside the buildings (these containers must be provided by the Contractor for the period of construction). The Contractor shall be liable for transporting and depositing at his own expense of all waste materials according to applicable standards and safety precautions and for the environmental protection, including transport, fees, etc.

The Contractor shall develop an executive documentation for all executed works and documentation for detailed reporting of the works by type and quantity, so to satisfy the requirements of the Contracting Authority and the supervisor appointed by the Contracting Authority.

Control laboratory measurements. If applicable, proper procedures shall be sought for commissioning, including full-scale tests of the equipment and the installations. These tests shall be carried out in the presence of the supervisors.

Adjusting and preliminary calibration of all the instrumentation and apparatuses.

All deliveries and works on the sites shall have warranty terms specified by the contract. The Contractor shall demonstrate proper methods for providing technical maintenance, repairs or replacement that may be necessary during the warranty terms. The Contractor shall also propose a service contract for technical maintenance after the expire of the warranty terms, if agreement is reached with the Contracting Authority.

Switchboards and main feed lines

The main boards of the electric meters in each entrance shall be located at the basement floor right next to the entrance door. They shall be vertically mounted and made of tin case min IP31, folded. Upon request of the Contracting Authority a separate electric meter shall be provided for each single garage. The electric meters of the garages shall be put in proper boards – Garages Electric Meter Board, Main Electric Meter Board_entr. B(Block A and Block B). The Main Electric Meter Boards (MEMB) shall be fed from the kiosk

switchgear located on the territory of the site and shall have redundant connection between them through YPK (each YPK allows supplying one MEMB).

All apartment and garage boards are supplied through automatic switch with maximal current protection and protection from overloading before the electric meter and load switch after the electric meter.

Main lines – **block A**

The main vertical lines are retracted into the staircase through the intermediate platforms of the staircase. Each apartment is supplied with CBT 2x10 and CBT 1x6 cables (guard wire), branch from the main guard wire CBT 1x16 for all floors. The water cooling unit (chiller) is supplied from a separate board Chiller Switchboard located at the basement of entrance C and directly connected to the kiosk switchgear.

Main lines – **block B**

The main vertical lines are retracted through the staircase platform near the lift. Each apartment is supplied with CBT 2x10 and CBT 1x6 (cables (guard wire), branch from the main guard wire CBT 1x16 for all floors. The two chillers of the blocks are supplied from the Garages Electric Meter Board located in Basement 1.

Main lines - **garages**

The main part of the electric meters of the garages is located in Garages Electric Meter Board, which is directly fed from the kiosk switchgear. To Garages Electric Meter Board are connected the both chillers of Block B. The feed lines of the garages and their distribution in the electric meter boards are shown in Drawing 2/7 and 4/7 (sub-site „Garages“)

The feed lines of the garages are laid on cable grids and fastened and with clamps of structural elements. Each feed line ends with a load switch in a box, which switch provides switching off the power supply from the consumer.

A sprinkler installation is provided in the site. For the purposes of this installation a diesel unit is provided. The electric board of the sprinkler installation Sprinkler Electric Board is fed through the electric board of the diesel unit Diesel Unit Electric Board. Diesel Unit Electric Board is fed from the Garages Electric Meter Board.

Installation for sockets and lighting in apartments

The whole installation in the apartment shall be made with ПБВМ wires laid under the masonry or in pipes.

The sockets in each room shall have a separate current circuit. The consumers in the kitchen shall be supplied with a 3x4 mm² line, with diversion from each of c 2,5mm².

The line for the electric cooker shall have cross-section of 4mm² and shall end with a junction box.

The height for installation of apartment switchboxes shall be H=2,2m , for sockets - H=0.30m, for lighting switches - H=1.2m from constructed floors. Kitchen sockets shall be installed at the height specified in the plan.

In the kitchens there shall be provided sockets for refrigerators 250W, common consumer 500W, exit for absorber 500W and washing machine or dish washer.

Garages

All garages shall be fed with CBT 3x2.5mm² power cables laid on cable grills in the corridor of the underground garages.

The sockets shall be designed for open installation with designed power of 2000W for switching an electric cooker.

The lighting fittings in the garages shall have IP44 protection index with luminous pipes 1x36W; mounting in the ceiling at places where the clearance height does not exceed 3.00 m or wall mounting in other places. The installation shall have CBT power cables, fastened with clamps and laid on cable grills.

[The lighting and the sockets in the garages shall have a single current circuit.

Emergency lighting with separate lamp (blast-proof) with own battery for 1 hour shall be provided for the boiler rooms.

The diesel unit located in a premise right next to the sprinkler room at Basement 1 shall provide operation of the sprinkler installation and the drainage pumps in the water conduit in Basement 2; in each one shaft there are two pumps - operating and reserve. The operating and the reserve pumps are connected in a separate current circuit at ПТДГ board.

Weak-current installation

Weak-current cables shall be retracted in a route different from the route of the feed cables. The distance between the closest power and weak-current cables shall be at least 10 cm.

Telephone installation

In each apartment there shall be an output for a telephone set. The installation is made with a ПВY installation wire. Each entrance of residential building shall be supplied with a single line. The telephone reglet shall be located at the basement in each entrance.

Vertical lines shall be put into PVC pipes.

Outputs shall end with telephone sockets.

The route of the feed cable from the BTC (Bulgarian Telecommunication Company) shall be specified additionally.

Ring bell installation.

Each apartment shall be provided with one button at the entrance door of the building and one button at the entrance door of the apartment, as well as with one ring bell.

One 220/3/5/8W bell transformer shall be installed in the main electric panel, which shall feed the ring bells of the apartments.

The installation shall have ПВ 0.75mm² wire in 2 PVC pipes.

The ring buttons at the entrance door shall be combined in one panel together with the intercom speaker.

Block intercom installation

In the entrance hallway of each apartment there shall be a intercom headset with button for opening the electrical lock.

At the main entrance of the building there shall be installed an intercom speaker at the common panel with ring buttons.

The intercom installation shall be fed by dry intercom rectifier $\sim 220V/8V$.

The entrance door shall have an electrical lock.

The electrical installation shall be of covered type with a ПВ wire with 0.75mm² cross-section in PVC pipes.

Cable television

The installation provides laying down 2 corrugated pipes in the space of the staircase without any cables within. For each apartment there shall be one output with corrugated pipe.

Fire alarming installation

The system consists of a supervisor – analogue-addressable station for fire diagnostic and alarm, detectors, manual buttons and alarm signalizations.

The analogue-addressable station for fire alarming monitors and registers the condition of the address points connected in the fire alarming loop /circuit/. Each loop services 128 address points. Their condition (normal, fire, damage) – is displayed on the LCD display of the fire panel.

The fire alarming loops are protected from interruption by double power supply, and in case of short circuit – only the damaged part is switched off by insulators. These conditions as well as all other damages of common nature are indicated and registered by the station.

The station for fire alarming is located in the premise of the door-keeper (security) of Block A, entrance A, and in the premise of the security of Block B there is a follower of the conditions.

The fire alarming station is for 8 zones, 5 of them being used and serves only the underground garages.

The system consists of:

- Thermo-differential sensor.

It produces an electric signal when the specific temperature exceeds the specified value or the gradient of increasing of the temperature also exceeds the admissible value. Each detector has an individual address, which allows identifying precisely its status and location.

- Manual button alarm device

It is actuated manually by the person who finds the fire by pressing the button. Thus at its output an electric signal for fire is initiated which is sent to the station.

- Remote light and acoustic signalization

It serves for sending a light and acoustic signal in case of fire in a specific zone.

Lightning protection and grounding installation

On the roof there shall be mounted several lightning-collecting rods 5 high, fastened with anchor plates to the roof plate or for "chimneys". The connections between the rods shall be of 40/4mm minimized galvanized strip. The taps from the roof shall be of 40/4mm minimized galvanized strip under façade lining and shall end with a revision box mounted at 1.5m above finished terrain. The grounding shall have earthing loop from galvanized strip 40/4mm at depth of 0.6 m under the foundation plate and at 3 m from the supporting wall of the excavation. The required transitional resistance is $R \leq 20\Omega$

Besides the protection from lightning the site shall have 2 more types of grounding installation – protective and informational.

The protective grounding shall have mixed grounding devices – a 40/4mm horizontal galvanized strip laid at the distance of 3 , from and parallel to the strip of the lightning-protection installation and at 6m from the edge of the excavation under the foundation plate, and grounding rods 63/63/6mm H=1.54m. The required transitional resistance is $R \leq 10\Omega$

The informational grounding shall also have a 40/4mm mixed horizontal galvanized strip and vertical grounding rods grouped by 3, as it is shown on the detail. The required transitional resistance is $R \leq 1\Omega$. The three installations are shown at the drawing "Grounding installation – sub-site Garages". All these installations shall be connected between them by galvanization, but shall remain autonomous.

1.4.2. Requirements for execution

The Contractor shall provide the following equipment and materials:

- All types of panels according to the design documentation;
- Power cables for low voltage;
- Control and weak-current cables;
- All instruments regarding the Instrumentation and Apparatuses Part;
- Cable grills – according to the specifications of the designs;
- Steel profiles for supporting structures;
- Pipes for underground cable routes and pipe junctions;
- Materials for grounding and lightning-protection installations;
- Lighting fittings and accessories for the lighting installation, "Shuco" sockets and additional supporting elements;
- Weak-current installations;
- Fire alarming station and fire sensors, unless they are excluded from the main contract.
- Proper number of cable shoes and cable markers according to the design documentation and the requirements of the normative documents.

- All other auxiliary materials and consumables.

Lighting installation and sockets

It is provided to construct a lighting installation in the residential buildings – for the residential buildings: making a lamp socket and wiring the switches for lighting. Alley lighting is part of a separate project for external installations.

Also mounting of “Shuco” sockets is provided. The supplier can be chosen by the Contractor and confirmed with Contracting Authority.

The delivery of cables and panels for lighting, as well as all other materials – lighting fittings, poles for alley lighting, grills, gas pipes, switchboxes, supporting elements, auxiliary materials and accessories – must be provided by the Contractor. All materials must be delivered with a Certificate of Quality and Declaration of Conformity. If imported materials are incorporated, to the Certificates of Quality translations into Bulgarian must be enclosed, signed and verified. The Contractor is solely liable for the quality of the materials delivered by him.

The lighting fittings shall be delivered strictly according to the specification of the bills of quantity. No deviations of the basis parameters or the designed IP of the lighting fittings are allowed. Each change in the type of lighting fittings shall be in advance conformed with representatives of the Contracting Authority. In case of change, all the information regarding the proposed alternative lighting fittings must be submitted in advance.

All lighting fittings for evacuation lighting shall be tested.

The selection of supplier for lighting fittings, sockets, switches for lighting and other supporting elements shall be confirmed with the Contracting Authority.

All - precaution measures must be taken during the installation of the lighting fittings.

During the adjustment of the lighting installation a Protocol for Single Samples must be composed. This protocol must be composed according to the decrees and confirmed in advance with representatives of Construction Supervision.

Protocols for Measuring Cables up to 1000 V and Protocols for the Zs Impedance of the Circuits must be submitted. In the Protocol for Measuring the Impedance of the "Phase - Guard wire" Loop there must be included also the current circuits of the lighting fittings, not only of the sockets.

Only “Shuko” sockets shall be installed on the site. Their protective terminals and all metal covers of the electric installation shall be connected to the guard wire. All static metal parts of the equipment, the air ducts and the pipes at Ventilation, Water Conduit and Sewerage section shall be connected to the guard wire.

Weak-current installations

When constructing weak-current installations the standard distances for laying weak-current cables and feed cables to apartment panels must be observed. In each apartment there shall be outputs for telephone, ring bell, intercom and television installation.

Fire alarming installation

The selected type of fire-alarming station shall be confirmed with the Designer and the Contracting Authority. The installation must be constructed by qualified experts, after studying the instructions for installation and exploitation of the equipment. Upon the completion of the installation works protocols for the performed tests shall be composed.

Grounding installation

The delivery of all materials, provided in this scope of activities, shall be carried out fully by the Contractor.

The characteristics of the grounding devices shall comply with the requirements for safety and for operation of the of electrical installation. The grounding wire shall be safely connected to the grounding device following the requirements for electrical connection. When connection elements are used, they must not damage the grounding device.

All actions towards the mounting of the grounding and the lightning-protection installations must be confirmed in advance with representatives of the Contracting Authority and of The Construction Supervision. The installations shall be mounted complying with the requirements of the normative documents.

The Contractor shall compose and present the protocols for measuring the resistance of the grounding circuits.

Switchboards

The main electric meter boards in every entrance shall be located on the basement floor right after the entrance door, they shall be mounted vertically and shall have a tin case min IP31, folded. Upon request of the Contracting Authority in each garage there shall be an electric meter. The electric meters of the garages shall be put in a electric meter boards –EMgarages, MainEM B_entr.B(Block A and Block B). The Main Electric Meter boards (MEMB) shall be fed from the kiosk switchgear located on the territory of the site and shall have a reserve connection between them through YPK (each YPK shall feed one MEMB).

All apartment and garage boards (panels) shall be fed through an automatic switch with protection from maximal current and protection from overloading before the electric meter and load switch after the electric meter.

All panels shall be produced by a certified manufacturers or by qualified electricians' quality protective equipment must be incorporated in these panels. Preferable suppliers are Schneider Electric and GE; if that the Contractor prefers other company, his selection must be confirmed with the Contracting Authority.

For all apartment panels a proper place must be chosen as well as method of installation. For "standing panels" special mounting racks shall be made.

After the installation of the cables on the panels, the cable inputs shall be sealed according to the requirements for keeping the specified IP.

Adjustment of the panels shall be carried out.

Cables and cable routes

The types of cables provided in the project shall be delivered and installed. The delivered cables shall be accompanied with the respective certificates.

The construction of all routes for power and control cables shall be solely Contractor's responsibility. All cable grills under these projects shall be delivered by the Contractor. The preferable companies are OBO Bettermann, Legrand and other by Contractor's discretion, but of the same quality. The cable grills shall be delivered together with the corresponding supporting elements and accessories for the respective type of grills. All the required accessories must be delivered - corners, vertical and horizontal junctions, consoles, etc.

All the cables shall be marked according to their codification in the cable log at some intervals according to the normative documents. Markers with printed inscriptions that cannot be erased shall be used.

Furthermore, all the cables shall be fixed to the grills at some intervals.

Grills that are to be mounted at a height of up to 2,5 m shall have covers. All the grills up to this height shall be equipped with covers there shall be no direct access to the incorporated cables.

All the cables shall be positioned correctly on the grills. No interlacement of cables laid on two levels is allowed. The requirements of Decree N93 for construction of electric systems installations and electric lines

shall be observed, and in particular regarding the routes for low-voltage cables. No fixing of groups of cables to the cable grills is allowed.

During the junctions through various levels of grills or from grill to grill the minimal diameters of bending of cables shall be observed, according to the information given in the catalogues. No cables that are not lying or are not to the grill are allowed.

The pipe branching shall be performed according to the requirements of the project. The routes of the pipe branches shall be confirmed in advance with representatives of the Contracting Authority. No grounding of any elements to the pipe branches is allowed.

The requirements regarding the minimal admissible distance between power and weak-current or control cables must be strictly observed.

The underground cable routes – construction of reinforced concrete shafts, excavation works, laying separate layers in the channels and the PVC pipes – shall be carried out after confirmation with representatives of the Contracting Authority and the Construction Supervision – Construction part. The pipes shall be of corrugated type manufactured by "KOPOS Kolin" a.s. (Czech Republic) or other manufacturer who guarantees the same quality. Samples of the pipes and certificates of quality shall be submitted in advance to the Contracting Authority for approval.

All the required protocols and statements for covered works regarding underground cable routes shall be composed in a duly manner. No concrete shall be poured if the shuttering and the reinforcement are not approved by the representative of The Construction Supervision. No channels shall be backfilled without the approval of the Construction Supervision. All statements for covered works and statements for concrete shall be duly composed and submitted.

All the required tests of cables and engines shall be carried out according to the normative documents and the statements for these tests submitted by a licensed laboratory.

Engines

All the engines shall be installed and wired according to the layouts provided by the Designer. The Contractor shall study the instructions for exploitation before starting the electrical and mounting works.

When laying different types of cables the minimal intervals between them according to the instructions of the manufacturer shall be strictly observed.

The setting and the adjustment shall be performed by the Contractor . Protocols with settings of the parameters shall be composed. The Contractor shall submit these protocols to the Contracting Authority for confirmation.

If there are any doubts regarding the adjustment, the method of connection, the type of the preliminary and compulsory tests, the Contractor shall carry out the required consulting with representatives of the supplier of the respective equipment.

Safety precautions

Only "Shuko" sockets shall be installed on the site. Their protective terminals and all metal covers of the electric installation shall be connected to the guard wire. All static metal parts of the equipment, the air ducts and the pipes at Ventilation, Water Conduit and Sewerage section shall be connected to the guard wire.

1.5. Lifts

Common part

The project includes the execution of the following types of electric and mounting works:

1. Power supply of the lift facilities.
2. Lighting installation in machine premises and lift shafts and sockets in machine premises
3. Delivery and mounting of hydraulic lifts for passengers.

When carrying out these works the requirements of the ПУЕУ, Construction and Technical Standards for Fire Safety and all regulations and decrees shall be observed, as well as the amendments and modifications in these documents that come into force during the construction works.

In addition, it is mandatory to follow the requirements of Directive 95/016-EEC of the European Parliament and the European Council regarding "technical safety", as well as BSS-ISO-4190-10 from 2002.

TECHNICAL DESCRIPTION

The type of signs for electric installations and power supply, as well as the method of laying depends on the possible mechanical failures and the local environment.

9 hydraulic lift facilities shall be constructed on the site, each one of the for 320kg.

All joints and details of the lift facilities and the cargo platform, as well as those of the cabins, shaft lift doors and guiding strips of the cabins shall be of standard manufacture.

In the machine premises on the places specified in the enclosed electrical plans at the height of 1.30 m above finished floor one T-type start panel shall be installed for operation with the lift (63A automatic switch). From these panels (switches) the lifting machines shall be fed with power, as well as the panels for control of the lift facilities. The start-up panels themselves shall be fed from the corresponding main switchboard with CBT-5x6mm² cable laid on cable grills and pipes under the masonry, as it is shown in the enclosed electrical plans and the layout of blocks.

The lighting installation in lift shafts, the lighting and the sockets in the machine premises shall be fed from the panels of the lifts. Such lighting shall also be mounted in the machine premises at places specified in the plans and at height of 1.30 m above finished floor.

The power supply of these panels shall be provided from PTstart-up panel in the machine premise with CBT-3x4mm² cable.

The lighting installation and the installation for the sockets in the machine premises shall be made with ПBBM wires that are hidden (incorporated). The switches and the sockets in these premises shall be moisture-resistant and shall be mounted on the places specified in the plans. The mounting height of the switches is 1.30 m, and of the sockets - 0.6 m above finished floor.

According to the requirements of the decree in the lift shafts of the passenger and cargo and passenger lifts there shall be constructed a lighting installation CBT cable laid openly with clamps in the lift shafts.

Moisture-resistant lighting fittings and moisture-resistant deviator switches shall be mounted. The switches shall be mounted in the machine premises (one switch for each lift facility) and near the shaft lift doors (from inside) at the main (first) stop at elevation 0.00.

The lift shafts shall be constructed of smooth concrete walls with the maximal horizontal and vertical deviations +/- 20mm allowed by the standard.

The machine premises for the lift facilities shall be separate (individual). The machine premises shall be accessed through doors that shall open to the outside.

The ventilation in the machine premises shall be performed with orifices with grill and thin mesh at the doors. This shall be a natural ventilation

In the machine premises ,on the floor there shall be put smooth cement coating according to the requirements of the regulations and the standards for shafts and machine premises. The walls and the ceilings in these premises shall be coated wit oil paint or latex paint. Furthermore, for proper exploitation and mounting of lift facilities and the cargo platform it is necessary to observe the following requirements from machine premises and lift shafts:

- The doors of the machine premises must be made of metal, they shall open to the outside and shall have orifices for ventilation with grills and thin mesh.

- No passing through machine premises and lift shafts to other adjacent premises is allowed.
- No installations (heating, ventilation, water conduit, electrical or other) installations, that have no relation with the lift facilities, shall pass through machine premises and lift shafts.

DESCRIPTION OF FACILITIES

The lifting (actuating) machines shall be mounted on structures insulated from sending noise and vibrations to the building structure.

The cabins, their doors and the floor shaft doors, as well as the industrial facilities and details shall be constructed according to the requirements of the standards and the decrees followed by the factory that manufactures such lifts. No changes are allowed at all.

SIGNALIZATION AND PROTECTION UNITS

For the lifts in the site proper signalization and all the required securing facilities shall be applied, according to the requirements of the "Regulations for Mounting and Exploitation of Lift Facilities", as well as all the instructions and decrees that are applicable ,during the construction and the mounting of the lift facilities.

1.6. Instrumentation and equipment

General information about the site

The present project describes the power supply of circulation pumps, boilers, chillers and ventilators used for the underground garages, as well as the gas-signalization systems for control of contamination with gas in the garages and the boiler rooms.

Technical solutions

In each residential block there shall be one automatic panel – TA-01 for block A and TA-02 for block B.

From these panels power supply, protection and control of circulation pumps shall be performed. There is provided a manual control of the pumps depending on the operational mode of the installation.

From TA the power supply feeds the boilers, their burners, the garage ventilators and the emergency ventilators in the machine premises.

Through switches installed on the door of the respective TA panel the control of the chillers is carried out. The signalization for the operational mode of each chiller and its alarms is shown on the corresponding TA and in the two premises designed for the door-keepers.

The garage ventilation systems shall work in two modes: manual and automatic. The selection of the two modes is performed with a switch for each ventilator; this switch is mounted on the respective TA. The manual mode is only for repair works. Operational mode is the automatic one – turning on and off the ventilator systems depends on the concentration of CO in the garages. For this purpose two gas-signalization systems are provided for CO – one system with 12 sensors for block A and one with 15 sensors for block B.

The sensors shall be installed directly under the ceiling and shall be connected consequently via "Bus" communication – see Drawing TA-03. The distribution of the sensors is shown on Drawing TA-05.

The stations shall be mounted in one door-keeper's room. The signalization for increase of the concentration at already working ventilators shall be doubled in the second door-keeper's room.

In the boiler premises there shall be gas-signalizations for detection of possible leakage of natural gas. If the first alarm level of the gas-signalization is activated, automatically is activated the emergency ventilator. If the second alarm level of the gas-signalization is activated, an electrical magnetic valve shall close (it is provided in "Gasification" part) and the supply of gas to the boiler room shall be stopped. A light and acoustic signal shall be activated in the two door-keeper's rooms.

Requirements during installation

The wiring and the installation of all sensors and devices shall be sole responsibility of the Contractor for electrical and mounting works.

The cable routes are provided in the electro-technical part of the project. The power and control cables shall be laid on cable grills, in PVC pipes or PVC channels, and the routes of the cables from the Electrical part shall be used.

If necessary, the adjustment and the calibration of all the instruments shall be performed by the Contractor in the presence of representatives of the respective suppliers of the equipment. The Contractor shall issue the respective protocols from the calibration of the instruments. These protocols shall be verified by the suppliers.

The Contractor must get acknowledged with the instructions for installation, wiring and calibration of all instruments.

All cables and cores shall be marked according to the enclosed cable journals. The markers must be prefabricated and forged.

Special tests of the system for gas-signalization in the boiler premises and in the garages shall be provided. These tests shall also include all blockings. The gas-signalizations shall be delivered by "Draeger" or "Delta instrument" company.

The sirens shall be delivered by "Ehnaton" company.

1.7. Common Water Supply and Sewerage

General information about the site

The present project discusses the construction of a complex consisting of two six-floor residential buildings – Block A with three sections and Block B also with three sections.

The first basement of block A is used for underground garage for 24 cars, boiler premise for the boiler installation with natural gas and cellars of the apartments.

The second basement is used for underground garage for 24 cars, boiler premise for the БГБ and cellars of the apartments.

At the basement floor of Block A /1 floor/ there are three apartments in every entrance. In entrance A there shall be a premise for security with WC and tap at the expense of the area of the third apartment.

On the floors from 2nd to 5th there are three apartments on a level per section, and on the last 6th level – one apartment in the sections A and C, while in section B there are two apartments.

The first basement of block B is used for underground garage for 26 cars, boiler premise for the boiler installation with natural gas, premise for the sprinkler installation, and premise for the diesel unit and cellars of the apartments.

The second basement is used for underground garage for 79 cars, boiler premise for the БГБ and cellars of the apartments.

The first basement of block B is used for underground garage for 26 cars, boiler premise for the boiler installation with natural gas, premise for the sprinkler installation, and premise for the diesel unit and cellars of the apartments.

The second basement is used for underground garage for 79 cars, boiler premise for the БГБ and cellars of the apartments.

On the basement floor of Block B/1 floor/ there are three apartments in entrance F, and in the rest of the sections there are two apartments (in entrance A there shall be a premise for security with WC and tap).

On the floors from 2nd to 5th there are three apartments on a level in sections A and F, and in the other sections – two apartments.

On the last 6th level there is one apartment in sections A, D, C, F and in sections B and E – two apartments.

The structure of the building is of monolithic type – reinforced concrete structure with brick filling and thermal insulation.

Thermal supply and cooling of the site

Block A

The supply of the building with thermal power shall be performed by a boiler room fed with natural gas from the gas distribution system of Sofia city.

The cooling of the site shall be performed with a water cooling unit using a thermal pump method with air cooling. This unit shall be mounted on the roof over entrance C.

Block B

The supply of the building with thermal power shall be performed by a boiler room fed with natural gas from the gas distribution system of Sofia city.

The cooling of the site shall be performed with a water cooling units using a thermal pump method with air cooling. These units shall be mounted on the roof of sections B and E.

Types of installations – brief description

Air conditioning

A water pumping heating /cooling/ installation is provided with parameters of the heat-transfer medium (cold-transfer medium) 70/60 C... for winter and 7/12°C for summer mode.

The distribution pipe network /ray system/ is mounted openly on the ceiling of the first basement.

This network shall be constructed of steel pipes in the boiler premise and the basement, while the vertical standpipes and risers in the apartments shall be made of polyethylene pipes with aluminum insert.

In the basement and in the installation recesses the pipe network shall have thermal micro porous insulation type "ARMAFLEX" – c b=19 mm or similar.

The vertical standpipes shall be hidden in installation recesses at the places specified in the project.

On each floor there shall be a recess for installation of a thermal meter with closing fittings for each consumer outside the borders of the apartments, according to the requirements of the Contracting Authority.

After the measuring unit the heat-transfer medium (cold-transfer medium) is sent to the collectors of the apartment that are equipped with stopping, deaeration and adjusting fittings, connection elements and supporting consoles.

Thus each apartment is served by an individual group of collectors, which allows individual estimation of the thermal (cold) power consumed.

As heating /cooling/ bodies shall be used ventilator convectors for open vertical mounting in 6 standard dimensions depending on the load of the premise, and for bathrooms – a heating body for bathroom manufactured by "MAQUET" company –Shumen – /two standard dimensions with height of 810 and 1170 mm/.

The connections of the convector bodies with the apartment collectors are made with multilayer polyethylene pipe Ø20/2,25 and 25/2.5 with aluminum insert, resistant to acids and with coating for protection against oxygen diffusion, laid in corrugated hoses passing through the flooring. The aprons are fed from a multilayer polyethylene pipe Ø16/2. They shall be fixed to the floor plate by plastic clamps.

The deaeration of the standpipes shall be local with ½" automatic deaerators.

The convectors shall have an incorporated temperature control, and the aprons shall have an adjustable angular radiator valve with thermostatic head and local deaerator.

Valves for adjustment of the of flow rate of separate collector groups with probes for adjustment of the installation are provided. The adjustment shall be made before putting the installation into operation.

The heating of the common parts – staircases and passages shall be performed with aluminum radiators of a single loop of distributive collectors in the boiler premise.

The drainage of ventilator convectors in "cooling" mode shall be made with a Ø19 drainage hose parallel to the feed line; this hose shall be laid in the flooring in a corrugated hose. Using Ø25 collector the drainage

from the hoses is collected and sent into a vertical drainage standpipe Ø50 and diverted to the sewerage according to the Water Conduit part of the project.

The type and the location of the heating bodies and the pipe network are shown on the enclosed drawings.

Boiler unit and cooling unit

The main thermal source for the site shall be 2 heating boilers "DE DIETRICH" GT 308 each of $Q_{max}=210$ kWt /or similar/.

For heat-transfer medium shall be used water 80/60°C.

Each boiler shall have a burner working with natural gas, thermostats for external and internal air, pressurestats for flow rate and pressure, protective fittings and a "DIEMATIK" type control panel, which allows to control precisely the temperature of the heat-transfer medium, the temperature of the exhaust gases and the efficiency of the boiler.

For safe operation of the boiler there shall be an automatic station with a sensor for gas for the instrumentation and apparatuses. For emergency ventilation of the boiler room there shall be an individual ventilator RVK 315 EX , which shall be activated by the station in case of gas leakage. The ventilator shall provide an 8-multiple air exchange of the boiler room.

The gas line is not a subject of the present contract.

The boiler room shall be supplied with the air required for the burning process through a pipe ϕ 329/7 that is lifted 3 meters above the terrain and provides the required volume of fresh air (in this particular case - 600m³/h).

In the boiler premise there shall also be a closed membrane expansion 105 l container 105 for each boiler and a hydraulic compensating basin /collector/ on which shall be mounted the main expansion container calculated on the basis of the expansion of the water installation in "heating" mode with a volume of 500 l and protective fittings.

There shall also be mounted distribution collectors and GRUNDFOS circulating pumps for the individual loops. For keeping the flow rate of the boilers there shall be a single circulating pump for each boiler.

The collectors shall have one reserve pipe union.

After the installation the pipelines shall be primed and painted, and then insulated.

The cold supply shall be provided by a chiller mounted on the roof over entrance C. The system shall have two circuits:

First circuit with cold-transfer medium 30% solution of ETT / 5/10°C/. This circuit consists of a chiller /on the roof/, an accumulator for 1000 l, a heat exchanger, a circulating pump and an expansion container for 150 l

Second circuit - water /7/12°/ activating the second section of the heat exchanger, a circulating pump, an expansion container for 200 l with protective fittings, distributive collectors and consumers.

There shall also be a container for preparation of the ETT solution with the respective pump for sending it to the installation.

From distribution collectors the cooled water shall be sent with pumps to the ventilator convectors.

The switching from summer to winter mode shall be performed manually.

The gas line shall be painted in bright yellow.

The pipelines shall be painted in red.

The cold pipelines for cooled water shall be painted in blue.

Ventilation installations

Suction system – sanitary units – bathrooms, WC.

The ventilation of the internal WC shall be made with axial ventilators with a return valve connected to the vertical branches with round air conducting pipes made of PVC with \downarrow 160 , located in vertical shafts.

The ventilators shall have the following flow rate:

WC, bathrooms – residential part - 90 m³/h

The used air shall be exhausted above the roof.

Suction system – underground garage

For ventilation of the underground parking there shall be 6 individual ventilation systems /three for each basement/. That is required by the specifics of the terrain. Between each section of block A there is out-of-leveling of approximately 60 cm.

The ventilation system of the garage cells shall suck in 250 m³/hour from each parking lot with ventilator box /total flow rate - 2000 m³/hour for one system/ located in the passage way; the sucked air shall be exhausted over the roof in a 250/550 mm ventilation channel. The suction shall be through a couple of grills /upper and lower/. The system shall be activated by switching on the lighting of the garage or by gas-analyzer, which by priority shall activate the installation if the level of CO has increased.

Enclosed to the present document are calculations for the required air exchange in the premise and layouts of separate installations .

Execution and commissioning

The installations shall be constructed according to the project, the applicable regulations and normative documents (Regulations for Execution and Acceptance of Building and Erection Works), the instructions of the manufacturers and the importers of the equipment and the materials.

Upon the completion of the building and erection works protocols shall be composed for covered works, single tests, hydraulic and hot test of the installations and adjustment of the flow rate from the heating installation.

Each change and deviation from the working design shall be confirmed with the Designer.

All materials and facilities must be confirmed with the Contracting Authority.

2. MATERIALS AND EQUIPMENT

2.1. General provisions

2.1.1 All materials used shall be of the best quality, as specified and described the Specifications, the Drawings and the Bill of Quantity, and shall be delivered from approved manufacturers or suppliers.

2.1.2 Before presenting a supplier/manufacturer to the Contracting Authority for approval, the Contractor shall provide correspondence of the facilities and/or the materials that were suggested to be used under the present Contract, to the Specifications.

2.1.3 The Contractor shall follow the instructions of the manufacturers/suppliers regarding the exploitation, application or mounting of materials, devices, etc. that are required for the implementation of the Contract. The instructions shall be suitable to the local climate and environmental conditions.

2.1.4 The materials shall by priority supplied from local sources.

2.1.5 For all incorporated materials and structures there must be submitted certificates of quality according to the requirements of the project, the specifications and the Regulations for Execution and Acceptance of Building and Erection Works.

2.2. Responsibility for delivered materials and equipment

The delivered materials and equipment shall be stored according to the accompanying documents.

Each loss or damage of materials and equipment delivered or accepted for operation by the Contractor shall be at his expense.

- The materials delivered by the Contractor materials shall be accompanied with the respective certificates.
- The equipment delivered by the Contractor shall be accompanied with the respective passport and instruction for exploitation and maintenance.

2.3. Mortars

2.3.1. Mortars shall be prepared mainly from Portland cement according to BSS 27-87. The cement-sand ratio shall be 1:1 or 1:2.

2.4. Bounding agents and materials

2.4.1. Cement – Portland cement type ПЦ35-Д20, complying with the standards of BSS 27-87.

2.4.2. Slacked lime – it shall correspond to BSS 26.

2.4.3. Plaster shall correspond to BSS 599

2.5. Reinforcement

2.5.1 Reinforcement steel according to BSS 4758-84. Calculated resistance of the reinforcement for first group limiting states:

- Reinforcement steel class A-I (Ø) according to BSS 4758; $R_s=225\text{Mpa}$
- Reinforcement steel class A-III (N) according to BSS 4758; $R_s=375\text{Mpa}$

2.6. Concrete

2.6.1. The concrete shall comply with BSS 7268.

Three types of concrete shall be used:

- Concrete with class of strength B20 according to BSS 7268 (B250 model)
- Concrete with class of strength B12,5 according to BSS 7268 (B150 model)
- Water-tight concrete B6 - for the structure under elevation $-2,75$

2.6.2. Concrete mixtures shall comply with BSS 7268-83, BSS 4718-84 and BSS 7016-74.

Concrete mixtures treated with a vibrator shall be classified according to the degree of settling K3 (8 — 14 cm)

Poured, self-compacting concrete mixtures, prescribed for concreting in walls and columns, shall comply with:

The class according to the degree of settling K4 (20 — 26 cm)

The spreading by Abrams 38 — 48 cm

The water filtration 0%

The settling by Abrams after a technological break of 2,5 hours ≥ 20 cm

2.7. Road materials

2.7.1. The mixtures of bitumen and concrete shall comply with BSS4132

- The ballast shall comply with BSS8991
- The sand shall comply with BSS2271

2.7.2. The cushion paper shall comply with following requirements:

- dry weight 0,15 - 0,18 kg/m²
- tearing paper strength after tow hours of soaking in water - at least 0,025 MN/m²

2.7.3. Opened and closed concrete curbs shall comply with BSS624

2.8. Paints

- 2.8.1. Oil paints ПФ-21, ПФ-11 and ПФ-12 according to BSS 2562-75
- 2.8.2. Latex paint according to OH 0255949-72
- 2.8.3. AMБ diluents according to BSS-4497

2.9. **Cables**

- 2.9.1. The cables shall comply with the standards BSS 16291, BSS 5099, BSS 914, OH-0479755, BSS 2581, BSS 4305, BSS 9096, BSS 3914, BSS 7952, and OH 09-77608.
- 2.9.2. The power and control cables СВТн and САВТн shall be manufactured according to OH-0479755-86 with external cover that does not allow spreading of burning.

2.10. **Lamps, switches, boards and sockets**

- 2.10.1. Switchboxes according to BSS 11122.
- 2.10.2 The lighting fittings shall comply with BSS8758; BSS 8502; BSS 8502; BSS 4851. All lighting fittings must be approved.
- 2.10.3. The lamps shall comply with BSS-5116, BSS-1155, OH-04577 and BSS-7356. The color of lamps shall be "cold white", unless something else is specified.
- 2.10.4. The switches shall comply with BSS 16506, BSS 68777 with nominal voltage of 380 V, 50 Hz;
- 2.10.5. The automatic single-pole switches shall comply with BA1127 according to BSS 6320.